WELCOME ADDRESS

Dear Friends and Participants,

On behalf of the Scientific and Organizing Committee, we have the pleasure to welcome you to the 24th Patient Classification Systems International Working Conference in Lisbon, Portugal.

This conference follows the tradition of our past conferences and, once again, it shows the importance of Patient Classification Systems all over the world. The theme selected for this year's conference and the diversity of abstracts are sound proofs that case mix, on all its forms, has a life beyond the inpatient sector of hospitals. The impact of Patient Classification Systems can now be felt throughout the entire health care sector because they are taken into consideration in health policy, financing, planning, budgeting, clinical management, and so on.

The number of participants, and countries represented, at this conference is a sign that this field of work continues to be of worldwide interest and is able to reappraise its research questions in order to present solutions for the current challenges. PCS International conferences have been able to contribute to the scientific debate and lead to a deeper understanding of case mix issues while, at the same time, presenting alternatives for future developments, and this year won't be any different.

As in the past, we hope that the 24th PCS International Conference provides a forum for participants to learn together, share experiences, strengthen links and explore collaborative approaches in Patient Classification Systems users, developers, coders, funding bodies and policy makers. We believe that what we learn here will certainly have an impact on our knowledge and on how we will contribute together for the development of Patient Classification Systems.

But do not forget that you are in Lisbon, a city with a very special light and a very rich and long history. Take your time to go to Alfama, Bairro Alto, Graça, Belém, Terreiro do Paço or Parque das Nações. The list of places "you cannot miss" is almost endless. We are sure you will find the time to enjoy Lisbon, the Portuguese cuisine and Portuguese wines!

Special thanks go all those who have worked with us and participated behind the scenes to create this conference: the Local Organizing Committee, the Scientific Committee, the Executive Committee of PCS International, the workshops facilitators, the juries' of the awards, the chairpersons, our sponsors and all the others who have helped us with so many other aspects.

Thank you for joining us – now enjoy it!

Céu Mateus
President Scientific Committee
PCS International President

Carla Nunes
President Local Organizing Committee

SCIENTIFIC COMMITTEE

LOCAL ORGANIZING COMMITTEE

CONFERENCE SECRETARIAT

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GENERAL INFORMATION

Attendance Certificates

Attendance Certificates will be distributed together with the conference documentation and the badge, upon registration.

Badges

Delegates and accompanying persons are required to wear the badges for identification purposes and admission to the various functions.

Best Paper Award

This prize, sponsored by AMGEN, will be awarded at the Opening Session. The rules and members of the jury, chaired by Jason Sutherland, are available at the conference website at www.pcsi2008.org.

Best Poster Award

This prize, sponsored by Schering-Plough, will be awarded on Thursday cocktail. The rules and members of the jury, chaired by Stephen Sutch, are available at the conference website at www.pcsi2008.org.

Casemix Innovation Award

This prize, sponsored by CASEMIX, will be awarded at the Closing Session. The rules and members of the jury, chaired by Jacob Hofdijk, are available at the conference website at www.pcsi2008.org.

Cocktails and Conference Dinner

The opening cocktail will take place on Wednesday October 8, starting at 17h30m at Sana Lisboa Hotel – Alfama Room, floor -2.

On Thursday October 9, there will be another cocktail at Sana Lisboa Hotel, from 18h45m to 19h15m, where the prize for the best poster will be awarded.

The conference dinner will take place on Friday October 10, at *Casal de Paulos*, in Lisbon, at 20h. Transport will be available from and to Sana Lisboa Hotel.

Coffee breaks

Coffee and refreshment drinks are served in the conference areas, at designated times, during the full length of the conference.

Instructions to presenters

Presenters are required to upload their presentations PRIOR to the session at the Secretariat in Room Castelo X, floor -1.

- Sessions in the morning – Presenters have to upload in the afternoon before.
- Sessions in the afternoon – Presenters have to upload in the morning of the same day.

Internet access

At the Secretariat (Room Castelo X, floor -1) there are three computers with internet connection available for conference participants from Thursday to Saturday.

Liability

The Organising Committee is not liable for personal accidents or loss or damage to private properties of registered participants during the Conference. Participants should make their own arrangements with respect to personal insurance.

Lunch

Lunch will be served in the Sana Lisboa Hotel, floor -2 (see map of conference venue), on Thursday and Friday.

Poster sessions

The Posters will be displayed in room Castelo VI+VII all day on Thursday and Friday, October 9 and 10.

Registration

The Registration Desk, situated in Room Castelo X, will be open during the following times:

- Wednesday, October 8 9h15m – 18h30m
- Thursday, October 9 8h15m – 18h
- Friday, October 10 8h45m – 17h30m
- Saturday, October 11 8h45m – 13h

Supplement of *BMC Health Services Research*

A special supplement to Volume 8 of *BMC Health Services Research* containing the top 25 abstracts selected by reviewers (20 from abstracts selected for oral presentation and 5 from abstracts selected for poster presentation) is available at http://www.biomedcentral.com/1472-6963/8?issue=S1. Publication of these abstracts has been funded by Patient Classification Systems International.

Visiting Lisbon

The Local Organizing Committee agreed with Carris (http://www.carris.pt/en/) a 25% discount on the regular fare for panoramic buses. You need to show your conference badge in order to have the discount. Accompanying persons are also entitled to this discount. Please check the Olisipo Circuit (http://www.carristur.pt/turismo/en/1/6) and the Tejo Circuit (http://www.carristur.pt/turismo/en/1/8).

Sponsors and Support

The organization of the 24th PCS International Working Conference would like to thank the following entities:

- National School of Public Health, Nova Universtiy of Lisbon
- Schering-Plough
- AMGEN
- Merck Sharp & Dohme
- Pfizer
- HP
- 3M
- Medtronic
- Casemix

PROGRAM

PRE-CONFERENCE PROGRAM

Wednesday, October 8, 2008

9.30 – 12.30	**Workshops**	**Room**
	Statistical methods with applications to DRG analysis	Castelo III
	Walter Sermeus and Jason Sutherland	
	A smooth introduction to case mix for new comers	Castelo IV
	Jean-Marie Rodrigues, Dana Burduja and Terri Jackson	
	Improving data quality through national benchmarking	Castelo V
	Howard Davis, James Peskett and Peter Saunders	
	Coding & case mix distance learning	Castelo VI
	Moderator: Jacob Hofdijk	
	Chair: Syed M. Aljunid	
	Presenters: Syed M. Aljunid, Alicia Ferreira, Shahram Ghaffari, Kevin Ratcliffe and Thomas Schongalla	
	Groupers, groupers everywhere…	Castelo VII
	Gareth Dear and Peter Broughton	

14.00 – 17.00	**Workshops**	**Room**
	Statistical methods with applications to DRG analysis	Castelo III
	Walter Sermeus and Jason Sutherland	
	Exploring case mix applications beyond the hospital stay	Castelo IV
	Karen Kinder Siemens, Stephen Sutch and Paulo Boto	
	Episode, go with the workflow	Castelo V
	Jacob Hofdijk, François Mennerat and Caroline Hydén	
	Case mix and clinics	Castelo VI+VII
	Michael Wilke, Carlos Elvira, Maria Angeles Gogorcena, Henrique Martins and Marc Berlinguet	

17.30 – 19.00	***Welcome Cocktail***
	Alfama Room – Hotel Sana Lisboa

CONFERENCE PROGRAM

Thursday, October 9, 2008

8.45 – 9.15	**Opening Session**	**Room**
	Chaired by the Deputy Minister of Health – Dr. Francisco Ramos	Castelo I+II
	Céu Mateus (President of PCS International)	
	Carla Nunes (President of the LOC)	
9.15 – 11.00	**Plenary Session I**	**Room**
	Case mix beyond funding: contributions for health policy	Castelo I+II
	Chair: Jean-Marie Rodrigues	
	The use of hospital cost estimates in the assessment of health technologies	
	Michael Drummond	
	Knowledge management and case mix – adding value to health services	
	Margarida Bentes	
11.00 – 11.30	**Coffee break**	
11.30 – 13.00	**Parallel Sessions (1-2-3)**	
Session 1	**Funding across health care facilities**	**Room**
	Chair: Jean-Claude Rey	Castelo I+II
	The application of ACG Predictive models to the English Secondary and Primary care data	
	Stephen Sutch, Klaus Lemke, Jonathan Weiner, Karen Kinder Siemens	
	Using Existing Case-Mix Methodologies to Fund Trauma Cases	
	Julia Monakova, Charles Botz, Irene Blais, Gino Picciano, Antoni Basinski	
	Improving casemix for description and funding in rehabilitation in France : additive model is better than tree-classification	
	Pierre Métral, Nathalie Ducret, Alain Patris, Padrig Steunou	
Session 2	**A close look at elderly patients**	**Room**
	Chair: Leena Kiviluoto	Castelo VIII
	Geriatric patients: AGGIR SOCIIOS PATHOS, a tool to take into account the specificity of geriatric patient in hospital financing complementary to APRDRG	
	Marie-Christine Closon, Jean-Pierre Baeyens, Freddy Falez, Micheline Gobert, Thierry Pepersack	
	Analysis of outliers identified within a study on appropriateness of care in four clinical departments	
	Cédric Bousquet, Paul Vercherin, Béatrice Trombert-Paviot, Jean-Marie Rodrigues	
	Using the ACG Case-Mix predictive model to identify individuals at high risk of hospitalisation in the elderly population	
	Anders Halling	
	Application of ICF codes for geriatric care	
	Jiro Okochi	

Session 3	**Impact of DRG implementation**	**Room**
	Chair: Jugna Shah	Castelo IX
	Health Services Policies And Case Mix - What Would You Expect (Or Not) To Happen? Selected Findings From Romania And Turkey, 2000-2008	
	Dana Burduja, Ahhmet A. Bilgic	
	The development of DRG based payment system and its effect on cost containment in Estonia	
	Kristiina Kahur	
	Advantages and disadvantages of being the lead hospital in a DRG implementation	
	Mustafa Ozmen, Richard P. Marshall	
	Experience in implementing case-mix system in Mongolia	
	Syed M. Aljunid, Saperi B. Sulong, Zafar Ahmed	
	Describing Iranian Hospital Activity Using Australian Refined DRGs: A Case Study of the Iranian Social Security Organisation	
	Shahram Ghaffari, Terri Jackson, Christopher Doran, Andrew Wilson, Christopher Aisbett	
13.00 – 14.00	**Lunch**	
14.00 – 15.10	**Plenary Session II**	**Room**
	Developments in funding and planning using case mix data	Castelo I+II
	Chair: Daniel Z. Louis	
	Hospital case-mix funding and the necessity to adjust for socio-economic status	
	Julian Perelman, Marie-Christine Closon	
	Number of hospital beds in 2030: Projection with national French case-mix data	
	Philippe Oberlin, Marie C. Mouquet	
15.10 – 15.30	**Coffee break**	
15.30 – 17.30	**Parallel Sessions (4-5-6)**	
Session 4	**Data quality**	**Room**
	Chair: Stephen Sutch	Castelo I+II
	The data collection process established for the German DRG system over the last six years with focus on data quality	
	Mathias Rusert	
	Strategies for Using Repeated Hospitalizations to Identify Coding Problems	
	Jason Sutherland, Olafr Steinum	
	The Impact of Diagnosis Coding Granularity on the CaseMix	
	Tapio Pitkäranta	
	AR DRGs - A companion to data quality	
	Jacqui Curley	

Assessing the quality of coding in Portuguese hospitals, 2007-2008

Nuno Amaro, Ana Barreto, Teresa P. Boto, Fátima Candoso, António Carvalheira Santos

Evaluating the quality of ICD coding in the DPC in Japan

Makoto Anan, Kazuaki Kuwabara, Yoko Hisatomi, Kiyohide Fushimi, Yuichi Imanaka, Hideki Hashimoto, Hiromasa Horiguchi, Koichi B. Ishikawa, Shinya Matsuda, Kenji Fujimori, Shunya Ikeda, Kenshi Hayashida, Hideo Yasunaga, Mitoe Akioka, Miwako Shibata, Rie Kurakake, Miyuki Horigami, Aki Inoue, Marika Minamoto

Session 5 — **Ambulatory care** — **Room**

Chair: Jeff Hatcher — Castelo VIII

Pilot Project Outpatient Services Classification & Costing The Irish Way

Luke N. van Doorn, Claude Grealy, Brian Donovan, Christopher Aisbett

Clinical benchmarking: a driver of change. The case of Ambulatory Surgery

Margarida Bentes, Salomé Estevens, João Completo

Can short lists facilitate the collection of data on diagnosis, intervention and presenting issue in community health and outpatient care services?

Lisa Fodero, Joe Scuteri

Comparison of Day Surgery processes of care, ALOS, costs and revenues between Australia and France

Laurence Dubourg

Pharmacy cost outliers in primary care. Multilevel approach based on ACG® in the Spanish context

Daniel Bordonaba, Alexandra Prados, Antonio Sicras, José Estelrich

A method to estimate expected day surgery activity in hospitals of the Spanish National Health System

Maria Soler, Mercedes Sáez, Mercè Casas

Session 6 — **Developing classifications** — **Room**

Chair: Karl-Peter Pfeiffer — Castelo IX

The methodology proposed to develop an international classification system for procedure: the Categorical Structure

Jean-Marie Rodrigues, Richard Madden, Pierre Lewalle, Béatrice Trombert-Paviot, Anand Kumar

A Patient Injury Classification for use with routine hospital data

Terri Jackson, Jude Michel, Rosemary Roberts, Christine Jorm, John Wakefield

Standardized documentation in physical therapy: testing of validity and reliability of the PT-ITC and mapping it to the metathesaurus

Arna Hardardottir

Medical Device Classification / Surgical Product Classification

Ismail Rasool, Brian Ruff

Construction of Functional Related Groups for Ambulatory Rehabilitation System

Fátima Candoso, Helena Lopes, Tânia Matos, Dália Nogueira

17.40 – 18.40 **Poster Sessions (A-B-C)**

Poster A **Studies in the hospital settings which focus on DRGs** **Room**

Chair: Virgina Jordan and Kevin Ratcliffe Castelo I+II

Quality monitoring in thyroid surgery by Shewhart control chart

Antoine Duclos, Sandrine Touzet, Pietro Soardo, Anne-Marie Schott, Cyrille Colin, Jean-Louis Peix, Jean-Christophe Lifante, Marie-Annick Le Pogam

Crude versus case mix adjusted complication rates in monitoring the quality of thyroid surgery using control chart

Antoine Duclos, Nicolas Voirin, Marie-Annick Le Pogam, Sandrine Touzet, Pietro Soardo, Anne-Marie Schott, Cyrille Colin, Jean-Louis Peix, Jean-Christophe Lifante

Feasibility Study of Casemix Funding in Low Resource Countries: An Iranian Example

Shahram Ghaffari, Terri Jackson, Chris Doran, Andrew Wilson, Christopher Aisbett

Using Case Mix System in Uruguay: Experience and perspectives

Alicia Ferreira

The real effects of special conditions for reimbursement of in - and out-patient's system in Hungary

Rita Kövi, Éva Kerekesné Kretzer, Imre Boncz, Julia Nagy, Péter Dublinszki, Maria Kis

Diagnosis Related Groups: Do you know what they are? – A Student's Perspective

João Pereira da Costa, Sandy Severino, Nuno Cruz

Development of a DRG system based on the German G-DRG system – Experiences of the development of a SwissDRG-Grouper

Christine Becker, Constanze Hergeth

The data collection process established for the German DRG system over the last six years with focus on data quality

Mathias Rusert

A Model to account for the cost of blood in a Hospital

Ana Harfouche, Dialina Brilhante

First Implementation of IR-DRG in Uruguay. Challenges of doing it from scratch

Elbio Paolillo

Cancerology and hospital health planning: case mix utility and limits

Corinne Hallais, Valérie Josset, Loetizia Froment, Pierre Czernichow

Review of and customisation of the IR DRG v1 in South Africa by Discovery Health

Riedwaan Jabaar, Yi-Ding Jiang

Final assessment of the ambulatory transfer potential for the coronary angiography patients in a teaching hospital in Malaysia.

Zafar Ahmed, Marc Berlinguet, Jon Eisenhandler, Syed M. Aljunid

Assessment about Spanish weights for the International Refined DRGs (IR-DRG)

Ana Belén Blanco Giménez, Maria Angeles Gogorcena, R Cózar, M Alfaro, Pere Ibern, E Unda, D Arribas, O Bernal

Poster B — **Studies in non-hospital settings (ambulatory and integrated care themes)** — **Room**

Chair: Anna van Poucke and Michael Wilke — Castelo VIII

Catalogue for Ambulatory Procedures (CAP)

Andrea Weisser, Claudia Scholler, Gottfried Endel

ATC -> ICD – Evaluating the reliability of prognoses for ICD-10 diagnoses derived from the ATC-Code of prescriptions

Andrea Weisser, Gottfried Endel, Michael Gyimesi, Peter Filzmoser

Pharmacy data and predictive modelling in primary care

Paulo Boto

Resource allocation in Swedish primary health care using the ACG CASE-MIX system

Anders Halling, Hakan Lenhoff

Impact of morbidity on the use of resources in primary care: Retrospective application of ACG® at a Spanish interregional level

Daniel Bordonaba, Antonio Sicras, Alexandra Prados, José Estelrich

Ambulatory drug consumption in the Oporto Oncology Hospital and its economic and financing impact

Afonso Pedrosa

Role of a teaching hospital in providing equitable health care: an evaluation by Adjusted Clinical Group

Supasit Pannarunothai

Accurate coding of clinical data - Code of ethics and practice standards

Irene Bohlin

Key conditions of pro-market health reform. The case of the Czech Republic

Marek Pavlik

A statistical evaluation of two payment methods for the funding purpose of thalassaemia diseases

Nilawan Upakdee, Supasit Pannarunothai, Ampaiwan Chuansumrit, Thaworn Sakulpanich

Business Intelligence in the Health Care System

Alexander Ganjeizadeh-Rouhani, Nina Pfeffer

Integrated Care Funding, the Silo Killer

Jacob Hofdijk, Erik Koster

Assessing resources allocation among the different levels of care in the NHS (2003-2008)

Cláudia Borges, Fátima Candoso, Ana Cristina Ferreira

Poster C — **Other hospital coding systems and applications** — **Room**

Chair: Lisa Fodero and Paulo Sousa — Castelo IX

Coded Adverse Events in Austrian Hospitals from 2001 to 2006

Irmgard Schiller-Fruehwirth, Gottfried Endel, Ingrid Wilbacher

Treatment- and diagnosis-related benchmarking of population groups in Austria. A dynamic information tool.

Nina Pfeffer, Alexander Ganjeizadeh-Rouhani

Regular updating of grouping and reimbursement parameters for case-mix system in Hungary - Experiences and future possibilities

Julia Nagy, Zsolt Kiss, Csaba Dózsa, Rita Kövi, Éva Kerekesné Kretzer, Péter Dublinszki

The reliability and precision of ICD coding for the DPC disease name in Japanese DPC system

Hinako Toyama

A generic flow-model as a base for constructing work- and monitoring processes in psychiatric care

Jan Lindmark, Staffan Rosenius, Annika Stenström, Anette Larsson

Analysing cost outliers at Karolinska University Hospital, Sweden

Stig Hagstrom, Mats Karlsson, Magnus Sundberg, Leif Sjoman

Visualisation of the Flow Model - the patients pathway through healthcare

Caroline Hydén

The Dutch DBC Systems switch to the Electronic Health Record

Jacob Hofdijk, Bauke Versteeg, You Kwa

Redesigning the DBC system in the Netherlands, background and context

Jaap Stam

DRG in the Czech Republic – Advantage or Impediment for Interest Groups?

Ivan Maly, Zuzana Darmopilova, Zuzana Zigova

Comparisons between outliers and inliers

Peter Bolin

Redesigning the Dutch DBC-system; towards increased transparency. A novel algorithm for DBC assignment

Mathee Swenne - van Ingen

DRG-Based Clinical Productivity Reporting In University Hospital Setting

Jorma Lauharanta, Esa-Matti Tolppanen

18.45 – 19.15 ***Cocktail***

Hotel Sana Lisboa

Friday, October 10, 2008

9.00 – 10.30 **Parallel Sessions (7-8-9)**

Session 7 **Funding hospitals** **Room**

Chair: Jason Sutherland Castelo I+II

Administrative changes in DRG-based financing models in Portugal

Ana Luísa Cardoso, Fernando M. Pereira

Towards transparency in health care in the Netherlands

Anna van Poucke

Refining hospital reimbursement: A Belgian pilot study aimed at appropriate length of stay, charge and cost

Pieter Van Herck, Walter Sermeus, Arthur Vleugels

Beyond funding: developing specific indicative cost components for internal hospital benchmarking based on DRG data

Jean-Claude Rey, Hervé Guillain, Luc Schenker, Duong Hong-Dung

Case-Mix Report in Japanese Hospitals

Kazuaki Kuwabara, Shinya Matsuda, Yuichi Imanaka, Kiyohide Fushimi, Hideki Hashimoto, Koichi B. Ishikawa, Hiromasa Horiguchi, Kenshi Hayashida, Kenji Fujimori, Shunya Ikeda

Session 8 — **Use of in-hospital mortality information to assess quality of care** — **Room**

Chair: Julian Perelman — Castelo VIII

Our Charité Hospital challenge: who to compare to when looking at mortality?

Marc Berlinguet, Lutz Fritsche, Matthias Kirste, Christine Kolodzig

Successful application of the APR-DRG classification to assess the episodes of care of patients who died

Carlos Elvira, Matthias Kirste, Marc Berlinguet

The use of different DRG groupers and its impact on hospital quality indicators

Isabel Lema, Celeste Dias

Casemix systems and quality evaluation: a young marriage soon to divorce?

Peter Fontaine, Luc Van Aken

Session 9 — **International comparisons** — **Room**

Chair: Hervé Guillain — Castelo IX

Is it a big advantage to develop a DRG system based on an international established system? - Experiences of the development of the Swiss DRG system based on the German G-DRG system

Martin Braun

Applying the Nordic rehabilitation case mix model to a French case mix database

Béatrice Trombert-Paviot, Jean-Marie Rodrigues

First German - Austrian case mix comparison with real life data

Michael Wilke, Klemens Haslinger, Mike Schenker

NordPol project - NordDRG with full outpatient grouping

Martti Virtanen, Leena Kiviluoto, Mats Fernström

What can we learn from international comparisons by DRG and from comparisons between hospitals?

Magali Pirson, Luc Schenker

10.30 – 11.00 — **Coffee break**

11.00 – 13.00 — **Plenary Session III** — **Room**

Exploring your data — Castelo I+II

Chair: Terri Jackson

Using Costing Data to Develop Funding and Budget Allocation Methodology for New Technology

Julia Monakova, Charles Botz, Rosalind Tarrant, Gino Picciano

DRG-Data for the Monitoring of the Health Care System

Karl-Peter Pfeiffer

Improving Data Quality Audits Through National Benchmarking

Howard Davis, Jon Evans, John Sandhu, James Peskett

13.00 – 14.00 **Lunch**

14.00 – 15.40	**Parallel Sessions (10-11-12)**	**Room**
Session 10	**Importance of patients' characteristics in health care use and funding**	Castelo I+II

Chair: Malene Højsted Kristensen

Case Mix and Health Policy: Sex and Health Care in the Regione Emilia-Romagna of Italy

Daniel Z. Louis, Vittorio Maio, Emily Gavin, Mary Robeson, Carol Rabinowitz, Lucia Nobilio, Rossana De Palma, Roberto Grilli

Sex differences in healthcare expenditures: A population-based study in Regione Emilia-Romagna, Italy

Vittorio Maio, Daniel Z. Louis, Emily Gavin, Mary Robeson, Carol Rabinowitz, Lucia Nobilio, Rossana De Palma, Roberto Grilli

Case mix funding for ambulatory care: the Belgian case

Marie-Christine Closon, Isabelle Roch, Isabelle Heymans, Catherine Moureau, Lieven Annemans, Julian Perelman, Raphael Lagasse

Length of hospital stay and discharge destination can be modelled using a survival analysis approach. Application to the association of patients' socioeconomic characteristics with the length of hospital stay from the French national DRG database

Ludovic Trinquart, Josiane Holstein, Tanja Bastianic, Namik Taright, Gilles Chatellier

Session 11	**New approaches on funding**	Castelo VIII

Chair: Karen Kinder Siemens

Tracking patient journeys' to enhance service development and resource allocation

Joe Scuteri, Lisa Fodero

A process model as tool for describing, planning and evaluating patient's pathways - design, implementation and validation

Jan Lindmark, Michael Dahlberg, Veronika Sundström, Lojsan Sundström

Financing along clinical service lines

Anand Kumar, Jean-Marie Rodrigues

Financing within the scope of the Integrated Disease Management – "Payment per comprehensive price"

Anabela Candeias, Fátima Candoso, Paulo Espiga, Filipa Moreira

Using national and regional registers for health policy analysis for management of mental health care

Bengt André, Emma Björkenstam, Maria Lindberg, Jenny Sandgren

Session 12	**Enhancing groupers**	Castelo IX
	Chair: Richard P. Marshall	
	Refined French DRG with 4 severity levels	
	Alain Patris, Sandra Gomez, Jean-François Noury, Marion Mendelsohn	
	From paper to production - Going live with HRG4	
	Paula Monteith and Julie Speller	
	Enhancements to the CMG+ Comorbidity Factor methodology	
	Jean J. He, Jeff Hatcher, Craig Homan	
	DRG grouper design with immediate test of resource explanation	
	Örjan Leringe	
	Redesigning the Dutch DBC-system; towards increased transparency. From ideas and directions for improvement to implementation	
	Joost Warners, Mathee Swenne - van Ingen, Jacob Hofdijk, Jaap Stam	
15.40 – 16.00	**Coffee break**	
16.00 – 17.30	**Plenary Session IV**	**Room**
	Atlas of Health Care	Castelo I+II
	Chair: João Pereira	
	Rethinking health care: Insights from population-based outcomes assessment	
	Elliot S. Fisher	
	The Spanish National Health System under scrutinity	
	Enrique Bernal-Delgado	
17.45 – 19.00	**PCS International General Assembly**	
20.00	**Conference Gala Dinner**	
	Casal de Paulos	

Saturday, October 11, 2008

9.00 – 10.30	**Parallel Sessions (13-14-15)**	**Room**
Session 13	**Risk adjustments in the outpatient setting**	Castelo I+II
	Chair: Alberto Holly	
	Going beyond diagnosis-based case-mix systems: how adding pharmacy information to your decision support systems can improve the efficient delivery of health care	
	Karen Kinder Siemens	
	Pharmacy cost outlier patients in primary care. Retrospective application of ACG® in a Spanish context	
	Amaia Calderón, Alexandra Prados, Antonio Sicras, José Estelrich	

Comparison of district physicians and family doctors care by visits to primary and out-patient secondary health care for selected chronic conditions in different co morbidity groups

Arnoldas Jurgutis, Arvydas Martinkenas, Klaus Lemke

Hospital emergencies: measuring morbidity and costs in an integrated care organization

Pere Ibern, José M. Inoriza, Jordi Coderch-Lassaletta, Marc Carreras, Manuel Garcia-Goñi, Elvira Sanchez-Gonzalez

Session 14	**Using administrative information**	Castelo VIII

Chair: Salomé Estevens

Case-mix and process indicators adjustment in monitoring the quality of prostate biopsies using multivariate control charts

Marie-Annick Le Pogam, Philippe Paparel, Antoine Duclos, Sandrine Touzet, Cyrille Colin, Paul Perrin

Clinical pathways at Norwegian hospitals 2003-2007. A general overview and special focus on cerebral infarction

Stein Petersen, Ola Kindseth

One-year follow-up of elderly patients hospitalized for hip fracture using linkage of administrative databases

Mathilde Raphael, Josiane Holstein, António Teixeira, Gilles Chatellier

Session 15	**Applications of clinical data**	Castelo IX

Chair: Jiro Okochi

Statistics in the Thai mental health case mix classification

Bupawan Phuaphanprasert, Supasit Pannarunothai

Beyond triage: usefulness of the Manchester Triage System as case mix analysis instrument in health planning and resource allocation

Henrique Martins, Luis D. Cuña, Paulo T. Freitas

Applications of the 'home grown' Discovery Health 'Episode' Grouper

Brian Ruff, Tebogo Phaleng, Christopher Nel

10.30 – 11.00	**Coffee break**

11.00 – 13.00	**Parallel Sessions (16-17-18)**	**Room**
Session 16	**Hospital management issues**	Castelo I+II

Chair: Dana Burduja

Managing gaming phenomena in the Tuscan performance evaluation system

Sabina Nuti, Anna Bonini, Milena Vainieri

Case mix and hospital management evaluation

Paul Radu, Mona Moldovan

The implementation of a purchasing mechanism for hospital resource allocation in Portugal

Nuno Amaro, Cláudia Borges, Fátima Candoso, Ana Cristina Ferreira, Maria do Céu Valente

Can DRG's be aggregated for health policy purposes: A pilot macro model

Leena Kiviluoto

Using activity based costing to understand and manage hospital financing and costs

Margarida Bajanca

Session 17 **Resource intensity** Castelo VIII

Chair: Céu Mateus

Estimating Resource Intensity Weights for CMG+ Atypical Cases

Qian Yang, Jeff Hatcher

Using available cost data for producing optimal DRG cost weights - The experience in Turkey

Mustafa Ozmen, Steve Gillett, Richard P. Marshall, Tolga Aktan

Comparison of cost weights developed by USA and Malaysia using IR DRG

Zafar Ahmed, Marc Berlinguet, Richard W. Freedman, Syed M. Aljunid

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Hello to Japan

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ORAL PRESENTATIONS

PLENARY I: Case mix beyond funding: contributions for health policy

The use of hospital cost estimates in the assessment of health technologies

Michael Drummond, Centre for Health Economics, University of York, United Kingdom

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The field of health technology assessment (HTA) has been growing in importance in recent years. For those HTAs that concern resource allocation decisions, it is necessary to assess the costs and benefits of alternative treatments and programmes. Casemix-related hospital cost estimates are often used in these assessments and, in addition, the adoption of new technologies has implications for hospital funding. This presentation will outline the basic methods of economic evaluation and address the following questions: are the current casemix-related cost estimates useful in economic evaluation; how transferable are these economic assessments across jurisdictions and; how should hospital funding be revised in order to accommodate new health technologies?

Knowledge management and case-mix – adding value to health services

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As in any other industry, modern day healthcare organizations are committed to excellence and feel the need to pursue means of measuring the extent of that commitment and the results achieved. Data has become a major asset for healthcare managers and one of the most challenging issues is the transformation of massive volumes of raw clinical and non-clinical data into contextually useful information for decision-making and delivery of care.

Knowledge management (KM) - a systematic process of production, organization, codification, acquisition and dissemination of information, appears to be an essential process for healthcare to face that challenge. KM ultimately aims at transforming tacit knowledge that arises from individual experience into explicit collective knowledge that is imbedded in the organization's processes.

Healthcare has traditionally been a rather disjointed industry in terms of information exchange among and within organizations. However, the minimum Basic Data Set (MBDS) associated with case-mix classification systems, particularly the DRG system generated a worldwide movement towards a clinical focus on standardized management information enabling meaningful comparisons of results between hospitals and between clinical services.

DRGs were introduced in Portugal in the early eighties of the 20Th century as part of a national project for the development of an integrated information system for the management and financing of hospitals. The first DRG pricing list was published in 1990 and a new funding model was developed to progressively adjust hospital global budgets, for case-mix. The changeover to public contracting was initiated in the mid-nineties when Contracting Agencies were created at the regional level to negotiate performance targets with the hospitals of their geographical areas. DRG and associated case-mix concepts were maintained as key tools of the new process but only after 2000 were they effectively included in the terms of the hospitals' funding contracts.

DRG are definitely associated with the major financing reforms for the introduction of efficiency based incentives in Portuguese public hospitals. Nevertheless the maintenance of a non-competitive environment with little or even non-existing financial risks has determined a limited impact of the case-mix funding system on hospital management and on the performance of individual hospitals.

The progressive transformations of public hospitals into firms, along with the growing restrictive economic and financial environment in which they operate have accentuated the need for change. In short, healthcare managers are being given more authority and responsibility to scrutinize their performance and to discover ways to carry out activities better, faster and cheaper. From the payer's point of view, the resource allocation model is gradually giving place to a payment by results approach, whereas from the providers' perspective the response implies the elimination of inefficiencies and the search for a better use of the physical and human resources present at their units.

Case-mix and DRG are still at the heart of this new paradigm fueling a whole set of new initiatives for hospital performance evaluation and for knowledge dissemination, which includes for example, external ratings and internal clinical benchmarking.

SESSION 1: Funding across health care facilities

The application of ACG Predictive models to the English Secondary and Primary care data

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Introduction: The current budgetary allocation in the UK to primary care trusts is based on capitation adjusted for demographic, socio-economic and population morbidity utilising aggregate and survey statistics. The ACG system has been used to risk stratify populations and investigate adjusting budgets using person based morbidity data as an alternative. The ACG predictive models utilised hospital secondary care data, GP primary care data, pharmacy and individual resident population data up to 50 million individuals.

Methods: The data sources were linked to form a single health record for each individual, comprising of inpatient, outpatient, Accident and Emergency (Emergency Room) and primary care activity data (including pharmacy) and related costs for two years. Crosswalks were designed to covert the primary care morbidity codes (READ codes) into ICD10 and the pharmacy codes into ATC (WHO Anatomical Therapeutic Chemical classification). The data was grouped using the ACG software with the resultant grouping variables used to form a number of predictive models.

- Restrictive models, using secondary care data only
- Full models, using secondary and primary care morbidity data
- Combined morbidity and pharmacy models
- Parsimonious models, utilising reduced numbre of markers (non-parsimonious 300+ markers)

Comparative statistics were produced to look at the overall performance of the models and also used to provide performance benckmarks for provider activity and utilisation.

Results: The results for the morbidity models showed that the significant improvement in prediction over age/sex adjusted models, with increased improvement for the combined model (including pharmacy). The results were also compared to US data and showed higher predictive results for the English data.

Conclusions: The ACG grouping system can be applied to UK morbidity and pharmacy data from both secondary and primary care activity, with the predictive modelling demonstrating the strength of utilising such data for future budgetary allocation, provider performance and case identification.

Conflict of interest: Stephen Sutch – Consultancies or honoraria

Using Existing Case-Mix Methodologies to Fund Trauma Cases

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Introduction: The purpose of this paper is to demonstrate how existing case-mix methodologies can be applied for funding of subpopulations of patients, taking as an example a suggested funding model for trauma.

Currently, trauma funding in Ontario is based on a flat rate per case. However the distribution of the measures of resource utilization, such as average length of stay, hours in intensive care, and resource intensity weights in Ontario Lead Trauma Hospitals suggests that facilities differ in patient case-mix. For instance, average hours in intensive care ranged from 62 to 153 across facilities, average resource intensity weight varied from 3.2 to 4.7, and average length of stay ranged from 11 to 18 days.

The literature related to the development of a funding methodology for trauma is divided into two streams. Some studies suggested the need for the development of a new grouping methodology specific for trauma cases, based on such factors as age, injury severity score (ISS), mechanism of injury, patient transfer, and the like. Other research was aimed at improvement of existing grouping methodologies and/or weights, such as diagnoses-related groups (DRG), case-mix groups (CMG), and resource intensity weights (RIWs) to better address characteristics of trauma patients.

Methods: In order to determine if the current system of resource intensity weights used in Ontario appropriately reflects trauma case-mix at Lead Trauma Hospitals, the following analyses were undertaken. First, exploratory models (regression trees and

spline models) were used to identify influential cost factors, such as resource intensity weights, age, hours in intensive care, and length of stay. Then, the linear, no intercept fit between the RIWs and costs was compared for goodness-of-fit to the more flexible spline models.

Results: The results indicated that resource intensity weights were a good explanatory factor of costs in trauma patients with no need for any additional explanatory variables, such as age, sex, intensive care hours, or ISS. The regression tree model based on RIW explained 76% of the variance in costs. (The exploratory results also indicated that the ISS was not a good predictor of costs, contrary to the outcomes in some previous studies.)

Conclusions: This series of analyses led to the conclusion that the existing case mix system (CMG's) and weights (RIWs) can form the basis for rational and equitable hospital funding of trauma cases, decreasing the need to develop a different grouper for this subset of patients. Finally, this study confirmed that ISS was a poor predictor of costs for trauma patients.

Conflict of interest: None disclosed.

Improving casemix for description and funding in rehabilitation in France: additive model is better than tree-classification

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Introduction: Rehabilitation and postacute geriatry is a large field with a large panel of hospitals in France (1800 hospitals). The French specific classification Groupes Homogène de Journées (GHJ- 280 groups), developed in 1996, is not good enough for easy use in health politics neither for funding. A new casemix model, based on the same medical dataset and on analytic costs data has been developed with a very significant improvement in r2 for cost per day.

Methods: The analytic costs and medical rehab datasets of 32 French hospitals in rehabilitation field have been used to build a new model. We used linear regression methods with different variables of the medical dataset and different modality of these variables. Rather than building a new classification tree, we decided to keep the significant variables of the different components of cost (medical, nursing, rehabilitation, logistic) in an additive way. We propose at the end of this step a valorisation model of rehabilitation activity with a basic amount of activity points for the medical group (70 groups) and additive activity points for the 7 other variables.

Results: The selected model including 5 qualitative variables (medical group, age, comorbidity, medical objective, full-time or outpatient) and 3 quantitative variables (physical dependence, cognitive dependence, number of different kind of rehabilitation) improve the R2 for cost variation per day from 30% to 44%.

Conclusions: This new classification, with just a part of it built as a tree (the initial part for medical groups), improve very significantly the cost prediction in the rehabilitation field. It also improves the way professionals (medical, physiatrist and manager) consider and accept it for use in planning and health politic field, because they can see more easily the specificity of each hospital activity. France will use this model for funding rehabilitation hospitals since 2009.

Conflict of interest: None disclosed.

SESSION 2: A close look at elderly patients

Geriatric patients: AGGIR SOCIIOS PATHOS, a tool to take into account the specificity of geriatric patient in hospital financing complementary to APRDRG

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Introduction: Most developed countries use case mix systems (APRDRG-type) to define the prospective budgets of their hospitals. However, these case mix are mainly based on the main diagnosis and procedures and do not take into account the specificity of geriatric patients. In the present study, we use all geriatric tools (RAI, RUGs, RIM, …) to evaluate the needs of acute geriatric hospital in terms of resource use. Then, using these techniques, we design a financing model for of acute geriatric hospital departments.

Methods: The AGGIR PATHOS SOCIOS (APS) tool was selected. This tool has been developed by the French Society of Geriatry and Gerontology. It collects for each patient their dependency level according to 8 criteria (eating, coherence, orientation, dressing…), their pathological condition, their care profile (vital, close and episodic medical supervision, psychiatric supervision, intensive and normal rehabilitation, palliative care…) and their social complexity. This tool allows to describe the profile of geriatric units in term of dependency, pathological condition, care profile, social complexity and the relative workload of the unit for the different health care professionals (physicians, nurses, psychiatrist, physiotherapists, occupational and speech therapists…). In Belgium, 77 geriatric units (1856 patients) collected the APS data by patient during two days in 2005.

Results: The analysis of the data shows that, controlling for APRDRG and severity, the geriatric specificities have important and complementary explanatory power on length of stay and intensity of nursing, rehabilitation and physician care. Profile of care and social complexity have the bigger impact on length of stay.

Conclusions: It is crucial to take these specificities into account in addition to APRDRGs in the hospital financing system, and define contracts with hospitals in order to avoid adverse selection and decreases in quality of care for geriatric patients. Based on these results, we propose a new financing system for acute geriatric departments.

Conflict of interest: None disclosed.

Analysis of outliers identified within a study on appropriateness of care in four clinical departments

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Introduction: French Health facilities are currently required to evaluate appropriateness of care within the accreditation process. The teaching hospital of Saint-Etienne has chosen to evaluate professional practices and care organisation efficiency. The health insurance usually checks patient discharge outliers because an additional funding for this kind of stay is provided for each additional day above the upper limit within the prospective payment system. Our objective was to identify reasons for outliers which exceed the upper limit of the number of days in their DRG considering causes of non appropriateness for the patient stay.

Methods: We used the case-mix database to identify patient discharges with the following criteria: length of stay more than fifteen days in the hospital and length of stay superior to the upper limit of the DRG. We selected four clinical departments that presented the higher number of patient discharges with these criteria. We studied the corresponding patient records and identified the causes of non appropriateness for each record. The reasons for non appropriateness were classified according to three main categories 1) Organization of care during hospitalization (delay for obtaining a therapeutic or diagnostic procedure) 2) Post acute care unit at the end of hospitalization unavailable, inaccessible or unknown 3) Reasons related to the patient or his family. The form used for collection of data consisted of the three categories and included an additional category in case there was no available information. We compared the repartition of causes of non appropriateness according to the categories in our form.

Results: Two Geriatric departments, a Pneumology and a Neurology department were selected. There were 150 patients (40% male, 60% female). The mean age of patients was 78.0 years (standard deviation = 13.1 years). There were 108 patient records (72%) containing at least one cause of non appropriateness with 17 patient records including two causes and 1 patient record including three causes. Causes of non appropriateness were different according to the departments. The repartition across categories was 73 records for organisation of care (48.7%), 38 records for post acute care at the end of hospitalization (25.3%), 11 records for reasons related to a decision of the family (7.3%) and 1 record with no available information. Each record could be associated to more than one cause.

Conclusions: When considering every patient record in the four departments, the two main causes for non appropriateness were related to 1) delays for getting an appointment in the radiology department are longer for the oldest patients than for the younger 2) lack of beds in post acute care facilities. Delay due to appointment in the radiology department is a consequence of the structural organisation within our hospital that requires a change. Difficulties for finding post acute beds outside the hospital are related to the age of the patients in the geriatric departments. It is expected to create additional beds dedicated to post acute care in our hospital and/or to develop relations between our hospital and post acute care units in other health facilities.

Conflict of interest: None disclosed.

Using the ACG Case-Mix predictive model to identify individuals at high risk of hospitalisation in the elderly population

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Introduction: Sweden has one of the oldest populations in the world and the population over 80 is the fastest growing age segment. With increasing age the number of individuals with chronic disease, functional impairment and polypharmacy increase. Elderly with chronic disease make up the majority of the total health care budget of which hospital care makes up the largest part. Hospitals and emergency wards in Sweden has problems in coping with the increasing number of elderly with comorbidities. New

models of delivering care are needed. In Denmark preventive home visits have been used on a large scale, but without information on the need for these visits

Methods: To study if the ACG Case-mix predictive model can be used to identify individuals at risk for hospitalisation for one week or more the following year and to study if a measure on self estimated health can improve the prediction. Method: The population listed to Trossö health care centre 60 years or older (N=2970) and their diagnoses from primary- and secondary care between 1-JUN-2005 and 31-MAY-2006 were used to obtain a predictive score using the ACG Case-mix system. Information on self-estimated health was obtained with a questionnaire that was sent to this population. Information on hospitalisations and length-of-stay was obtained between 1-JUN-2006 and 31-MAY-2007. The predictive ability of the ACG Case-mix system in identifying individuals with 7 or more hospitalisation days was analysed using ROC analysis.

Results: 22% of the population was hospitalised for more than one day and 10.9% for 7 days or more. Using the predictive score of the ACG Case-mix system the sensitivity was 12.1% and specificity was 95.6% with an AUC of 0.54. When age and sex was added the sensitivity increased to 43.7% and the AUC to 0.69 and when self estimated health also was added the sensitivity increased to 52.6% and the AUC to 0.73, together with a decrease in specificity to 80.8%.

Conclusions: ACG Case-Mix together with a measure of self estimated health can be used to screen elderly individuals in the population and identify those that have a high risk of lengthy hospitalisation the following year and opens possibilities for intervention studies with the aim to prevent hospitalisations.

Conflict of interest: None disclosed.

Application of ICF codes for geriatric care

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Introduction: Measuring human health status using codes and the qualifiers of the International Classification of Functioning, Disability and Health (ICF) has been a challenge in its implementation. In this study, the author aimed to construct an ICF code set to measure activity of daily living (ADL) and cognitive function, which is to be used in nursing care facilities. In previous studies the reliability of the ICF codes when measured with the current ICF qualifiers was found to be relatively low and it was suggested that some modifications should be made. Therefore most relevant ICF items for each measurement were selected and organized as a code set. In addition, appropriate qualifiers for each code were developed, and finally reliability of each code and its sensitivity to change were examined.

Methods:

1. Delphi study: Initially, the author performed a Delphi study to prioritize the purposes of using the code set. The committee members of the Japanese association of geriatric health facilities, which is an association of rehabilitation oriented intermediate care facilities, answered the questionnaire. As a result, measurement of functional change of the elders was identified as a preferred purpose of using the code set. Also, it was preferred to use it as an interoperable communication tool with other health care institutions and home services.

2. Measurement: According to the results of Delphi study the author constructed an initial questionnaire item set composed of 88 ICF codes. A simple dichotomous qualifier for each code was also developed. Initial questionnaire included functional independence measure (FIM), dementia behavior disturbance scale (DBD), geriatric depression scale (GDS) and items used to classify elders in Japanese nursing care law. These items were included in order to properly assess the sensitivity to change.

3. Participants: 330 Japanese elders aged 65 or older in 15 geriatric health facilities were recruited to measure 88 ICF items using the newly developed dichotomous ICF qualifiers. All elders were measured by two surveyors independently. The measurement was repeated after 1 week, 4 months and 8 months to analyze the sensitivity to change.

Results: The average weighted kappa was 0.55 for all domain measured. The kappa statistic by domains of mobility, eating, toileting and cognitive functions were 0.57, 0.66 0.54 and 0.54 respectively. Further result including sensitivity to change analysis will be presented at the conference.

Conclusions: The average weighted kappa of the measurement using the ICF qualifiers in this study was higher than previous studies. Further results will be presented at the conference. In this study, the author intended to construct a set of ICF items to be used in the nursing home and geriatric wards. This code set were aimed at not only enables measurement of resource utilization and functional change, but also has an effect to facilitate information exchange with other medical facilities and home services.

Conflict of interest: None disclosed.

SESSION 3: Impact of DRG implementation

Health services policies and casemix - What would you expect (or not) to happen? Selected findings from Romania and Turkey, 2000-2008

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Introduction: Both Romania and Turkey started the implementation of Case Mix systems as a tool to be used for acute inpatient care reimbursement by the public insurance system, in the context of inflationist, non transparent and non equitable reimbursements at the time. Romania used HCFA DRG system for the initial phases (2000-2005) and it is using currently the AR DRG system for full reimbursement of acute inpatient care (2008). Turkey decided directly to start with AR DRG, but only to pilot technical steps (2005-2008), moving to a locally adapted system to be used for reimbursement (after 2009?).

Methods: The authors' analysis of health services legislative and regulatory frameworks of the 2 countries identified selected changes in the organization and funding of the health services along the time line of Case Mix systems development and implementation (2000-2008). We evaluated these policy changes using mainly direct information from the official decision making process of the responsible institutions and compared against literature and international experience. All major changes in the organization or funding of the health care systems had been evaluated, no matter how Case Mix systems were used at the time of respective change (piloting, testing technical tools, reimbursement, budget neutral etc).

Results: The results had been grouped around 4 major areas of the health system: 1. data and MIS, 2. organization, delivery and reimbursement of different types of care, 3. hospitals management and performance evaluation, 4. costing of health services.

Patient level clinical and demographic data and MIS: In Romania, no data was available at patient level before introducing the Case Mix system, as in Turkey this data was widely available at Hospital level (but with almost no standardization). MIS systems in Romania were almost inexistent (2000), as opposed to Turkey (2005), with a wide range of MIS, lacking again any standardization. Presently, standardized data sets are collected in a structured manner and linked directly with payments (Romania, 2008), as in Turkey almost no formal legal empowerment of the existing pilot standardized tools is in place (2008), apart from the recently published standards of the National Health Data Dictionary (2008). Standardized clinical and cost data are being collected from 40 pilot Hospitals in Turkey.

Types of care: Romania took a step by step approach in restructuring provision and contracting of different types of care, especially as correspondent payment systems were developed (starting with 2002, as Case Mix based reimbursement started). In Turkey, types of care are only standardized as primary and hospital care, as organization and delivery of ambulatory care (separately or within Hospitals) is strongly biased by the fee for service payment scheme (2008). Minor changes are envisaged, to allow contracting for health services, as by 2009.

Hospitals management and performance evaluation: Romania used available (clinical) data initially as support for decision making at hospital level; standard reports and analysis were provided in the early years of the Case Mix implementation to Hospitals (2000-2005); the same reports were promoted at central level (aggregated) and some of them are now in use (2008) as performance evaluation tools for hospitals management teams. Turkey has a longer and better experience in clinical data collection and utilization of the MIS systems (even though not standardized) and internal hospital reports are commonly used, both clinical and financial/cost data. Unfortunately, apart from official international organizations reporting, no major use of this data is being made at central level.

Conclusions: Some policy decisions are long ago known as prerequisites for starting a basic Case Mix system (coding and collection of clinical data), and they applied accordingly to Turkey and Romania.

Other policy decisions in the two countries were purely and consistently driven by Case Mix, like type of care definition or standardization, hospitals performance evaluation etc. Some of them are the result of the local approach in using and implementing Case Mix for payments (foe example, in Romania day stay care is considered purely ambulatory care and in Turkey inpatient care). The main paradox and difference remains the relationship between costing and Case Mix payment for inpatient acute care, quite unusual when compared with other countries: Romania has (almost) no costing data available and uses the system for full reimbursement, as Turkey has good costing data available (together with the other Case Mix tools) and no reimbursement policy has been yet legislated (even though considered).

Conflict of interest: None disclosed.

The development of DRG based payment system and its effect on cost containment in Estonia

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Introduction: The Estonian health care system is mainly publicly funded through solidarity based mandatory health insurance contributions in the form of earmarked social payroll tax, which mounts to almost two third of total health care expenditures. Most public revenue in Estonia is pooled in the Estonian Health Insurance Fund (EHIF) which is responsible for purchasing care on behalf of the insured population. There is used combination of different payment methods to purchase specialist care as per diem, fee-for-service and DRG based payment to balance variety of incentives. The DRG implementation plan in Estonia was prepared in 2001 when the decision was made to move away from detailed fee-for-service system and its perverse incentives. Along with emerging technologies, medicines, infrastructure, implementation of medical guidelines etc the health care providers are able to provide more health services than the budget constrains allow. Therefore the main objective of DRG system implementation in Estonia was to contain the increase of average costs per case. In addition, the DRG system was expected to give providers more opportunities to use their resources efficiently and to improve the system's transparency by improving knowledge on provider's activity. In total there were one and half years of preparatory time before DRG system was implemented as a grouping tool and almost three years before it was implemented as a payment tool. In preparation stage two alternative strategies were considered: developing a specific DRG system based on historical case-based data in Estonia or using an already functioning DRG system. Nevertheless, the preliminary analyses and comparison with Nordic countries showed that it would be too difficult to develop own comprehensive system and therefore the decision to adopt the NordDRG system was made. Thus, in 2004 DRGs as a payment system were put into practise. Since the change in payment system was relatively strongly opposed by health care providers several risk management mechanisms were put in place. First, the proportion of DRG payment for each medical case was initially set as low as 10% and was raised to 50% in 2005. Second, a different reimbursement system was set for outliers, which are reimbursed based on fee for services and per diem rates.

Methods: In order to evaluate the effect of DRG system on cost containment in in-patient care two indicators were used - first, fee-for-service based average cost versus DRG based average cost and second, monetary impact of DRG system. In both cases simulation analyses were used.

Results: In 2005, the simulated fee-for-service based average cost per case was 0,6 per cent lower compared to DRG based average cost. In 2006, the fee-for-service based cost comprised 0,5 per cent more than DRG based average cost. In 2007, the fee-for-service based average cost accounted for 1,5% more than DRG based average cost. The monetary impact of DRG system has followed the same trend and fallen during 2005-2007 indicating that DRG system has contained the cost per case compared to the situation where only fee-for-service based payment system would have been used. Both indicators varied between different levels of hospitals and depended on whether it was a teaching/higher level hospital or general hospital.

Conclusions: During the first years of the adoption of DRG payment system in Estonia the set objective has been met. The DRG system has contained the average cost per case compared to if only fee-for service based payment system had been used. However, the further development and fine-tuning of the DRG system is needed. Since the results showed the differences between different hospitals its impact on outcomes should be analysed.

Conflict of interest: None disclosed.

Advantages and disadvantages of being the lead hospital in a DRG implementation

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Introduction: Hacettepe University Hospital (HUH) has taken the lead in casemix capacity and infrastructure building in Turkey. It has co-ordinated the development of coding and reporting formats and processes in the 50 hospitals involved in the project to date and also acted as demonstration site for the procedure implementations and outputs testing. As such it appears to be well placed to maximise the benefits that a hospital can receive from the use of output based activity management. The question, however, is whether being the first to optimise both performance and data accuracy places the hospital in the best position as other hospitals join the competition for share of the resource base.

Methods: Inpatient data grouped to AR-DRGs from HUH and other hospitals are compared with data from comparable benchmark hospitals in other countries. The comparison is used to estimate the likely change in relative casemix index as coding is optimised for DRG payment in the new hospitals.

Results: The comparisons demonstrate a differential ability to optimise coding accuracy between the pilot hospitals and those who come into the implementation later. Accuracy and completeness rises from the commencing levels to approach that of the benchmark hospitals. This provides an opportunity for the "most undercoded" hospitals to increase their share of a fixed resource pool at the expense of the hospitlas which were optimised earlier in the implementation.

Conclusions: Pilot hospitals may have the advantage of arguing for a higher share of a fixed budget at the beginning of implementation. However they may also have a lower scope for increasing their claim and may actually stand to lose budget share as "under coded hospitals" optimise. Approaches to ensuring fairness in the process of phasing in additional hospitals to a casemix funding system are considered in this context.

A key question that is not in the scope of this analysis is the potential for the hospital to redress or exacerbate this disadvantage by efficiency gains. Some examples of both advantages and disadvantages from this aspect of the implementation are also discussed.

Conflict of interest: None disclosed.

Experience in implementing case-mix system in Mongolia

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Introduction: Case-Mix System is not a totally new concept in Mongolia. In July 2006, the government approved the new Citizen's Health Insurance law which contains a provision for reimbursement of hospital services on the basis of diagnosis related groups (DRG). A simple case-mix payment method has been developed containing 22 Major Diagnostic Categories. This payment system, although may be lacking in sensitivity and specificity, is currently being used for reimbursement of secondary and tertiary hospitals in Mongolia. Ministry of Health Mongolia, with the financial assistance from Asian Development Bank has appointed United Nations University-International Institute for Global Health (UNU-IIGH) to support the pilot implementation of a more refined case-mix system in selected hospitals in Ulaanbaatar.

Methods: The pilot project consists of a series of training workshops to enhance capacities of MOH personnel in implementing case-mix system In addition, four on-site visits outside Mongolia has been planned to give international exposure to MOH personnel in managing case-mix system. These on-site trainings are coordinated by International Training Centre For Case-Mix and Clinical Coding (ITCC) based in Kuala Lumpur, Malaysia. This pilot project will help to improve the capacity within MOH to implement more specific and detail case-mix system in the future.

Results: Five hospitals were selected in the pilot projects: two are general hospitals and the other three are tertiary centres providing specialised services. Two committees were formed at the national level to supervise the implementation of the pilot project. These are: National Case-Mix Steering Committee and National Case-Mix Working Committee. The National Case-Mix Steering Committee, headed by the State Secretary of Health is the highest level committee in the case-mix implementation. This committee decides on the policy of case-mix implementation which include the objectives of the case-mix project, applications of case-mix system, selection of hospitals for the pilot project, type of grouper to be used and obtaining adequate financial resources for the pilot project. The National Case-mix Working Committee is group of technical people at the national level responsible for the day to day running of the pilot project. The Secretariat for this Working Group is the Office of Health Statistics in National Centre for Health Development (NCHD) which collates data from all the pilot hospitals and maintains the database for this project.

Each of the hospital is encouraged to form three teams to run the pilot project: Coding Team, Costing Team and Clinical Pathway Team. Coding team is responsible for coding the diagnoses and procedures and ensuring input of the minimum data set for case-mix in hospital information system. The Costing Team is responsible to collect costing data for case-mix system, ensures accuracy of costing data and use standardize methods in costing analysis. The team sends costing data to NCHD for calculation of hospital based rates, update the cost-weights and develops national case-mix based tariff. Another important team is Clinical Pathway team; members are mostly doctors, nurses and other clinicians. The team decides on cases to be selected for development of Clinical Pathway and monitor the development, implementation and continuous updating of the Pathways. At the hospital level, the Clinical Pathway Team supervises the variant analysis carried out by different clinical pathways group and facilitates the provision of regular feedbacks to clinicians to improve their practice.

All the pilot hospitals receive a digital coding tool, CodExpert System to support them to carry out more accurate coding. This coding tool uses ICD-10 Diagnosis codes for the diagnosis coding and ICD 9 CM for procedural coding. It has the functionality of grouping the patients using the IR-DRG version 2.1 groups, the DRG grouper to be used in this pilot project.

Costing is a major component of Case-Mix System. Costing data are used for development of cost-weights and to calculate major parameters of case-mix such as case-mix index, hospital base-rates and case-mix based tariff. In this pilot project, step-down costing will be used as the main methodology in cost analysis. Activity-based costing will be used in selected cases, where clinical pathways have been developed, in the refinement and customization of the international cost-weights. Minimum data sets for costing analysis are divided into two groups: general information on hospital operations and specific information by each cost centres.

Conclusions: Case-Mix pilot project in Mongolia is progressing as planned with a few important issues that need to be addressed. To date five training workshops and one on-site training has been conducted. Generally the pilot project received overwhelming support and commitment from major stakeholders such as MOH, ADB and hospital officials.

Conflict of interest: None disclosed.

Describing Iranian hospital activity using Australian Refined DRGs: a case study of the Iranian Social Security Organisation

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Introduction: Objective: to describe Iran's hospital activity with Australian Refined Diagnosis Related Groups (AR-DRGs).

Methods: a total of 465,531 separations was grouped into discrete DRG classes using AR-DRGs. L3H3; IQR; and 10th -95th percentile were used to exclude outlier cases. Reduction in variance (R2) and coefficient of variation (CV) were applied to measure model fit and within group homogeneity.

Results: Editing processes identified some data problems including missing or invalid principal diagnosis (4.0%), diagnoses with the initial characters V,W,X,Y that cannot be used as principal diagnoses (0.04%), invalid age (0.05%), invalid sex (0.74%), and invalid LOS (0.41%). Almost 93.7% of cases had normal grouping that is assignment to all DRGs including error DRGs other than 960Z. LOS was not recorded for almost 4% of the total separations. Total hospital acute inpatients were grouped into 579 DRG classes in which 'Surgical' cases represented 63% of the total separations and 40% of total DRGs. Approximately 12.5% of the total separations fell into DRGs O60C (caesarean delivery) and 28.5% of the total separations classified into Major Diagnostic Category (MDC) 14 (pregnancy and childbirth). Although reduction in variance (R2) for untrimmed data was low (R2 = 0.17) for LOS, trimming by L3H3, IQR, and 10th-95th percentile methods improved the value of R2 to 0.53, 0.48, and 0.51, respectively. Low value of R2 for AR-DRGs within several MDCs were identified including 02 (Disease of eye), 05 (Circulatory system), 10 (Endocrine system), 15 (Neonates), 20 (Drug and alcohol related disorders). High within-DRG variation was identified for 23% of DRGs using untrimmed data.

Conclusions: Low quality and incomplete data undermines the accuracy of casemix information. This may require further classification refinement in Iran. Further study is also required to compare AR-DRGs performance with other versions of DRGs and to determine whether the low value of R2 for several MDCs is due to any weakness in the AR-DRGs algorithm or to Iranian specific factors.

Conflict of interest: None disclosed.

PLENARY II: Developments in funding and planning using casemix data

Hospital case-mix funding and the necessity to adjust for socio-economic status

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Introduction: Although the efficacy of hospital casemix funding in reducing resource use has been largely documented (at least in the short term), many debates persist as regards its consequences on equity. Several authors have pointed to the failure of risk-adjustment methods to accurately reflect the patients' condition and needs, raising the threat of patient's selection and unfair penalization of hospitals. Most of this debate has centered around the failure to risk-adjust for the severity of disease, pointing to the drawbacks of diagnosis classification systems. In this paper, we emphasize the importance of the patient's socio-economic status (SES).

The case of Belgium is an interesting example of this risk-adjustment debate. Simply put, the Belgian system consists in paying in-patient services a per diem for a normative number of in-patient days based on the patient's characteristics (AP-DRG, age and hospitalization or not in a geriatric ward). The hospitals with "excess days" with respect to the norm are financially penalized, while the others are financially rewarded. On the one hand, the "pro-SES" argue that the AP-DRG/age classification system is limited in predicting the differences in length of stay between poorer and richer patients. Hence, hospitals with a large proportion of underprivileged patients are unfairly penalized, while other hospitals receive windfall gains. Meanwhile, the failure to adjust payments to patient's SES rewards hospitals practicing "case selection" while punishing hospitals doing well in treating the poor. On the other hand, the opponents contend that the socio-economic condition is accounted for by severity indicators, particularly since the shift from AP- to the "refined" APR-DRGs.

In 2007, the Belgian government decided to adopt a series of socio-economic characteristics as risk-adjustors, starting from the 2008 financing. In this paper, we present the evidence that sustained this decision.

Methods: We use a data base including all in-patient stays for 60 Belgian hospitals for the 2002-2003 period, used by the Ministry of Public Health for financing, administrative and medical purposes (records are equivalent to the US Medical Data Base System). The database contains 673,407 overnight in-patient stays. Those data include fully comparable information on patients' clinical and demographic characteristics. Data are merged with data from the 6 Belgian sickness funds, which provide information on patients' economic situation. A large array of socio-economic indicators on the patient's neighbourhood of residence are also used, as a proxy of the individual socio-economic status and to account for potential contextual effects.

Results: We show that low-SES patients have a significantly longer length of stay. The beneficiaries of reduced co-payment rates stay 15% longer at the hospital and the recipients of health services vouchers 24% longer (both status are attributed to low-income people). People living alone stay 5% longer, so as people living in underprivileged neighbourhoods, defined by the high rate of unemployed people, the low median income, the low percentage of car owners and the poor quality of housing. In addition, we find evidence that the impact of SES persists while controlling for APR-DRGs. Finally, we show how the financing formula used by policy-makers has been built in practice, and how it decreases the incentives for risk-selection and the penalization of hospitals treating high percentages of low-income people.

Conclusions: Our findings show the specificity of SES as a predictor of length of stay. That is, the impact of SES remains significant and large in magnitude after a more accurate control for the severity of disease. This finding also highlights that heterogeneity is still large within diagnosis categories even after the shift towards APR-DRGs. The importance of these results should not be neglected when designing hospital financing schemes; otherwise, the search for a higher efficiency might have unattended consequences on equity in access and use of in-patient care.

Conflict of interest: None disclosed.

Number of hospital beds in 2030: Projection with national French case-mix data

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Introduction: If changes in healthcare practices are not made to decrease the need for hospitalization, the ageing of the population could create substantial challenges for healthcare in general and seriously impede the ability and effectiveness of the hospital system. This study is a projection, using French case-mix data, on the number of acute care beds that will be needed in 2030.

Methods: At first, recent changes in hospitalization rates (HR), day-case ratios (DCR) and lengths of stay (LOS) were studied, comparing case-mix data in 1998 and 2004 for acute care patients. To accurately assess the effects of the changes, five age groups (<15, 15-64, 65-74, 75-84 and over 84) and 41 diagnoses groups were constructed. Then, three different projections, including population projections for 2030, were developed. In the first one, 2004's HR, DCR and LOS were used without modification. The second one continued to 2030 the trend in HR, DCR and LOS observed between 1998 and 2004. The third one was developed after discussion with experts who made hypotheses on the evolution of diseases (incidence and prevalence), on improvement in treatment methods (better prevention, improvement of techniques, new pharmaceutical drugs), care organization and social demand. These changes were included in the projection. Financial possibilities or number of health workers were assumed to adapt to the changes. Number of days for in-patient and day-case care was calculated using HR, DCR and LOS. Number of beds and places were then determined, taking into account bed occupancy rate and holiday period closings.

Results: From 1998 to 2004, the total number of hospitalization days (in-patient and day-case) decreased from 62 to 52.4 million. If the 1998's HR, DCR and LOS would be applied to 2004's population, this number would have been 66.7 million. The global increase observed in HR occurred with a decrease in LOS and an increase in DCR, proving the important role of changes in the practice of care giving on the volume of hospital activity. In 2030, the number of hospitalization days with the first scenario would be 79.4 million, using the effect of population ageing as the sole influence. In the second, it would be 64.7 million, including 11.4 million of day-cases. In the third scenario, the number of hospitalization days would be 56.1 million: 45.7 million for in-patient and 10.4 million for day-case care. That means 157,000 acute care beds for in-patient (-20 %, compared to 2004) and 30,600 places for day-cases (twice the 2004's figure). This analysis presupposes an optimal framework for each of the 41 diagnoses. For example, patients with dementia are supposed to be treated more and more on an out-patient basis, either at home or in specialized out-patient centers; in spite of that evolution, the most severe patients will still need long hospitalization. Unlike for the majority of diagnoses, the number of hospitalization days for cardiac insufficiency increased between 1998 and 2004. Improving treatments could change patients from in-patient to day-case status and reduce LOS. That could limit the growing of the number of hospitalization days (2.6 million in 2030 with scenario 3 vs 2.8 with scenario 1).

This shows that the method of care delivery and medical practices could balance out the effects of population ageing. Nevertheless, strong public health measures are mandatory to make these changes possible.

Conclusions: Through retrospective and prospective analyses, this study demonstrates there is important room for change in the field of medical care. Population ageing does not necessarily have to lead to an increase in the number of acute beds needed. But, the most fragile elderly patients will still need specialized care, with a high density of health workers in acute care units. Although the primary focus of this exercise is on the long-term, attention is drawn also to the shorter-term outlook. Methodology of the study

makes new analyses available, comparing actual observed with projected evolution. Regional extensions of these results would be possible with caution, knowing the variability in prevalence of the diseases, and moreover in practices.

Conflict of interest: None disclosed.

SESSION 4: Data quality

The data collection process established for the German DRG system over the last six years with focus on data quality

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Introduction: A key aspect of developing a successful DRG system is the quality of the underlying data. In Germany about 18 million patient data and four million detailed patient cost data are collected annually to obtain an accurate and up-to-date basis. Though routines are established in the collection process it has been developed and refined over the years (2002 to 2007). This leads to a continuous upgrading of data validation.

An overview over the process of data collection is given, with focus on the following questions:

- What happens to data in order to analyse successfully and apply the results in the further development of the G-DRG system?
- How can improvement of data quality be achieved? How can it be measured?
- How are about 18 million cases collected every year (data flow)?
- Which results are published to guarantee transparency?

There is an obligation for nearly all German hospitals (about 1,800) to transfer patient data according to a certain law of hospital remuneration. In addition, detailed patient cost data and augmentative patient data are provided by nearly 270 hospitals that participate voluntarily in a partial census. The collection of hospital data in Germany runs annually through a standardised technical process including several quality checks.

The data collection process from hospital into the relational databases of the German DRG Institute (InEK) is described and details about the communication process and data security are given.

Methods: The German DRG dataset is complex and voluminous. It covers nearly the complete range of German hospital structure data and case related service data. The dataset is described and some figures of the amount of data over the years are provided. The necessary technical equipment to control and carry out the processing is mentioned.

In order to ensure a high level of data quality complex data validation procedures are installed. The complexity of data validation is described. The experience from the previous years is always integrated into the development of new and more differentiated checks. The communication with the participating hospitals plays a vital role for the continuous improvement of data quality as they have the possibility to resend their data several times – after having studied validation reports.

An overview over the technical processes installed by InEK to carry out the procedural tasks is given. Proprietary software tools used to support the validation process are shown.

Results: After data collection and reassessment the data is intensively used for further development of the G-DRG system (i.e. to calculate an accurate baserate or simulations). Deep insight data analyses to several aspects are carried out with the DRG data. In Germany an obligation exists to publish the data to obtain transparency. An overview over the required publication is provided and an example of a certain data browser (concerning the secondary research) is given.

Conclusions:

1. Data quality is essential for a data-driven DRG system.
2. To achieve a high level of data quality
    2.1. intensive communication with the participating hospitals is needed,
    2.2. experience from previous years should be integrated into the development of data validation.
3. Even with a large amount of high quality data there are still questions unanswered concerning the allocation of services to remuneration. Expert analyses beyond standard techniques are essential.
4. Publication of data, methods and results leads to transparency and acceptance.

Conflict of interest: None disclosed.

Strategies for Using Repeated Hospitalizations to Identify Coding Problems

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Introduction: Integral to the appropriate functioning of case mix systems is that accurate, and complete, clinical information is abstracted from the patient chart upon discharge. Reabstraction studies in the Province of Ontario (Canada) have shown that the accuracy and completeness of comorbidity reporting in some hospitals is lacking. Although reabstraction studies are the gold standard for evaluating coding quality, they are expensive and do not provide up-to-date insights into coding quality. We propose a strategy of evaluating clinical data quality by aggregating clinical data from patients with repeated hospitalizations. Clinical review of electronic abstracts reveals common themes regarding clinical coding quality. Strengths and weaknesses of evaluating coding quality by aggregating clinical information from repeated hospitalization are evaluated.

Methods: The clinical data for 1.15 million acute inpatient discharges comprise the sampling frame. From amongst these discharge records, we used the (anonymized) patient identifier to identify unique patients with valid identifiers. We selected those patients with at least 4 discharges from acute hospitals that occurred during the fiscal year April 1 2005 to March 31 2006. There were 7,986 patients with at least 4 discharges - representing 49,352 acute inpatient discharges records during the year. The discharge records included detailed clinical information abstracted from the patient chart, including comorbidities (up to 25 are allowed) and procedures for each hospitalization. From amongst the 7,986 unique patients with at least 4 discharges, patients were randomly selected for further analysis.

Results: Through clinical review of abstracted data, inconsistencies between different hospitalizations' abstracted data for the same patient were noted. The review of abstracted information included review of all chronic conditions and procedures to derive a complete picture of the patients' condition. This process was repeated for 45 patients, representing over 260 abstracts. A common theme was incomplete reporting of chronic diseases which, regardless of principal diagnosis, are known to have an impact on subsequent treatment. In such cases, conditions should be coded. Example: a patient with coded chronic heart failure (CHF) in 3 discharges, but not in a fourth discharge (for surgery) suggests that the fourth admission did not include CHF.

Conclusions: Longitudinal compilation of abstracted discharges is a reasonable strategy for identifying incomplete hospital diagnosis data and should be used in conjunction with other methods. Using this method, the most common instances of incomplete reporting were of chronic conditions. When this information is aggregated to the facility level, facilities most likely to incompletely abstract information are identified and suggest which hospitals can improve on data quality from the perspective of data completeness.

Conflict of interest: None disclosed.

The impact of diagnosis coding granularity on the casemix

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Introduction: Several studies and physicians have criticized the complexity of the ICD classification and some studies have even demanded the simplification of the ICD-10. Previous studies have noted that when two or more individual clinical coders re-code the same patient case, the precision with the full ICD-10 granularity is often not achieved [1]. Studies on quality of diagnosis coding and clinical register information have used the granularity of diagnosis coding as one measurement of clinical coding quality [2,3]. Previous studies have reported major differences in the diagnosis coding granularity between hospitals. The primary research question in this study is to analyze what kind of impact the granularity of the diagnosis coding has on the secondary classification of the patient care such as Diagnosis Related Grouping. In this context, the granularity refers to extent in which precise ICD-10 codes are used. The ICD classification contains also so called not elsewhere classified (NEC) and not otherwise specified (NOS) diagnosis codes. In this study, these codes are considered coarse grained diagnosis codes. Previous studies have used the large number of NOS and NEC codes as an indicator of poor clinical coding quality. This study presents empirical tests and reports what kind of impact the granularity of the diagnosis coding has on the secondary classification of patient care, i.e., does a more specific diagnosis code affect the assigned DRG compared to a corresponding NOS or NEC code. By doing so we can speculate how fine grained should the diagnosis coding be from the secondary classification and casemix perspective.

Methods: The material used in this empirical study was collected from Finnish hospitals. This study was conducted by modifying the original primary diagnosis classification (ICD-10) by generalizing the precision of the coding from four and five character level codes to three and four character codes. These modified codes were mapped to the corresponding NOS and NEC codes in the ICD classification. The granularity of the diagnosis coding is analyzed in three scenarios: 1) only for primary diagnosis codes 2) only for secondary diagnosis codes 3) For both primary and secondary diagnosis codes. All of these scenarios are analyzed both for three and four character level mapping. The classifications used in this study are the ICD-10 for diagnosis coding and the NordDRG for secondary classification of patient care.

Results: The granularity of the primary diagnose has an impact on the secondary classification: 91.2% of the patient episodes were classified to the same NordDRG group from when the primary diagnose was replaced by the three character level NOS code. The average casemix index change was 0.80 %. The granularity of the secondary diagnoses has a minor impact on the secondary classification. From all patient episodes 98.4% of the NordDRG groups remained the same although all secondary diagnoses were generalized to three character level codes. The average casemix index change was 0.01 %.

Conclusions: The granularity of the diagnosis coding has an impact on the assignment of the DRG when it comes to the primary diagnosis for the patient. However, when the focus is on the secondary classification and casemix, the granularity of the secondary diagnosis codes is somewhat irrelevant.

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Conflict of interest: None disclosed.

AR DRGs - A companion to data quality

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Introduction: In Ireland, hospital discharge data is submitted to the Health Research & Information Division of the ESRI as part of the Hospital InPatient Enquiry (HIPE) scheme, by monthly exports from hospitals. Hospital discharge data is currently coded using ICD-10-AM 4th Edition incorporating Irish Coding Standards (ICS) and these data are grouped using the Australian Refined Diagnostic Related Groups (AR DRGs) version 5.1. The ESRI perform data quality checks on HIPE data including a number of checks using the AR DRG assignments to monitor and audit activity and data quality. For example:

- Error AR DRGs*
- Marked Increases or decreases in activity per AR DRG in each hospital
- Changes in severity profiles
- High volume compared to other hospitals
- Pre-MDC AR DRGs
- AR DRGs with a high Relative Value (RV)

* Error AR DRGs: Hospital records that contain clinically atypical or invalid information are assigned to one of six Error AR-DRGs (source: AR DRG Definition Manual, Vol. 1, p.12)

Methods: Using the AR DRGs as a data quality tool allows for data quality checks to be run routinely, efficiently and easily across the national file. Examples of checks conducted as part of routine data quality:

- HIPE data is routinely subjected to a set of approximately 40 checks which include checks on cases assigned to Error AR DRGs
- Checks on admission weights of neonates – as the admission weight can affect AR DRG assignment of neonates in MDC 15.
- Checks for unexpected occurrences of Allogeneic bone marrow transplants assigned to Pre-MDC A07Z
- Checks for unexpected occurrences of cases falling into Pre MDCs for liver and heart transplants as these procedures are performed in national centres only.

Results: There are many reasons for differences in a hospital's AR DRG profile and these may include changes in the service provision of the hospital. Hospitals are asked to explain why there is difference. Reasons for changes may include;

- New services provided by a hospital
- Correction of coded cases previously returned by the ESRI as part of routine data quality checks
- Change in hospital practices for collection and reporting of information
- Move of services within a region – e.g. the centralisation of orthopaedic services may result in a decrease in orthopaedic AR DRGs in associated hospitals.

- Demographics – for example there may simply be an increase in birth rate which is reflected in an increase in the obstetric related AR DRGs
- Coverage levels affected by coder turnover, backlogs etc

Where reasons for a change in AR DRG profile cannot be identified further review may be required and may include;

- Detailed review of cases
- Chart based audit
- Discussions with coders and hospital management

Conclusions: Ireland implemented ICD-10-AM in 2005 and work on coding quality in Ireland is continuous. The AR DRGs have proved an invaluable companion data quality tool to this quality assessment work. With systems, hospitals' activity and practice changing and improving all the time it is expected that there will be changes in ARDRG assignment. Hospitals are encouraged to review their own data and to monitor AR DRG assignment to ensure that HIPE data is of the highest quality as from 2009 a blend rate of 70% will apply to casemix data. Checks on all aspects of HIPE data including AR DRG are continually developed and information is provided to enable hospitals to run checks similar to those run at a national level. Ensuring correct coding of cases and correct AR DRG assignment is fundamental to an effective and fair casemix budget model.

Conflict of interest: None disclosed.

Assessing the quality of coding in Portuguese hospitals, 2007-2008

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Introduction: Coding inpatient episodes using the ICD-9-CM forms the basis of grouping them in Diagnosis Related Groups (DRG) in Portuguese public sector acute care hospitals since the late Eighties. Since DRG case-mix is important both in terms of institutional performance assessment and financing, evaluating the quality of coding is essential. Coding has therefore been the subject of audits for the best part of the last decade, and has consistently improved. In this study, we show the results of approximately sixty hospital coding audits, from the years 2007 and 2008, and assess its impact and implications in terms of the financing of these institutions.

Methods: In both 2007 and 2008, coding audits were conducted by teams of physicians in about half of the public sector acute care hospitals (30 to 40 hospitals are selected each yea r, based on their legal status and total budget). These audits consist in analyses of episode charts and discharge summaries (approximately 100 per hospital), selected either randomly or based on a suspicion of coding errors. The teams of auditors record the presence or absence of coding errors in each episode, in terms of the principal and additional diagnoses, and procedures.

Results: The number of episodes without coding problems has steadily risen to the current 45%. In the remaining 55%, both principal diagnosis and procedures are usually correct; the most common errors are found in terms of additional diagnoses. These can either be under- or over-coded. In 2007, 14% of randomly chosen episodes changed DRG, given the experts' corrections of coding. (Note: Work in progress; preliminary results).

Conclusions: Quality of coding inpatient episodes in Portuguese public sector acute care hospitals has been improving continuously over the last few years, partly due to the implementation of audits, with feedback being given to hospital coders. However, a reasonable number of problems remains, both in terms of over and under-coding, mostly around additional diagnoses, and these result in a change of DRG assignment in approximately 14% of cases in any given year. This has implications, both in terms of financing and performance assessment of institutions and must therefore be addressed in the near future.

Conflict of interest: None disclosed.

Evaluating the quality of ICD coding in the DPC in Japan

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Introduction: The Japanese case-mix classification system referred to as DPC (Diagnosis Procedure Combination) was introduced in 2003. The number of hospitals participating in the DPC project was 82 in 2003, up to 1400 in 2008, which are now providing beyond half of acute care beds in Japan.

The DPC grouping logic is based on both the International Classification of Diseases 10th revision (ICD10) and the Japanese procedure code (K-code). However, ICD10 is not being used in most Japanese hospitals. We assume the reason is because the ICD10 has not been adopted claims under the national health insurance system. High accuracy in coding has yet to be answered, and assurance of data quality as well as the coding guideline will be the next health policy.

Methods: DPC Hospitals have to submit there clinical information and claim data to the Ministry of Health, Labor and Welfare (MHLW). We have assessed the data from 262 hospitals the voluntarily attending participated in our research project in 2007. We examined ICD10 codes for it principal diagnosis and analyzed the proportion of the cord which may be classified elsewhere (Dot9 code)in all 16 Major Diagnostic Category (MDC) groups.

Results: The result of the research showed that among 1,087,507 cases (academic hospitals; 341421 cases, 31.4%), there were 305,657 Dot9 codes (28.1%). A large Proportion of Dot9 code was broken into academic hospitals (31.1%) and community hospitals (26.7%). That varied significantly from 9.0% in MDC15 (Disease of related to pediatrics) to 63.4% in MDC09 (breast related diseases).

Conclusions: ICD codes provide in important clinical information; diseases location and pathology. These are very useful when executing some clinical study through the use of an administrative database. And, for these purposes, a database has to have enough accuracy. However, though there is enough information for high accuracy ICD coding, incorrect coding is made. This might be due to the lack of gathering clinical information from charts or to an inconsistency of DPC coding tools. Also, it seems to depend on a using of a hospital information system, a using of a checking system and a present of a Health information manager. We believe coding education associated with developing a coding system to pick up clinical information correctly is a necessary step for a Japanese healthcare system.

Conflict of interest: None disclosed.

SESSION 5: Ambulatory care

Pilot project outpatient services classification & costing – The Irish way

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Introduction: The Irish Health Service Executive proposed a phased approach to the establishment of an outpatient service casemix system to help with the fair and reasonable allocation of funds to Irish hospitals. The approach applied to the project consisted of an initial literature review, covering systems that were being used in other countries. This information provided the method that was to be applied in analysing the data during this initial phase. It was then determined that we would seek the participation of six hospitals and investigate six specialties.

Purpose: The aim of the project was to identify six hospitals and six specialties which could serve as an indicator of the feasibility of develop Casemix budgeting in an outpatient setting. It was proposed that the first phase deliver answers to the following fundamental questions:

- Can current systems and processes support a useful casemix system for outpatient services?
- What changes are necessary for a useful system to be broadly implemented?
- How are episodes/contacts to be defined?
- Where will the approach be on the continuum between Cost Modelling and Clinical Costing?
- How informative and useful are the approaches considered? What level of confidence?

Methods: A cost modelling approach was adopted to analyse the data. This involved a number of staged functions to the data sets, whereby the financial data included in the financial stages file were expanded to include the consultants' pay file so that clinics could be identified to determine direct costs associated with each specialty clinic. Each cost area was then assigned a cost centre number which was used to identify those cost areas which were direct or indirect expenses for a clinic. The patient files from each hospital contained information which included observing the clinic name, the consultant name and matching the consultant back to the Medical pay files to determine that all the patient records had a correlation to the cost files and the clinic descriptions in the final products file that identifies the clinic type. A series of SQL statements and a basic algorithm were used to redistribute indirect costs to direct cost centres and apply those costs by patient volumes and service weights to each outpatient clinic.

Results: The results are demonstrated in four sections: 1. Derived cost weights for each clinic by hospital. 2. The cost per attendance at each clinic by hospital. 3. Case volumes by clinic 4.The total cost associated with each clinic by hospital.

Conclusions: Having identified six hospitals and six specialties which could serve as an indicator of the feasibility of develop casemix budgeting in an outpatient setting, we were able to expand this process to incorporate all specialties in five of the six hospitals that took part. We believe that this project has provided information which can lead to the further development of an informative system for outpatient clinics in the Irish Health Services.

Conflict of interest: None disclosed.

Clinical benchmarking: a driver of change. The case of ambulatory surgery

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Introduction: Benchmarking is a performance improvement method well established in the industrial sector where it has largely shown its potential to improve the efficiency, cost-effectiveness and quality of products and services. Its use in the health sector is more recent and still faces barriers due to technical difficulties in measuring healthcare results, to problems of data confidentiality and to the cultural prejudice associated with the delivery of objective information. Nevertheless clinical benchmarking offers several benefits, including the opportunity to build on the work of others, thus promoting a more effective and efficient use of resources and the creation of an environment that leads to continued improvement and learning.

There is great variability between hospitals and physicians in respect to clinical practices, which are not always well documented and understood. For example, ambulatory surgery has been responsible in the last decades for a significant rise in the productivity of surgical services as a consequence of new anesthetic methods, new surgical approaches and surgical materials and more educated populations. In addition, ambulatory surgery is associated with shorter stays, higher patient turnover and smaller waiting lists, not to mention cost efficiency and patient comfort. And yet the level of implementation still varies greatly between countries, regions and hospitals. For example in Portugal the overall ambulatory surgery rate is still below that of many developed countries, including the USA (83,5%), the UK (62,5%), Sweden (50%) Norway (48%) and Spain (30%-44% depending on the region).

Methods: The Minimum Basic Data Set (MBDS) associated with the implementation of DRG in Portugal has enabled the production of routine administrative and clinical data in all NHS hospital including data for ambulatory surgery. For decades, this information has been used by the Central Funding Department mainly for resource allocation purposes, delaying the awareness of hospitals in respect to its potential for internal management. With the establishment in the country since 2007 of Iasist Portugal – a sister company of the well conceited Iasist SA in Spain, a growing number of NHS hospitals started to use a proprietary benchmarking tool known as "Perfil de Direcção Clínica" (hospital clinical profiling), which uses the MBDS data as input to generate a series of clinical quality and performance indicators. The PDC is an executive information system that compares the results of the hospital overall performance and that of its individual clinical services with Standards that are derived from a group of similar hospitals and services.

The performance and quality indicators included in the PDC are adjusted for case-mix and / or clinical risk of the individual patients to enable more robust comparisons between the different organizations. In respect to ambulatory surgery, two core indicators are considered: ambulatory surgery substitution rate and ambulatory surgery index. The first indicates the intensity of use of ambulatory surgery by group of procedures which according to the state of art can be performed in an ambulatory setting. The second is a ratio between the observed substitution rate and the expected one if the hospital or service analyzed had in each

procedure the substitution rate observed in the Standard. Together, the two indicators give a good picture of the development of ambulatory surgery in the hospital or clinical service and enable access to more detailed information at the DRG level.

Results: By comparing their results with their peers', hospitals CEO and heads of clinical services can identify areas or procedures where the gaps are more significant, and set their own targets for ambulatory surgery levels which have been achieved by others in the real world. Based on the core indicators identified above, the results from a group of ten Portuguese public hospitals in 2006 and 2007 are presented and discussed in comparison with a Standard derived from 53 Spanish hospitals.

Conclusions: More than the deviations per si, those results support the idea that clinical benchmarking based on routine information is a tool that can be used by hospitals to demonstrate their effectiveness and also to identify areas of improvement. While it is a demanding activity, mainly at the initial stages, it is a highly useful process that can be integrated into the day-to-day life of the organization, leading to an environment of continuous improvement and facilitating the access to a superior performance.

Conflict of interest: Margarida Bentes, Salomé Estevens and João Completo – Consultancies or honoraria

Can short lists facilitate the collection of data on diagnosis, intervention and presenting issue in community health and outpatient care services?

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Introduction: NSW Health is undertaking the community health and outpatient care information project (CHOCIP) which will develop a patient level data collection across all community health and outpatient care services in NSW. It is the largest project of its type ever attempted in Australia and when complete will result in the collection of some 25 million unit records describing the services provided in community health and outpatient care settings. A key CHOCIP sub-project is to develop short lists in consultation with clinicians, that represent the 10-20 most common values in the data domain for the data elements diagnosis, intervention and presenting issue for each of the defined 130 service types in community health and outpatient care. These short lists were developed to avoid the use of clinical coders to retrospectively code the three data elements.

Methods: The methodology consisted of three major processes. First, a range of classification systems were evaluated to assess their suitability as the underlying base for the short lists for the three data elements. Second, draft short lists were developed for the three data elements for each of the 130 service types (ie 390 short lists) by reviewing the literature, conducting initial consultation with clinicians, and collecting and analysing the available (coded) data. Third, the draft short lists were refined by working with the Clinical Advisory Groups (CAGs) formed specifically to advise on one or more of the 130 service types, as appropriate. The refinement method was a three round Delphi process, two rounds by mail and the other through a face-to-face meeting. The refined short lists were then incorporated into the CHOCIP Data Dictionary and the enterprise systems from which the collected data are to be drawn.

Results: Through review of classification systems it became clear that no one system would be suitable as the base for the short lists across the 130 service types. The evaluation showed that for hospital outpatient clinics it was most logical to use ICD-10-AM and ACHI. This decision allowed for maximum continuity and consistency of the outpatient data to be collected with hospital inpatient data already collected where diagnosis and intervention are coded using ICD-10-AM.

For community health services the decision was more difficult. A classification system specifically for activities and interventions in community health services had been formulated as part of a major project to develop an enterprise system for community health being the Australian Classification and Terminology of Community Health (CATCH). The other major candidate was ICPC-2 PLUS which is primarily used in general practice settings in Australia. Given that the community health enterprise system was only used in some 15% of community health services and that there was no ongoing maintenance and development process for CATCH it was decided to choose ICPC-2-PLUS as the basis for the short lists in most community health settings.

It was found that there was little data available on diagnosis, intervention and presenting issue within existing systems. Review of the available data assisted in the generation of some of the draft short lists but the majority of the short lists had to be developed by working directly with the CAGs. In the event it was possible to produce short lists for each of the 130 service types for the data elements diagnosis, intervention and presenting issue.

The final refinement process consisted of a pilot test of the short lists in 15 services across NSW covering off at least one service type in each of the 130 categories across community health and outpatient services. The pilot test was conducted over a period of six weeks using predominately manual data collection. Results of the pilot test were used to refine the short lists which were then included in the CHOCIP Data Dictionary and enterprise systems.

Conclusions: The project has demonstrated that is possible to develop abbreviated value data domains for the collection of data elements diagnosis, intervention and presenting issue across community health and outpatient care settings. The value domains were shown to be relevant to each service type, largely because of the homogeneity of patients and services within each service type. The short lists will continue to be evolved and refined as the CHOCIP data collection commences. Importantly the short lists facilitate the collection of data that address the important questions of why do patients present for services? (presenting issue); what is wrong with them? (diagnosis); and what services are provided to them? (intervention) without the need for specialised

clinical coders. These data will be extremely valuable in planning, developing and funding community health and outpatient care services in NSW.

Conflict of interest: None disclosed.

Comparison of Day Surgery processes of care, ALOS, costs and revenues between Australia and France

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Introduction: Australia, Victoria, embarked in casemix funding in 1993 whilst France adopted Casemix funding recently. Both health systems are fairly similar except for the absence of a waiting list system in France.

In regards to surgery, the types of surgery performed, the processus of care, the funding incentives and costs are different at times, similar at other times.

Methods: This paper analyses regional data on day surgery cases to compare, volumes, % of day surgery, funding and costs. Incentives to do day surgery will be highlighted when found. The impact of a waiting list system will be examined.

Results: The Victorian Australian health care system has greatly advanced in day surgery under a casemix funding system over a 15 year period. It is essential to highlight the effect of funded pre-admission cliniques run by nurses. The pressure created on governments by the waiting list may have contributed at creating funding incentives in Victoria.

Conclusions: It could be concluded that France will need more financial incentives to further decrease the ALOS and develop systems of care that can enhance safety whilst decreasing costs. The overall gains would be to improve access of patients to health care.

Conflict of interest: none disclosed.

Pharmacy cost outliers in primary care. Multilevel approach based on ACG® in the Spanish context

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Introduction: The objective of this study was to analyse variability in pharmacy cost in Primary Care through a multilevel approach including patient, physician and health centre organisation variables. The analysis was carried out separately for normal and outlier patients concerning pharmacy expenditure.

Methods: Multicentre, retrospective study based on electronic records of patients seeking care during 2005 in the regions of Aragón, Baleares and Cataluña. Principal measurements: variables related to the patient (age, sex and morbidity), the health centre (accreditation, teaching activities and localisation-rural/urban centre), and the physician (academic training, sex and work-experience) and the dependent variable pharmacy cost. In order to avoid data collection biases, health centres were selected depending on their experience in the use of electronic medical records. Outlier patients were identified according to case-mix adjustment based statistic criteria (those with values of studentized deleted residuals higher than 2). Log transformation of the variable pharmacy cost was carried out to reduce skewness of the distribution and make it close to normal. The explanatory power of ACG was calculated by coefficients of determination. Multilevel regression models were employed to analyse the hierarchical structure of data (level 1: patient, level 2: physicians, level 3: health centre). Statistical software: SPSS 15.0, STATA SE/10.0, MLWin 2.0, $p<0.01$.

Results: Outlier patients represent 1.6% of the global population (n=286,450) and are responsible for 10.87% of the total pharmacy cost in Primary Care. Among the three different included levels, the one related to the health centre was insignificant either for normal or outlier patients. The results for the two other levels - patient and physician – are shown in the tables below. Among normal users, up to 12.4% of the total variance in pharmacy cost was explained by variables inherent to physician, whereas, among outlier patients, the explanatory power of this second level (physician) was negligible (0.2%-1.5%). For normal users, the model that best explained variability in pharmacy cost included patient's variables (ACG and age) and physician's variables (academic training and work experience) (R2.=48.8%). For outlier patients, the optimal model only included the variable ACG (R2.=61.1%).

Conclusions: Variability in pharmacy cost is explained mainly by patient's characteristics of morbidity (measured by ACG). Physicians seem to have a lower influence on patients whose morbidity characteristics (ACG) explain most of the variability in pharmacy cost, as it is the case of outlier patients (R2.=up to 61.1%). This could be attributed to the fact that physicians face up patients with specific clinical features that reduce their decision-making capacity. The fact that the third level (health centre organisation) was not significant could be due to the health centre selection procedure.

Further investigation should be done on other factors related to the physician and specific clinical aspects of patients (e.g. severity, co-morbidity) influencing uncommonly high cost trends in Primary Care since outliers are a legitimate economic concern to individual practitioners and institutions.

Table 1. Multilevel regression models for normal users

	Normal users			
Pharmacy cost (ln)	MODEL I	MODEL II	MODEL III	MODEL IV
Patient				
Age				0.040 (0.000)
Sex			0.08 (0.000)	
ACG	0.05 (0.000)	0.05 (0.000)	0.05 (0.000)	0.033 (0.000)
Physician				
Sex		-0.28 (0.000)	-0.28 (0.000)	0.04 (0.183)
Academic training		-0.30 (0.002)	-0.30 (0.000)	0.15 (0.000)
Work experience		-0.01 (0.015)	-0.01 (0.001)	0.01 (0.000)
R^2	0.313	0.317	0.317	0.488
σ_e	1.470	1.470	1.470	1.307
σ_u	0.554	0.533	0.403	0.222
ρ	0.124	0.1161	0.070	0.028

Table 2. Multilevel regression models for outlier patients

	Outliers			
Pharmacy cost (ln)	MODEL I	MODEL II	MODEL III	MODEL IV
Patient				
Age				-0.01 (0.000)
Sex			-0.03 (0.059)	
ACG	0.04 (0.000)	0.04 (0.000)	0.04 (0.000)	0.04 (0.000)
Physician				
Sex		-0.02 (0.278)	-0.02 (0.296)	-0.02 (0.146)
Academic training		0.02 (0.402)	0.02 (0.389)	0.02 (0.384)
Work experience		0.01 (0.060)	0.01 (0.051)	0.01 (0.036)
R^2	0.611	0.602	0.602	0.603
σ_e	0.518	0.518	0.518	0.518
σ_u	0.021	0.064	0.064	0.044
ρ	0.002	0.015	0.015	0.007

Conflict of interest: None disclosed.

A method to estimate expected day surgery activity in hospitals of the Spanish National Health System

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Introduction: Day-surgery did arise as an attempt to improve quality, effectiveness and efficiency of health care resources, specifically in the surgical procedures of low-medium complexity. The high volume of this kind of procedures and the development of minimally invasive surgical techniques and new anaesthetic approaches favoured the implementation of day-surgery care. The decision to assign a patient to a day-surgery program does not depend only on the selected procedure, but also on demographic and clinical characteristics of the patient and hospital variables. The objective of this study is to develop a model to estimate expected day surgery activity in hospitals taking into account the characteristics of the patients and hospitals in order to construct an observed vs. expected ratio.

Methods: Data source: Minimum Basic Data Set (MBDS) of hospital care episodes. Potential Day surgery Episode (PDSE) was defined as the hospital episode with a surgical procedure (ICD-9-CM), programmed admission and home discharge. To be considered as PDSE, the selected procedure must appear at least in 50 day-surgery cases and developed at least in 5 hospitals. Study database: MBDS of 188 (85%) hospital of the National Health System and 32 (15%) private hospitals of Spain of year 2006, that attended 1.162.082 surgical admissions. From 1.770 procedures identified (ICD-9-MC), 798 fullfilled PDSE criteria that were grouped finally in 204 procedure groups. From the total number of surgical admissions, 931.630 episodes were considered as PDSE and 541.715 were observed as real day surgery episodes (substitution index of 58,1%). A logistic regression model was applied to estimate expected number of day surgery episodes. Dependent variable was day-surgery case (yes/no).

Results: Diagnostic categories of Eye, Skin, Subcutaneous Tissue & Breast, accounted for 56,3% of total day-surgery episodes. Significant independent variables that were finally included in the model to predict the likelihood of day-surgery for every patient were: age at admission (categorical, 5 year intervals), sex, observed rate of day-surgery by combination of principal diagnosis and

surgical procedure (the variable with higher weight), observed rate of secondary diagnosis that show the lower rate of day-surgery (as an adjustment by clinical conditions that deter from applying day-surgery techniques), hospital level (teaching, non-teaching) and hospital service contract (public/private). The model showed a reasonable predictive performance, with 82% sensibility and 82,1% specificity. ROC curve value was 91%.

Conclusions: This model may allow setting expected values to be used as reference patterns for day-surgery in Spanish hospitals. This approach can be very useful to set objectives of day-surgery activity increase in hospitals, based on objective data.

Conflict of interest: None disclosed.

SESSION 6: Developing classifications

The methodology proposed to develop an international classification system for procedure: The Categorical Structure

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Introduction: Since the beginning the extension of national case mix projects all around the world has been facilitated by the use of WHO International Classification of Diseases (from ICD 8 to ICD 10 and including ICD 9 CM and ICD 10 AM) but has been hampered by the absence of an international classification of procedures even if the WHO International Classification of Procedures in Medicine (ICPM) has been used within pilot testing (France, The Netherlands, Germany, Hungary, etc.)

The drawbacks are multiple: first there are huge efforts in several countries to develop (the level is measured in century person) and to update the national systems: second for smaller and less developed countries there is a need to adopt the system of another country and to be forced to follow the versioning policy of such systems: finally international comparisons of case mix results for management and efficiency assessment can only be partial and of a questionable validity due to the limitations in the mapping between the different classifications of procedures. Several solutions have been proposed without practical applied examples.

One solution could be to agree on a only procedure system as proposed by 3M with ICD 10 PCS or by the new international organisation named IHTSDO (International Health Terminology Standard Development Organisation) with SNOMED CT but this is restricted to fully or partially English speaking countries and to countries able to support the important and permanent translation policy between English and their national languages. Another proposal for developing a common classification of procedures for 3 German speaking countries (Germany, Austria and Switzerland) was considered non feasible.

This scientific presentation expressed the opinion of the authors and is not endorsed by WHO as an institution.

Methods: The CEN Categorial structure was defined, as a minimal set of health care domain constraints to represent a biomedical terminology It is a definition of a model of knowledge restricted to 1) a list of semantic categories; 2) the goal of the Categorial structure; 3) the list of semantic links between semantic categories authorised; 4) the minimal constraints allowing the generation and the validation of well formed terminological phrases.

The WHO-FIC network Family of Development Committee has set through 3 meetings in Freiburg,Trieste and Geneva the rationale as following:

- There is a common purpose to each health intervention. It is performed by an actor (individual or corporate), it is performed on or aimed at a target (from the individual patient to the population of a country), and it is performed in a certain manner.
- Where the intervention is performed is not included. The classification is independent of the health service setting.
- Why the intervention performed is not included, but is classified using the ICD or the ICF.
- The performer ("who") of the intervention is not part of the classification of interventions.
- Finally the summary statement for an health intervention can be re-expressed as "What is done to whom and how"

It should be noted that for surgical procedures, the statement is consistent with EN 1828 which has been presented elsewhere including PCSI conferences.

Results: The categorial structure for the International Classification of Health Intervention.

The consequence of the merging of the 2 developments can be summarised as following:

1 the 3 semantic categories would be

Action

Target which can be:

1. An organ system or part of the anatomy (eg, surgical interventions),

2. A person (eg, counselling), o

3. A population group (an anti-smoking program).

Means which can be further subdivided into additional axes such as Approach and Method

2 The semantic link authorised between the 3 semantic categories are:

An Action has a Target (or Site when a part of the body) and at least one Means (Approach, Method or Technique)

The European standard's categories for surgical interventions are accommodated within these axes. But other types of interventions can also be included.

Conclusions: The coordination of efforts between WHO-FIC and international standardisation in biomedical terminologies has set a framework to prescribe the rules to which national or international classifications of interventions or procedures should conform to allow international comparisons between them and the use of an international case mix algorithm. The following steps are to assess the minimal rules of the categorial structures for the different uses cases and to test the conformance of the existing systems with the minimal rules. The final output will be the adaptations of the existing systems to these minimal rules.

Conflict of interest: None disclosed.

A Patient Injury Classification for use with routine hospital data

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Introduction: Most classifications of patient safety events are focused on issues of preventability, and thus cover a narrow range of hospital-acquired conditions. Most have been developed using ICD-9-CM, where Australian jurisdictions use ICD-10-AM, and most have been developed without specific information about whether the injury or illness was present on admission versus hospital-acquired. The Australian Patient Injury Categorisation (APIC) uses routinely abstracted hospital data on diagnoses in ICD-10-AM, and the timing of onset of those diagnoses, to flag the full range of hospital-acquired illness and injury.

Methods: Analysis of the Victorian Admitted Episodes Database (VAED) for 2005/06 allowed identification of high volume sets of diagnosis codes that were flagged as hospital-acquired conditions using the ICD-10-AM and the Victorian diagnosis onset flag ('C-Prefix'). Principles were developed for grouping of codes and criteria agreed for reconciling salience for patient safety use with low patient volumes in some categories. In an iterative process involving health information managers, patient safety researchers and clinicians, individual codes were grouped together using the attached logic tree, into this third Draft of the Australian Patient Injury Categorisation (APIC).

Categories were compared with two similar published grouping systems, the Utah/Missouri Adverse Event Classification (2002) and the proprietary 3-M 'Potentially Preventable Complications' (2007). The final categorization will be refined by use of the Project's data cleaning algorithm (to remove inappropriately prefixed codes) and by inclusion of a small number of 'miscellaneous' categories to cover the entire range of codes in use.

Results: The VAED included 126,940 episodes with a hospital-acquired diagnosis in the 2.032 mil inpatient episodes, for a complication rate of 6.25%. These records had a mean of 3 C-prefixed diagnoses per episode, yielding 386,048 codes. In addition, 128,323 C and P-prefixed codes were analysed in obstetric and neonatal episodes, for a total of 514,371 diagnoses. 4345 unique codes were used to characterise hospital-acquired conditions, and these were grouped by applying coding standards and record sequencing criteria into 145 detailed types of 'adverse events'.

Conclusions: Routinely coded data is often criticised as less sensitive and specific than physician collection of data on adverse events (prospective collection or retrospective chart review). Recognising the limitations of the routine data, we argue that access to comprehensive and timely information on patient safety may warrant use of data which under-identifies adverse events.

Conflict of interest: None disclosed.

Standardized documentation in physical therapy: testing of validity and reliability of the PT-ITC and mapping it to the metathesaurus

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Introduction: Physical therapists (PTs) have not yet developed a classification or terminology specific for the domain of physical therapy. A new collection of 141 intervention term (PT-ITC) specific to physical therapy, in – and outpatient practice, exists at Landspitali University Hospital (LUH), Reykjavik, Iceland. The purpose of this study was to assess utility of this collection and map to the UMLS Metathesaurus. Research questions: 1. Does PT-ITC contain all interventions provided by PTs at LUH (content validity)? 2. Is PT-ITC reliable in clinical practice at LUH? 3. Can the PT-ITC be mapped to classifications or terminologies in the Metathesaurus?

Methods: Translation: An English version of the PT-ITC was necessary for mapping to the Metathesaurus. The Icelandic PT-ITC was translated from Icelandic to English and back translated, then systematically reviewed by clinical PT experts to assess the accuracy of translation and content.

Questionnaire: A questionnaire was used to test content validity and reliability (inter- and intra-rater) of the PT-ITC and test inter- and intra-rater reliability of the translation. All PTs (N=69) at LUH were asked to estimate, using a 7 point ordinal scale, how often they used the intervention each term described. Opportunity of adding new terms was given. They answered the questionnaire in Icelandic and then in English, respectively. A determination was made that for a term to be included in the collection it should receive at least one rating.

Mapping: The PT-ITC was mapped to the 2006AC version of the UMLS Metathesaurus augmented with the 4th edition of the Nursing Intervention Classification (NIC) and the 3rd edition of the Nursing Outcome Classification (NOC) terms using MetaMap.

The analytical software, SPSS version 11.0 was used to analyze the data.

Results: Translation: The translation of the PT-ITC was validated through the translation process and with using ongoing independent assessment by clinical PT experts. Analysis of data from the questionnaire showed that the inter- and intra-rater reliability was high to very high ($p<0,001$).

Questionnaire: Participation was 72,5% of all PTs at LUH. The 141 term are all interventions that are used at LUH and none of the terms were excluded. A total of six terms were added to the PT-ITC. Inter- and intra-rater reliability was high to very high ($p<0,001$).

Mapping: Exact matches were to 40% of sources within the Metathesaurus. SNOMED CT received the highest mapping results, 37% of the terms mapped to it. Only 5% of the terms mapped to NIC and one term mapped to NOC, in the Metathesaurus using MetaMap.

Conclusions: The PT-ITC in Icelandic and English is valid and reliable. It represents the interventions used in physical therapy at LUH and can be partially mapped to several sources in the Metathesaurus. Restrictions were the format of the sources in Metathesaurus and the MetaMap tool. Other methods may therefore give other results. PTs need to define their specific needs, terms and definitions, for representation in a classification or terminology.

The PT-ITC has been coded (arbitrary codes) and implemented into the electronic patient record at LUH. Further work needs to done in defining the terms, creating a hierarchical structure, assessing possible usage in other clinical settings and considering editorial policies and maintenance issues.

The PT-ITC is an important foundation for future clinical research, quality assessment and a necessary input into case-mix based funding of hospital services.

Conflict of interest: None disclosed.

Medical Device Classification / Surgical Product Classification

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Introduction: 'Medical device' means any instrument, appliance, material, machine, apparatus, implant or diagnostic reagent:

a) Used or purporting to be suitable for use or manufactured or sold for use in:

   i. the diagnosis, treatment, mitigation, modification, monitoring or prevention of disease, abnormal physical or mental states or the symptoms thereof; or

   ii. restoring, correcting or modifying any somatic or psychic or organic function; or

iii. the diagnosis or prevention of pregnancy and which does not achieve its purpose through chemical, pharmacological, immunological or metabolic means in or on the human body but which may be assisted in its function by such means; or

b) declared by the South African Minister of Health by notice in the Gazette to be a medical device, and includes any part or an accessory of a medical device

Methods:

Objective: A medical device / surgical product classification system is an essential clinical risk management component in the identification, procurement, analysis and reimbursement of surgical items. For these reasons coding units of all role-players are beginning to focus on precise coding in terms of coding rules, conventions and nomenclature.

Results: Benefits of such a classification system include:

- Identification of Surgical Items & Devices
- Registration /Certification of identified products
- Comparison of similar functional items – Nationally & Internationally
- Price validation of individual items and reference price benchmarking of comparable items
- Inflation tracking of individual items and comparator categories & manufacturers
- Product procurement & manufacturer & Provider Network negotiations
- Product & Preferential pricing reimbursement of legislated minimum benefits
- Development & maintenance of national & international classification standards for claiming standards for accurate profiling & rule validations
- Benefit Product design
- Management of perverse incentives associated by item or category
- Tracking of new technology
- Funding Policy development & Health Economic analyses

Conclusions: Examples will be demonstrated.

Conflict of interest: None disclosed.

Construction of Functional Related Groups for ambulatory rehabilitation system

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Introduction: Ambulatory rehabilitation has grown significantly in the past 20 years in Portugal. In 2007 were identified, approximately 617 outpatient rehabilitation providers between the public (15%) and the private sector (75%) (Entidade Reguladora da Saúde 2007). Between 2004 and 2006 the growth rate in utilization, based on charges, grew about 1,2% (ACSS 2008). Due to financial limitation and to establish more equity in the distribution of resources, the Portuguese NHS is implementing new models of drawing up contracts for the health care provision. The Portuguese outpatient therapy rehabilitation sector is being studied to develop an outpatient classification and a payment alternative model based on patient functional limitation. The international perspective on this matter shows that trends are moving towards patient classification both for financing and paying for performance.

Methods: To design a practical (clinically and scientifically), defensible payment alternative model, researchers need to progress beyond clinical classifications groups and address several important concerns. The use of the diagnosis as an indicator of the medical condition, that is a factor for predicting costs, is troublesome. Consequently, it became evident that the diagnosis coded by the International Classification of Diseases (ICD 9) was a poor predictor of rehabilitation therapy utilization. As this diagnosis (working as single indicator) was not appropriate for the development of an alternative policy, researchers suggest a general impairment classification based first, on the principal diagnosis (ICD 9) and second, on The International Classification of Impairment and Diseases (ICIDH using an abbreviation of two categories" (Body Function" and "Activity and Participation"). This classification by impairment categories needs to be sufficiently specified to constitute a strong indicator for the association between patient functioning and a potential predictor of costs. In order to certify the comprehensiveness of a rehabilitation classification system three hospital with outpatient rehabilitation units volunteered to participate and together prepared a first classification document. The second step of the project intends to develop an outcome measures system that shows patient

clinical improvement, and if it is successful, it could be used, in a near future, to design needs based payment model and/or payment for performance.

Results: An international revision showed that it is generally accepted an inexistence of one only useful outcome measurement tool for ambulatory rehabilitation and furthermore, no single tool, at this stage, has been accepted across the impairment groups. We emphasize that measures must be based on clinical evidence accepted by the patient, the relatives and the providers.

Conclusions: The project is under progress and preliminary studies included a Delphi exercise, a systematic review and an empirical data collection. Based on those exercises several categories were identified, in a formal consensus, and then applied to a patient sample of a rehabilitation hospital unit.

Conflict of interest: None disclosed.

SESSION 7: Funding hospitals

Administrative changes in DRG-based financing models in Portugal

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Introduction: In the last few years, use of DRG in the model adopted to finance Portuguese hospitals, has been subject to an extensive debate. In order to decide on the best method to achieve the desired efficiency goals, players in the health care system have carried out a wide debate to identify whether there exist – or not – efficiency incentives in the adopted model. This discussion, in an effort to design a comprehensive analysis, also allows one to integrate both the financing model and performance measurement methods. Important features of the Portuguese financing model – besides others – are: i) Equivalent Patients, payment unit for production – quantity; and ii) Case-mix indexes (CMI), a measure of the complexity of in-patient episodes treated in the hospital in terms of recourse consumption - price. Administrative changes in these variables promote changes in hospital behaviour.

Methods: In 2007, funding rules suffered two important administrative changes that heavily impacted on the use of DRG financing. On one side, patients admitted for in-patient care, whose length of stay is higher than the DRG upper limit, count now as 1 Equivalent Patient; there is no proportional effect of their LOS, as previously occurred. On the other hand, when discussing activities and financing engagements, Health Care Authorities impose the use of previous (un-updated) case-mix indexes. This paper analyses DRG, in one of the biggest public hospitals in Portugal in 2007, comparing the effect of the above changes in the rules (with and without this administrative change in the DRG database of 2007). This paper also uncovers DRG which are the drivers of change, i.e., identifies the "loser" DRG.

Results: Change of the administrative rules reduces: i) number of financed discharges (equivalent patient), ii) CMI, iii) overall income. It also induces hospitals to look for alternative sources of financing, instead of just focusing on CMI. Number of DRG responsible for this decrease in financing are small, and most of them have high relative weights.

Conclusions: These changes were designed to i) reduce financing stress of the Portuguese NHS, by decreasing the bill to be paid to hospitals; and ii) generate efficiency incentives – mostly with the first change. Notwithstanding, we note that the pressure for efficiency associated to this financing model, in some cases, produces perverse incentives: i) Quick discharges – "Quicker but sicker" for certain patients needing longer treatments; ii) Increase of LOS for other patients needing shorter stays. We also observe that, not updating CMI, mainly for the hospitals that had increased it in the last years: i) creates problems of solvability or sustainability; ii) decreases funding for hospitals that treat more complex patients; iii) generates incentives to select patients ("adverse selection"); and iv) hurts equity funding among hospitals. Finally, we conclude that the most important variable of a DRG-based funding model – CMI – lost the attention of hospital actors in external engagement with Public Authorities.

Conflict of interest: None disclosed.

Towards transparency in health care in the Netherlands

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Introduction: In 2005 a dutch case mix system, the DBC-system was introduced in all hospitals in the country. This system was mainly used for billing provided care. The price of 10% of all provided care was to be negotiated between providers and insurers in a 'free market'. The other 90% of provided care was financed on the basis of existing historical budgets. In 2008 the 'free market' portion was enlarged to 20%. Plans are to enlarge this portion to 35% in 2009 and further up to 70% in later years. The rest of budgets will be determined on prices based on costing of the future DBC's.

In line with the developments of the financing system in the Netherlands and the political choices of a substantial free market it is interesting to look at: (1)The effects of the political choices on prices and quality of care in the Netherlands; (2)Intervening variables that determine the failure and success of the system.

Methods: The evaluation of the effects of the system on price and quality of care will be based on a number of studies that were recently performed. The results of these study show mixed effects with a slightly positive tendency. Next to that, the effects of increased transparency on policy in health care financing will be discussed. Intervening variables are explored.

Some case-experiences regarding possibilities for manipulation will be discussed.

Results: The introduction of a free market portion in health care in the netherlands has had differing effects on price of care and quality of care, with a tendency towards a positive influence on price and quality. Intervening variables that determine the effects of the introduction of free market on price and quality are the complexity of the system, the absence of indicators for severity, the differences in the financial system for medical professionals versus for hospitals, the development of performance indicators and the room for manipulation of users of the system.

Conclusions: On the basis of the experiences some guidelines for the future of casemix systems in relation to stable financial systems can be developed.

Conflict of interest: None disclosed.

Refining hospital reimbursement: A Belgian pilot study aimed at appropriate length of stay, charge and cost

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Introduction: Current Belgian hospital reimbursement in terms of charges is mainly independent of the cost of patient care. 'Appropriateness' is only defined for length of stay, using an average approach with outlier adjustment. There is also no relationship with evidence based guidelines. This pilot study attempts to link appropriate hospital reimbursement with activities and casemix parameters on the level of patient groups, using APR-DRG v. 15. Different ways to capture the variability of care are being investigated.

Methods: In a first phase national Belgian minimal medical and financial data are being explored for about 800000 patient stays in all 116 Belgian general hospitals, during the second semester of 2005. Different international approaches are tested to model and refine appropriate length of stay and charge. The approach introduced in Canada by the CIHI in 2007 is applied on the Belgian data, next to Australian, UK, US and other outlier definitions. The second study phase addresses a similar cost prediction, based on data of a limited number of hospitals. Comparisons are made. Thirdly, guidelines, clinical pathways and patient record analysis are used to evaluate and refine the models further. Finally, feedback on the findings is being sought from involved policy makers and hospital directors.

Results: This pilot study, which is currently halfway, will result in a two-tiered system addressing appropriate length of stay, charge and cost in hospital reimbursement. At the first tier the prediction model covers as much as possible of the available variability in patient care. At the second tier, the remaining variability is differentiated into a low, medium and high variability grouping of APR-DRGs. These classes require a different, customized financial rule set of prospective payment.

Conclusions: At present the necessary scientific knowledge and the statistical techniques to optimise an 'appropriate' hospital reimbursement are available. A country like Belgium, that also can provide the necessary patient data, should make use of these opportunities to improve the healthcare system.

Conflict of interest: None disclosed.

Beyond funding: developing specific indicative cost components for internal hospital benchmarking based on DRG data

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Introduction: APDRG's are used in Switzerland for hospital financing since 2002. In 2007, 228 new subgroups were created to refine further the aging APDRG's. Such a refinement was made possible by the fast increasing quality of the participating hospitals cost data. Since 2003, all hospitals have to calculate their costs to comply with a new legislation: if they don't, sickness funds may refuse to reimburse them the full DRG price. This new legislation represented a strong incentive to improve cost calculation: in 2005, the Swiss hospital federation (H+ Les hôpitaux de Suisse) delivered to its members a new cost accounting package. Once this package installed, the hospitals were able to routinely do case-costing, thus improving greatly the quality of cost data. A survey conducted in late 2006 showed that 80% of the hospitals had succeeded in implanting full case-costing.

Methods: With the improvement of cost data, it seemed appropriate to move beyond funding to the development of indicative cost components for internal hospital benchmarking. 9 of the most common cost components were identified: intensive care, OR,

medical goods, emergency services, labs, imaging, nursing care, hotel services and physicians. The detailed costs of each cost component were aggregated and computed, both for the cost-weights version 5.1 and 6.0.

Results: Results were most interesting and revealed impressive variations of cost components percentage from DRG to DRG. Nursing costs ranged from 1% to 63%, confirming former studies OR from 0.5% to 68 %, etc. Numerous examples will be part of the presentation. Since the aim of the study was to promote hospital internal benchmarking, the results were published on the APDRG Suisse website for use in each hospital as a tool to compare its own cost components data with the national averages. Consulting agencies, as members of the APDRG Suisse group, integrated this new tool into their benchmarking packages.

Conclusions: It was discussed as to whether it was more useful to publish data which quality was often questionable or not publish any data until the level of quality had reached acceptable level. Since it is predictable that the quality of the cost data will be improving continuously because of the strong incentives, it was decided to publish the results, in particular to prepare the ground for future developments and uses. It was also decided to present the results with precautions and to add to the title that these results were "indicative".

Conflict of interest: None disclosed.

Casemix report in Japanese hospitals

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Introduction: Since the introduction of the Japanese case-mix classification system (DPC; Diagnosis Procedure Combination) in 2003, it has become possible to analyze volumes of acute care delivery, resource use, and some clinical outcome measures across participating hospitals. Case-mix statistics can play an important role in informing health policy recommendations. The number of hospitals participating in the DPC system has steadily increased each year. With an initial pool of 82 academic hospitals in 2002, the system has expanded to include 174 hospitals in 2003, 361 in 2004, 731 in 2006, and 1400 in 2007. Many of the institutions now participating are community hospitals, which contribute a variety of case-mix statistics. This study aimed to understand the variation in resource use by hospital type.

Methods: The Ministry use the DPC database to store clinical information and medical claim data. The DPC system also serves as a reimbursement mechanism, organized around per-diem payments for DPC groups. Of the 731 hospitals enrolled in this payment system in 2006, 469 agreed to participate in this study. We selected 17 of the 18 Major Diagnostic Categories (MDCs) in the DPC system, then analyzing 34 DPC groups corresponding to those 17 MDCs with or without any procedure listed in DPC definition table. Only the "mental health disorder" and "miscellaneous" groups were excluded from this study. As proxies for resource utilization, length of inpatient stay (LOS) and total charges (1 € = \160) were calculated. If every hospital had fewer than 10 cases for any of the 34 study groups, the original average of every 34 group was used as a surrogate value and average resource use was recalculated. The amount of variation in resource allocation between hospitals was subdivided into the following three components: amount of variation attributable to hospital processes (efficiency), amount attributable to hospital case-mix (complexity), and amount attributable to the interaction between efficiency and complexity (interaction). Independent variables in this study included case-mix group, hospital type (academic or community), ownership, and hospital volume (<500 discharged patients per month, 500-999, or >1000).

Results: Of the 469 participating hospitals, 69 were academic and 400 community-based. Of the 1,727,231 DPC patient cases in 2006, we included 1,721,274 in this study. Nearly 26% of patient cases were from academic centers. The overall average for LOS was 15.4 days, and the average TC was 4,311 €. The DPC group with the highest patient volume was digestive and hepato-biliary-pancreatic disorders with procedures (15.3%). The group with the highest mean LOS (32.4 days) and TC (10,436 €) was hematological disorders with procedures. Mean LOS was longer for academic centers than community centers (17.6 versus 14.7 days). Interestingly, the narrower range of LOS or TC difference was found in academic or high-volume hospitals. The tightened range of efficiency or complexity component in LOS and TC were also observed in academic or high-volume hospitals (Table). Among the 259 hospitals with shorter LOS values, 97 had above-average complexity.

Conclusions: Our study found that complexity was the major contributor to LOS in 195 hospitals and to TC in 256. Additional room for improving efficiency remains in academic centers, most of which had above-average complexity. Efficiency contributed more than complexity to longer LOS values in 53 hospitals, and to higher TC values in 59. Teaching responsibilities may contribute to these inefficiencies. We believe that DPC payment should be linked more closely to the complexity of patients treated. By this system, hospitals would receive predetermined payments according to the complexity of care, but could receive pay-for-

performance incentives for efficient care. This cross-sectional study was not exhaustive, and additional longitudinal studies will be required when monitoring quality improvement. In formulating health policy, DPC will prove to be an invaluable tool through the contribution of case-mix indices on assessing Japanese healthcare resource allocation and hospital performance.

Table 1: Aggregated statistics of averaged observed differences for hospital characteristics

Hospital	N	Cases	LOS diff.	LOS diff. Efficiency	LOS diff. Complex	LOS diff. Interaction	TC diff.	TC diff. Efficiency	TC diff. Complex	TC diff. Interaction
Function										
Academic	69	446.589	2.6 [-2.7 - 7.3]	2.3 [-2.9 - 7.6]	0.5 [-0.3 - 1.7]	-0.3 [-1.6 - 1]	1165 [-168 - 4377]	950 [-8 - 2208]	263 [-81 - 2092]	-48 [-430 - 491]
Community	400	1.274.685	-0.6 [-8.2 - 8]	0.2 [-4.9 - 6.2]	-0.3 [-4.7 - 6.8]	-0.5 [-5.3 - 5.1]	-495 [-3038 - 6399]	-344 [-1552 - 757]	-142 [-1465 - 3321]	-8 [-1621 - 2861]
Ownership										
National	51	260.661	2.6 [-2.5 - 7.3]	2.3 [-3.1 - 7.6]	0.5 [-1.2 - 2.4]	-0.2 [-1.6 - 2.8]	927 [-696 - 4377]	695 [-679 - 2208]	272 [-741 - 2092]	-39 [-430 - 737]
Municipal	80	304.034	0.3 [-4.3 - 5.9]	0.7 [-4.2 - 6.2]	-0.2 [-3.1 - 2]	-0.2 [-1.9 - 1.4]	-319 [-1715 - 3741]	-239 [-1407 - 1550]	-120 [-1465 - 1988]	40 [-475 - 1039]
Private (non-profit)	124	443.023	-0.5 [-6.4 - 5.2]	0.2 [-3.9 - 5.0]	-0.3 [-2.8 - 2.6]	-0.4 [-2.4 - 1.2]	-564 [-2040 - 1015]	-368 [-1277 - 686]	-198 [-1176 - 1199]	2 [-887 - 536]
Private (for-profit)	214	713.556	-0.6 [-8.2 - 8]	0.2 [-4.9 - 5.8]	-0.2 [-4.7 - 6.8]	-0.7 [-5.3 - 5.1]	-324 [-3038 - 6399]	-200 [-1552 - 1743]	-87 [-1459 - 3321]	-37 [-1621 - 2861]
Volume										
Low	219	387.686	-0.2 [-8.2 - 8]	0.3 [-13 - 10.7]	-0.4 [-4.7 - 6.8]	-0.1 [-10.4 - 13.2]	-588 [-3038 - 6399]	-361 [-1552 - 2208]	-201 [-1465 - 3321]	-26 [-1621 - 2861]
Middle	178	761.190	-0.1 [-5.2 - 7.1]	0.3 [-4.5 - 6.3]	-0.1 [-2.8 - 2]	-0.3 [-2.8 - 1]	-128 [-1721 - 4377]	-109 [-1407 - 1961]	-30 [-1176 - 2092]	10 [-430 - 536]
High	72	572.398	0.2 [-5.1 - 6.4]	0.2 [-4.4 - 4.9]	0.3 [-1.5 - 2.4]	-0.3 [-1.3 - 0.4]	473 [-885 - 2135]	364 [-683 - 1743]	147 [-720 - 917]	-37 [-365 - 323]

TABLE FOOTER: LOS = length of in-patient stay day; TC = Total charges (€), [ ] = range.

Conflict of interest: None disclosed.

SESSION 8: Use of in-hospital mortality information to assess quality of care

Our Charité Hospital challenge: who to compare to when looking at mortality?

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Introduction: We had already compared our distribution and proportion of cases dying by APR DRG and ROM with a large German dataset initially developed by 3M with many of its clients for classical efficiency measurement, length of stay analysis, etc. This produced very good comparative results for us but our goal has been more recently to identify the best benchmark to compare ourselves with, in order to learn about and improve if need be our clinical efficiency. So this is the topic of this presentation, what should we use as the best benchmark to compare our practice?

Methods: We co-opted 9 other German members of the 19 VUD (Academic Centers-AC) members of the committee on Quality Assurance to pool their data with ours and participate with us in a comparative evaluation using APR DRG and ROM for the years 2006 and 2007. We produced crude mortality ratios (ratios of proportion of case who died without adjustment) as well as standardized mortality ratios (indirect standardization) allowing predictions based on the probabilities of dying from each ROM and APRDRG cells in the benchmark applied to our hospital; then dividing the expected number of deaths by the observed number of deaths, summed up across ROMs and DRGs.

Results: First,for 2006, 46 556 medical DRGs cases were in ROM 1, with a mortality rate of 0.1% (ratio of 0,40 from AC benchmark); 15 413 medical DRG cases in ROM 2, had a mortality rate of 0.9 % (ratio of 0,64); 6245 such cases in ROM 3 with a mortality rate of 7,6 % (ratio 1,02); and 1653 cases in ROM 4, with a fatality rate of 39.4% (ratio 0,98). Also, 34 629 surgical DRGs cases were in ROM 1, (ratio of 0,18 from AC benchmark) in Charité hospital; 7913 surgical DRG cases in ROM 2, with a mortality rate of 0,4% (ratio of 0,52); 3570 such case in ROM 3 with a mortality rate of 5.2%(ratio of 0,79); and finally 2158 cases

in surgical DRGs and ROM 4 with a fatality rate of 31.2% (ratio 0,98). We observe the expected pattern of monotonic decrease of the number of cases and increase of mortality by ROM subclasses. Second, for 2006, we analyzed our 310 DRGs (183 medical DRGs and 127 surgical DRGs); retained a threshold of 3 deaths for medical DRGs and 2 deaths for surgical DRGs, so kept 105 medical DRGs and 92 surgical DRGs. Except for the ROM1 medical DRG cases, the proportion of cells where the 3M general benchmark had a 15% or higher mortality rate in comparison with the Academic Centers pooled benchmark is higher in all ROM subclasses. 16 ROM cells of medical DRG out of 105(15,2%)have an AC benchmark mortality ratio higher than 15% in comparison with the general benchmark,versus 78 out of 105 of them (74,2%) having a general benchmark mortality ratio higher than 15% in comparison with the AC benchmark(83,3% for union of ROM1 and 2 cells). For the surgical ROM cells, 31,5% of them have a Charité mortality ratio higher than 15% in relation to the general benchmark, while 52,1% (48/92) have a general benchmark mortality ratio higher than 15% (70,2% for union of ROM1 and 2. Third,using all DRGs, the crude mortality ratios are significantly reduced when adjustment is made with the ROM indicator for both years 2006 and 2007 (Table 1); when an academic center benchmark is used in 2006 and 2007, the crude mortality ratios and adjusted SMRs raise and are closer to 1,00 (neutrality) in comparison with the general 3M benchmark (BM), as could be expected. Using for 2007 an academic center benchmark without including Charité Hospital(9AC)slightly change the results. Finally,in 2007,and using only the AC benchmark,two of the academic centers had SMRs higher than 1, 2 and one academic center with SMR less than 0,8. There is of course much variability when looking at specific Major Diagnostic Categories and DRGs.

Conclusions: Using an Academic Centers benchmark allow us to review more DRGs and areas where coding quality or quality of care may be at issue in comparison with using a more general benchmark. However, comparing ourselves only to norms that are pooled averages may be less informative than identifying the best practices and performing centers for each significant DRG and ROM, and ideally using data from all 40 AC.

Table 1: Charité and Academic Centers benchmark crude and ROM adjusted mortality. 2006-2007

BM/year	#BM	DRG partition	% dead BM	C. death ratio	ROM SMR
2006: 3MD	2,745,315	Total	2.2%	0.825	0.653
		Medical	2.7%	0.671	0.618
		Surgical	1.4%	1.324	0.710
2006: AC	512,205	Total	1.8%	1.040	0.910
		Medical	1.7%	1.014	0.922
		Surgical	1.8%	1.078	0.894
2007: AC	532,430	Total	1.9%	0.970	0.870
		Medical	2.0%	0.944	0.862
		Surgical	1.8%	1.007	0.883
2007: 9AC	412,255	Total	1.9%	0.962	0.830
		Medical	2.0%	0.929	0.816
		Surgical	1.8%	1.009	0.851

Conflict of interest: Lutz Fritsche, Marc Berlinguet and Matthias Kirste – Other; Christine Kolodzig – Consultancies or honoraria.

Successful application of the APR-DRG classification to assess the episodes of care of patients who died

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Introduction: We propose an study of the results. One of the main advantages of working on performance indicators is that you can work directly on data already available, as are those of Minimum Basic Data Set (MBDS) and this provides two advantages: immediate available information because the data already exists and no further investment of resources to obtain them. If instead we look at processes, data is generally more complex to gather. It is customary when acting as weaknesses in the process; work on results allows anticipate and identify sources of potential problems. The approach of quality analysis on the results was articulate from the golden triangle of outcome quality indicators whose three points are: mortality indicators, indicators of complications and indicators on hospital readmissions. This paper is an initial study phase and mortality has been chosen as a focus of analysis results because mortality analysis is an important component of quality evaluation. This study was done in Spain in the Hospital Clinico San Carlos, with 1,000 beds, 35,888 discharges (year 2007) and covering all medical specialties. Special thanks to Dr Lutz Fritsche, from Charite Hospital to have provided authorization to use his hospital as benchmark (BM).

Methods: The approach has been made on the basis of a BM between the hospital Spanish, and the academic centre, Charite Hospital in Germany. It has been using the 2007 MBDS of episodes of hospitalization from both hospitals. The diagnostics were coded with Disease International Classification of Diseases ICD-9-CM and bundled with software from 3M® All Patients Refined-Diagnostic Related Groups (APR-DRG)® version 20.The results have been analyzed with a spreadsheet in Microsoft Excel. The system allows APR-DRG grouping the case mix in four Risk of Mortality (ROM) subclasses (1 the lowest and the highest 4) based on the likelihood that mortality occurs. This enables adjuster to better compare case-mix mortality rates with benchmark for each

and all DRGs. In our study we select for review of charts only those cases with ROM Groups 1 and 2,because they are where they are less likely to happen and what we confront death with the frequency of occurrence in the group contrast benchmarking

Results: The number of deaths for the medical DRGs is 6.1% while 1.8% for surgical DRGs. The % of mortality in hospital Spanish is 4.1% versus 1.8% Benchmark Group, which constitutes a significant difference. In Spain the % of hospital mortality is ~4%. Indirect standardization adjusting for the 4 subclasses risk of mortality (ROM) defines a Standardized Mortality Ratio (SMR) of 2.26 for the medical DRGs and 2.16 for the surgical DRGs. When we adjust only with 16 age and gender groups, the SMR drops down to 1,7 and 0,95 respectively for medical and surgical DRGs. The overall crude ratio between the benchmark and San Carlos is 2.23,about the same after ROM adjusted SMR of 2.24: the SMR with age and gender adjustment is much less at 1.47. As summarized in the ratios above, and after review of specific information for all DRGs with a larger crude ratio or SMR, we documented that there differences in the age and gender structure between the hospital and the benchmark as exemplified in the CVA & Precerebral Occlusion with Infarct DRG cases (crude mortality ratio of 4.16 between hospital and BM), where the average age is 78,4 years in the Charite H. while 83,5 years in the Madrid hospital, and even a wider difference for the men 72,6 years versus 81,8 in our Madrid hospital. Now we are recoding and doing chart review for all cases from the DRGs with higher SMR and for all cases who died in ROM 1 and 2, except for the following exclusions: older patients, palliative care patients, immuno-suppressed and complex cancer patients, trauma patients

Conclusions: 1) Some crude mortality rates and ROM Standardized mortality rates (SMR) in our hospital are significantly different than in the benchmark. A more specific benchmark with more local data from Spanish hospitals is necessary. 2) ROM is applicable in Spain and can be used. Results can be obtained using administrative routine data. Results are immediately available for internal quality management. 3) Problems in documentation and coding and/or potential quality problems can be further identified. 4) ROM is becoming a valuable and valid indicator for risk adjustment of mortality in our hospital. 5) More in depth validation is needed with the Charite Hospital to understand why some differences are so important, but this provides a new and exciting initiative for us of European comparisons for quality of care using DRGs.

Table 1: Distribution and percentage of deaths of San Carlos Hospital (Spain) compared with external benchmark (2007)

APR-DRGs Partition	Number of inpatients discharges	Number of deaths	Probability of death	Crude Mortality ratio San Carlos vs Charite	Type of comparisons	Standardized Mortality Ratio San Carlos vs Charite
Medical	18 675	1 138	6.1%		16 age/gender groups	1.70
					4 ROM	2.26
Surgical	15 957	291	1.8%		16 age/gender groups	0.95
					4 ROM	2.16
Total	34 632		4.1%		No adjustment	2.23
					16 age/gender groups	1.47
					4 ROM	2.24

Table 2: Average Length of Stay (LOS), Number of Secondary Diagnostics and Procedures, San Carlos Hospital (Hosp) and Charite Hospital (BM). APR DRG Cerebro-vascular Accident and Precerebral Occlusion with Infarct . 2007

Avg LOS		Avg #SDx		Avg #Proc	
BM	Hosp	BM	Hosp	BM	Hosp
8,50	9,43	5,0	5,0	4,6	4,9
9,28	12,39	7,5	7,0	4,7	4,4
10,85	34,40	11,0	8,2	6,0	4,7
13,63	23,81	13,5	9,2	11,1	4,7
9,41	14,78	7,2	6,6	5,2	4,6
8,85	11,19	6,2	6,2	4,6	4,6

Conflict of interest: None disclosed.

The use of different DRG groupers and its impact on hospital quality indicators

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Introduction: We belong to the Portuguese Group of the International Quality Indicators Project (IQIP). In this project, the indicator 3 - Acute Care Mortality includes total mortality rate and sub-indicators indexed to relevant DRGs. In August 2006 Portuguese hospitals updated their DRG grouper from HFCA V.16 (G16) to AP-DRG V.21 (G21). Since then we noticed a difference in the analyzed values and trends of this indicator. IQIP's manual doesn't establish a definite grouper to compute this indicator but its definition of the sub-indicators implies the use of the USA grouper required by MEDICARE (HFCA V.24). This appears to be a potential drawback to the benchmarking branch of this project as IQIP is widely used to evaluate acute care quality indicators,

making it possible to compare hospital performances from different countries. However, in order to fully understand these comparisons, it is necessary to clarify the impact which the different grouping systems used in various countries may have on the results.

Methods: We compared mortality rate sub-indicators indexed by DRG from our hospital database classifying all discharges during 2007 by two different DRG groupers used in Portugal (HFCA V.16 and AP-DRG V.21).

Results: Taking in consideration the relevant DRGs for mortality analysis by IQIP (Table 1), we found that, with G16, we analyzed 11% of total inpatients, accounting for 34% of in hospital mortality whereas with G21 we were looking at less than 7% of inpatients, accounting for only 10% of mortality. In further analysis we will exclude DRGs 475 and 489 as they constitute extremes. The first one shows the same values with the two groupers and the other one disappears with G21. The mortality rates obtained using G21 decreased between 1 and 11 percentage points in relation to the ones obtained with G16. The variation in the number of inpatients by DRG, induced by the use of G16 or G21, ranges from 20% to 83%. The variation in the number of deceased by DRG, induced by the use of G16 or G21, ranges from 40% to 100%. In half the DRGs analyzed, this last variation more than doubles the variation in the total number of inpatients by DRG. When we tracked those patients (Table 2) we found new relevant DRGs that explain hospital mortality, namely 533, 540, 541, 544, 552, 568, 584, 810. All these DRGs are related to the original ones but refined for patients with major complications.

Conclusions: This short paper demonstrates that the comparison of mortality rates indexed by DRGs between different institutions, countries and even different years, as occurred in Portugal, needs to take into careful account the DRG grouper used. The heterogeneity of groupers and even of the philosophy of classification endangers any serious attempt of benchmarking indexed by DRGs. In view of this problem, IQIP has recently introduced three new sub-indicators indexed by ICD-9-CM coded diagnosis, as opposed to breakdown by DRG, to be reported on only by non-USA hospitals.

Table 1: Comparison of Mortality Rates by DRG Grouper

	Grouper HCFA v. 16			Grouper AP-DRG v. 21		
DRGs	Inpatients	Deaths	Mortality Rate (%)	Inpatients	Deaths	Mortality Rate (%)
14	1 127	105	9,3	738	20	2,7
79	165	24	14,5	65	8	12,3
88	444	20	4,5	356	12	3,4
89	984	155	15,8	605	70	11,6
127	636	47	7,4	497	18	3,6
174	147	7	4,8	72	0	0
316	182	13	7,1	125	3	2,4
416	321	129	40,2	54	16	29,6
475	89	25	28,1	89	25	28,1
489	202	40	19,8	0	0	0,0
All other	34 555	1 090	3,2	36251	1483	4,1
Total	38 852	1 655	4,3	38852	1655	4,3

Table 2: Distribution of DRGs by Grouper

AP-DRG v. 21 \ HCFA v. 16	14	79	88	89	127	174	316	416	475	489	Total
14	738										738
15	2										2
35	19										19
75				1							1
79		64									64
80		9									9
88			356								356
89				593							593
90				52							52
127					497						497
174						70					70
175						45					45
316							125				125
416								54			54
475									89		89
477	1										1
533	216										216
540		68									68
541			87	332							419
544					139						139
552						32					32
568							57				57
584								264			264
702										1	1

AP-DRG v. 21 \ HCFA v. 16	14	79	88	89	127	174	316	416	475	489	Total
703										9	9
705										40	40
706										9	9
707								1		8	9
708										9	9
709										32	32
710								1		48	49
711										1	1
712		2								7	9
713				1						3	4
714				5				1		35	41
740			1								1
800		16									16
801		6									6
810	151										151
Total	1 127	165	444	984	636	147	182	321	89	202	4 297

Conflict of interests: None disclosed.

Casemix systems and quality evaluation: a young marriage soon to divorce?

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Introduction: In this paper we highlight the different issues associated with using routinely collected casemix data for quality evaluation of hospitals. Most DRG or casemix systems have not primarily been developed to measure quality of care but to measure resource intensity. In the latter years some DRG systems have been specifically adapted to measure aspects of quality of care such as Risk of Mortality adjusted mortality ratio's, present on admission indicators etc….The way DRG systems today are designed and used to fund hospitals often result in a financial gain for hospitals reporting and coding non-safe or non-quality care.

Methods: In Belgian several initiatives have been taken to calculate and disseminate quality indicators based on routinely collected casemix data. Using the matrix database of routinely collected administrative, invoice, ICD-9-CM and nursing data of 45 Belgian hospitals, we calculated several promulgated quality indicators such as patient safety indicators, outcome indicators, risk of mortality adjusted mortality ratio's, readmission ratio's.

Results: Based on this dataset we highlight the different pitfalls in using casemix data for quality evaluation of hospitals. We show the different possibilities to use routinely collected casemix, nursing and invoice data to evaluate practice differences.

Conclusions: We conclude that quality indicators based on casemix data do not allow to evaluate and to benchmark quality of care. This means casemix data can not simply be used as a tool to correct current financing systems to build outcome based Pay For Performance (P4P) systems. On the other hand since this data is routinely collected, the information is very useful as a detection tool for potential quality issues and can extremely well be used to highlight significant practice differences in patient care and cure.

Conflict of interest: None disclosed.

SESSION 9: International comparisons

Is it a big advantage to develop a DRG system based on an international established system? - Experiences of the development of the Swiss DRG system based on the German G-DRG system

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Introduction: In Germany, a DRG system for the in-patient sector was established in 2002, which based on the Australian AR-DRG system. Over the last six years this system was adapted for Germany and developed further, in order to use it as a prospective payment system. Due to the decision in Switzerland to introduce a DRG system for remuneration, they chose the very differentiated and versatile German G-DRG system for further development of the Swiss system. The following annotations describe the advantages and disadvantages of the adaptation process.

Methods: To adapt and develop a further Swiss DRG system different steps are necessary. Since differing classifications of diagnoses and procedures are used by the different countries, transitions between these classifications are required (mapping). Because of the topic's complexity a concept has to be formulated, therefore allowing a transition to be determined accurately. With this mapping, as the next step the underlying algorithm can be defined by the classifications of the country that is adapting the system. If necessary, adaptations of the data format could be made, so that the grouping software (grouper) can detect the epidemiological parameters. The result of this process is a first development patient classification system.

If cost data is available in the country, this can be used for the determination of the cost weights of the DRGs. Imperatively this cost data has to be valuated. Therefore it is useful, if the cost data exists modularly, in the context of a cost unit accounting. Then, a methodology for the determination of inliers and for the financing of outliers has to be defined. After that, a catalogue with cost weights for inliers and outliers can be established.

Results: The excellence and acceptance of a DRG system depends on a close approximation to real case costs. Thereby, one of the main problems is a cost compression. This denotes a tendency to underpay high cost cases while overcompensating simple services. To avoid this cost compression, two aspects are of huge importance for countries, which want to succeed in a prospective payment system:

- creating a highly sophisticated classification system and

- establishing a sound methodology to determine factual case costs.

The analysis of the originated Swiss patient classification system and the Swiss cost weights shows that the developing process lead to a compression of the primary level of differentiation. This compression can be retracted by several adaptations, in order to gain a highly sophisticated DRG system.

On the one hand, while the process of mapping is executed, it becomes apparent that the classifications are very often missing the level of differentiation for the description of elaborated activities. By means of marks the several critical areas can be made detectable, in order to enhance the classifications to these topics. The same has to be done to the coding guidelines aligned to the DRG system. Adaptations of the algorithm might be necessary to reassess the haziness due to the mapping.

On the other hand, the quality of the cost weights is based on a sufficient cost unit accounting. Because of the highly complex matter, the use of a calculation directive as a standard is helpful. A clear directive of a performance depending cost assignment is necessary. This has to define the assignment of highly expensive material costs, costs of doctors and nurses, costs for infrastructure, et cetera. Furthermore, the checking of the plausibility of the cost data raises the data's quality immensely. Early feedback of these distinctive features to the calculating hospitals makes corrections of the data possible.

Conclusions: The development of an own DRG-system, based on an existing system, is possible by several technical steps. The resulting demand of adaptation refers substantially to the medical classifications and the cost calculation. The experience shows that important knowledge for the enhancement of the DRG system from the adaptation of a advanced DRG system carries on. Bilateral cooperation is very helpful to integrate national and cultural characteristics. The alternative adoption of a DRG system, which has not to be adapted to the classifications, does not provide these indications for the enhancement. Therefore a highly sophisticated system will not be achieved and the "black box" of the unfamiliar foreign system will remain.

Conflict of interest: None disclosed.

Applying the Nordic rehabilitation casemix model to a French case mix database

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Introduction: Since 1998 in France, a case mix system is applied in rehabilitation and post-acute care hospitals. The standardized data set has been defined based on morbidity, functional status, rehabilitation type and staff working time and is weekly recorded. There is a grouping algorithm but no utilization for the payment due to a mix of technical and political issues.

Most of the rehabilitation case mix groupers tested in other countries (FRG in USA, FIG in Australia and NordDRG in Europe) are based on a recording by stay including morbidity coding and a functional status measure at admission and sometimes at discharge. We have proposed in 1996 during the PCS/E working conference in Sydney the same type of model for orthopedic rehabilitation. The rehabilitation case mix system developed by the NordDRG Rehab-group is based on statistical analyzes of length of stay and functional status of the patients measured with a new instrument for assessment of functioning (NASS: Nordic Assessment System) based on the WHO new classification system for function (ICF).

We applied the algorithm of the rehabilitation Nord DRG to the database of the University Hospital of Saint Etienne in order to test the feasibility to use in another country (France) a case mix developed in the European Nordic countries and as well the opportunity to assess the functional status within midterm health services hospitals with the new WHO classification tool mainly tested until now in specific social and rehabilitation services.

Methods: The 7061 inpatients stays recorded from 2003 to 2007 within the 3 rehabilitation and post-acute care units in the university hospital of Saint Etienne were selected. ICD-10 codes as principal diagnosis or etiologic diagnosis or rehabilitation diagnosis (Z50-group) were mapped to one of the 11 diagnosis groups (based on ICD-10) of the Nord DRG classification. A

mapping of the functional status at admission measured by an activity of daily living (French acronym AVQ, including 6 axes of 4 levels, plus the use or not of wheelchair) was achieved with the NASS (11 axes of 5 levels). Then the whole stays were clustered according to the Nord DRG algorithm in 32 final groups. Data management and statistical analyses were performed with SAS software.

Results: The functional rehabilitation unit includes 21.3 % of stays, with younger patients (48.6 years ±18.5) and longer LOS (48.8 days ±49.1). The 2 geriatric units 78.7% of stays with older patients 84.2 years ±6.4 and shorter LOS (31.0 days ±31.8). The 7061 stays are clustered into 32 NordDRG rehabilitation groups: the average LOS vary from 5.6 days for group D111 Rehabilitation for amputation to 61,5 days for group C111 Rehabilitation for spinal problem. The LOS explained variance part(R2) is 10.2%. For geriatric stays the R2 is 10.1% and for functional rehabilitation stays 10.2%. When age (>75 y versus <75 y) is added in the model, R2 reaches 12.6%. The maximum R2 (16.5%) is obtained combining rehabilitation group, age and units (geriatric versus functional rehabilitation units)

Conclusions: Mapping the French functional status scale (less precise) with the Nordic one was the main difficulty namely for the axis "toileting" missing in the French scale. This limit is in favor of the use of an international functional status scale like ICF (or related to ICF as NASS) rather than a genuine national functional status specific scale. The feasibility test of a rehabilitation case mix system developed in the European Nordic countries in France was conclusive for the model is simple and it is performing better for LOS variance reduction than the officially used French grouper (aiming to explain the cost per day). Finally this work tries to support that the French rehabilitation and post acute care case mix system shall move from week based record to a full stay record.

Conflict of interest: None disclosed.

First German - Austrian CaseMix comparison with real life data

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Introduction: Many countries use Casemix system for funding in healthcare. So far comparisons between the systems have been performed whenever people in a country were thinking about introducing a Casemix system in their respective country. Moreover there are also other reasons. Especially when countries share borders it is often the case that also citiziens share healthcare services. Germany is directly adjacent to Austria and therefore we conducted a study that compares the German G – DRG System with the Austrian LKF – System in order to find out, where the systems differ and where they're similar.

Methods: We analyzed a sample of 2385 patients that were treated as inpatients in an university hospital in the state of Salzburg, Austria. The initial challenge was to detect structural differences in the underlying data. First of all we had to perform a matching exercise for the procedure classification. In Austria, where the LKF – financing system was set up 1997 there is classification called "Medizinische Einzelleistungen" (MEL) in place. It contains about 3,500 procedures. In Germany we use the "Operations- und Prozedurenschlüssel nach §301" (OPS301) that contains roughly 30,000 codes. For diagnoses fortunately both countries rely on ICD – 10. The German version (ICD-10 GM) does not significantly differ. However some minor adjustments on the coding had to be performed. In the next step we identified other differences in funding. The most significant difference is that the G-DRG System always produces one DRG with a fixed cost-weight that is only affected by outlier adjustments. For payment sometimes co-payments e.g. for dialyses or expensive drug or blood products apply. In Austria the funding based on LKF is much more differentiated: every DRG (it is called LDF-group for conservative and MEL-Group for surgical cases) consists of various elements that affect the resulting cost-weight.

It consists of the following components:

- procedure
- length of stay
- low outlier
- high outlier
- intensive care
- repeated procedure
- special procedures

After matching the procedures and adjusting the diagnoses we transformed the intensive care data into the German corresponding classification, which respects hours of mechanical ventilation (HMV) and sometimes the complexity of treatment that is coded via an OPS – code based on daily TISS and SAPS measuring. Finally we transformed the Austrian data format, which is a fixed format that contains all values in one file into the German so-called §21-format, which is a comma separated value (csv) format having seven files for case, ICD, OPS, hospital, department, cost and structural information. After this preparation we

sent the data through the G-DRG Grouper Version 2008. Having those initial results we performed an analysis on plausibility and selected about 300 cases where the patient records had to be reviewed directly. We chose intensive care, same-day, newborns and cardiology cases to be reviewed in this sample.

For assessment of the payment we used the regional reimbursement rate in Salzburg and the base rate of a German university hospital in Bavaria as the original data also emerged from an university hospital in Austria.

Results: Although the final results are not yet ready – we will be happy to show them on PCSI conference, we found the following – to some extent surprising results:

- Matching was feasible and reliable, we did not produce Error-DRGs
- The systems although they are very different in design (LKF: ca. 850 DRGs and 3,500 procedures, G-DRG: 1,158 DRGs and 33,000 procedures) and in the mechanisms of producing the final cost-weight match astoningly well and produce almost consistently close payment rates!
- The biggest differences we found were in the area of intensive care, same-day patients, cardiology and newborns, therefore we draw a representative sample to further investigate in these cases by peer review which is currently still going on.

Final results will be ready by the end of June 2008.

Conclusions: It is a bit early to draw final conclusions as we're still in the phase of review the patient records. The most surprising results are the good correlation of the payment rates although system design is heavily different.

Moreover one finding to be proven is the higher payment for intensive care (still under investigation) cases. One structural difference is the higher stuff quota on Austrian intensive care units compared to German ones.

Conflict of interest: Michael Wilke and Mike Schenker – Consultancies or honoraria.

NordPol project - NordDRG with full outpatient grouping

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Introduction: The NordDRG collaboration was established around a traditional inpatient DRG system and with appr. 500 groups. The first step to include outpatients was taken in 2003 when short stay groups for day surgery and two sets of groups for the rest of outpatients were implemented. The first set (800-series DRG's) was meant for outpatients with minor interventions and the second set (900-series DRG's) for outpatients without any significant intervention. All the short stay DRG's and the DRG's in 800- and 900-series were placed within the respective MDC's. The total number of groups was extended to almost 800.

Not unexpectedly, the 800- and 900-series turned out to be too unspecific and to have an unacceptable high cost variance. Finland was the first to react and developed a set of additional rules in its national version. Based on patient related cost data in Helsinki area (>25% of the Finnish population), the first set of rules was developed for high cost diagnostic radiology. The second set of additional rules was to handle expensive pharmacotherapy and/or radiation therapy. An additional set of rules was designed to enable grouping of nursing cases and contacts with other health professionals. The requirement for mandatory valid principal diagnosis was retained in all new groups as well as the 800- and 900-series DRG's. However, the content of these DRG's changed because of the added groups. This version evolved to a Finnish national NordDRG version 2006-2007.

Sweden developed similarly a national version of NordDRG to adjust for the problems of 800- and 900-series. Sweden had no national coding systems for radiology or pharmacotherapy and thus no data was available for the expensive cases. Therefore, the solution was based on a new grouping of minor interventions. A large part of the rules omitted the major diagnosis category and 800- and 900- series DRG's were totally removed. The Swedish national Full (inpatient and outpatient) grouper version was implemented in 2006.

Norway established a national reimbursement system for surgical short stay cases based on DRG in 1999. A fee for service system (FFS) was used for the rest of outpatients. The original NordDRG Full (inpatient and outpatient) version was thus never implemented in Norway. Later, the Norwegian government decided to replace the FFS system with a DRG reimbursement system for all outpatients. Based on partly the Swedish and partly to the Finnish model, a Norwegian national version of outpatient DRG was developed and implemented in 2008 for all somatic hospitals. The model was inspired by the Swedish minor interventions grouping but on the major diagnosis category basis, and the 800- and 900-series were retained.

In 2005 a Nordic common outpatient DRG project, "NordPol", was established. All Nordic countries participated in the working group which published a preliminary report in March 2007.

Methods: In this report, the common principles for a Nordic outpatient grouper are described. The model will allow for national adjustments. The next step of analysis of the different national models is presented in this paper.

The four different models are compared using cost per patient data from Finnish hospitals. A new combined model will be analyzed at the meeting.

Results: Nordic common version has 77.7% of cases and 28.3% of cost in the unspecific 800- and 900-series DRG's. Finish has version respectively 69.6% and 22.1%, and Norwegian 75.1% and 27.4%. Finnish data does not include all interventions affecting DRG assignmet in the Norwegian model. The model has 9 new DRGs with >25 cases/year with acceptable variation Finnish data does not work with Swedish version because in procedure classification and data collection. However, there are 25 DRG's with >25 cases/year with acceptable variation. A first draft of a combined model shows a diminishing cost variation.Further work is done before PCSI.

Conclusions: There wee several important findings from comparison of the four models (common version and the 3 national versions) using patient related cost from Finnish hospitals. Although Finnish data and Swedish model were not compatible at least 25 of the Swedish groups were applicable in this data and the results indicate a possibility to improve the Finnish model. The Norwegian model performed for outpatients almost as well as the Finnish model although the latter has been developed with Finnish data.

The Nordic countries agree about a basic set of rules for outpatient grouping. The first generation outpatient groupers are based on individual hospital contacts. They have the major advance of being applicable today. A problem is possibly the message to the hospitals and to the clinicians: "The more visits, the better". Therefore we are looking for possibilities to second generation groupers based on episodes care comprising of several individual contacts.

Conflict of interest: None disclosed.

What can we learn from international comparisons by DRG and from comparisons between hospitals?

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Introduction: Clinical costing is realised in many countries for hospital funding reasons (determination of adequate tariffs on the basis of costs and comparisons between tariffs and real costs for institutions management). Some local experiences also try to benchmark cost data. For example, the "Echelle Nationale des coûts" in France, the "Pacha" (Projet d'analyse des coûts des hôpitaux associés) experience in the south part of Belgium and studies in Switzerland to calculate successive versions of cost-weights by APDRG. This study will try to make cost by DRG comparisons between two countries for which medical practices are probably quite similar.

Methods: 3 groupers are used in this study. Two groupers require a mapping for diagnoses: APDRG Suisse 6 (transcoding of Belgian ICD-9-CM into Swiss ICD-10) and APR-DRG 15 (transcoding of Swiss ICD10 codes into Belgian ICD-9-CM codes). IR-DRGs 2 groups do not need transcoding. The use of three groupers aims to study the effect of mapping and the effect of groupers on international cost data. Comparisons will be done on lengths of stay and costs by DRG data. Belgian and Swiss costs data have been made comparable according to the technique of purchasing power parity. Comparisons will be made on average costs by DRGs and by category of expenditures (salaries, average costs of medical procedures, average costs of drugs…)

Results: The Belgian sample consists of 4 general hospitals, with 44 810 inpatients stays in 2005. The Swiss database is composed of nineteen general hospitals, with 171.092 inpatient stays. The study is still ongoing and results are thus not yet available

Conclusions: The first objective of this study is to determine if there are significant differences in costs by pathology between the two countries and to analyse if these differences are especially present for some diseases. If we observe differences, we would try to analyse if reasons are due to clinical costing methodologies differences or due to medical practices differences.

Conflict of interest: None disclosed.

PLENARY III: Exploring your data

Using costing data to develop funding and budget allocation methodology for new technology

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Introduction: The purpose of this paper is to demonstrate how case cost data has been used in the development of a funding model that identifies which hospital department costs can be reallocated to offset the costs associated with the introduction of new technology, thereby facilitating its uptake and diffusion.

Craniotomy with mechanical clipping has until recently been the traditional procedure for intracranial aneurysms. Alternatively, endovascular coil embolization is a percutaneous approach to treat an intracranial aneurysm from within the blood vessel without the need of a craniotomy. Whereas some patients can only be eligible for one mode of treatment (i.e. coiling versus craniotomy), there is a subset of patients eligible for either method of treatment. There is a consensus among clinical experts that for this subset of patients, coiling method is preferable to craniotomy, and should be regarded as a preferred treatment method. In such cases, the main question in the development of a funding approach is whether the costs of coiling can be offset by the cost of craniotomy.

Methods: The analysis of the total average cost per case and departmental cost breakdown was performed using the Ontario Case Cost Initiative (OCCI) dataset. The analysis of case volumes was performed based on the Discharge Abstract Database.

Results: The results of our analysis of the average total inpatient cost per case for patients with ruptured and unruptured aneurysms (which represent clinically different populations) based on Ontario Case Cost data (Table 1) showed that the total costs of inpatient treatment of patients with coiling are on average lower than the respective costs of patients treated with clipping. In line with this conclusion, average total cost per case, median total cost, average RIW, and total length of stay are all higher for clipping cases. However, the net difference between the average costs of coiling and clipping cannot be thought of as net opportunities for cost reallocation, because not all costs can be transferred in hospital practice. Consequently, further analysis, such as the breakdown of costs across various departments, was useful to evaluate possibilities for budget reallocation within hospitals. As can be seen from the department-specific distribution of inpatient costs (Table 2), the main burden of costs associated with coiling of patients lies with the department of neuroradiology, which incurs the costs of the coils. At the same time the nursing, ICU, and operating room costs are higher for patients undergoing craniotomy. So, the departmental breakdown of costs suggests that for clipping there should be a reallocation of budget from the ward (nursing) area, as well as therapy, lab, diagnostic imaging and pharmacy to the neuroradiology (Interventional Radiology) department. Finally, the results of volume analysis conducted in the study suggested that the opportunities for cost re-allocation would eventually decrease once the facility experiences the growth of coiling cases stemming from the new population of cases subject for coiling.

Conclusions: The substitution of the craniotomy with intracranial aneurysm coiling, where clinically appropriate, should be based on a funding model that involves budget reallocation of resources within hospitals. Additional funding to supplement the cost of coils would be required in the amount left after reallocation opportunities are exhausted, due for new population of cases, among other factors.

Table 1: Comparative profiles for Coiling and Clipping cases

	N cases	Average Total (inpatient) Cost	Ave RIW	Ave LOS
Ruptured Coil	75	$46,661	5.87	19
Ruptured Clip	100	$60,461	8.39	26
Non Rupt. Coil	50	$16,683	3.12	6
Non Rupt. Clip	29	$28,739	5.41	13

Table 2: Breakdown of (Inpatient) Cost by Department

	OR	ICU	Nursing	Diagn Imaging	Neuro Rad.	Pharm.	Lab.	Therapy	Clinics	Other	Cost per case
Rupt. Coil	$736	$17,422	$7,767	$1,534	$11,880	$2,230	$1,643	$3,359	$6	$84	$46,661
Rupt. Clip	$6,652	$24,705	$10,015	$1,817	$6,085	$3,094	$2,489	$5,429	$7	$168	$60,461
NonRpt. Coil	$846	$4,988	$2,097	$533	$6,304	$598	$557	$645	$37	$77	$16,683
NonRpt. Clip	$6,457	$7,931	$5,820	$1,000	$3,788	$854	$966	$1,805	$41	$77	$28,739

Conflict of interest: None disclosed.

DRG-Data for the monitoring of the health care system

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Introduction: Beside financing DRG-data can have a very high importance for the monitoring of the development of a health care system and furthermore for planning and control. To observe changes in hospital utilization, shifts from in- to outpatient settings, effects of the introduction of new procedures, effects of medical progress it is important to have appropriate parameters for monitoring For a global analysis usually a case-mix-index is used. But this highly aggregated value is not appropriate for the monitoring of specific developments. Two dimensions, namely time and region are the most important factors for monitoring, which are discussed here.

Methods: Considering the time series of diagnoses or procedures test of trend can be used to distinguish between random variation and systematic effects over time. Also cross-correlation functions between variables can be used e.g. to analyse the similarity between trends. Special problems arise if new procedures are introduced and if they substitute others. An interesting example for this is the introduction of possibility of coding of the drug eluting stent and addition to the bear metal stent. Because the costs of the different stents have also considered in the Austrian patient classification system it was possible to study the reaction of hospitals to this innovation of time but also in different hospitals. Furthermore statistical test are used to analyze seasonal variations of diagnoses and procedures.

For the comparison of regions a standardisation according to age and gender is necessary. Defining distance functions between regions autocorrelation functions can be computed to study small area variations. A case-mix standardisation function was developed to achieve better comparability on a more global scale.

Results: Using the Austrian DRG-data, which are now available since 1997, examples of characteristic parameters for the monitoring of the Austrian inpatient sector will be demonstrated. For comparisons of time effects the main problem is the continuity of the catalogues of diagnoses and procedures as well as the continuity of classification models. The appropriateness of different characteristic parameters and their limitations for monitoring of the inpatient sector will be discussed and different statistical tests will be applied to test for significance.

Conclusions: Statistical tests can be used to show significant trends over time for selected procedures and diagnoses. For some procedures substantial changes over time can be observed. After the introduction of new procedures substantial reductions in other procedures can be demonstrated. Furthermore the usefulness of regional autocorrelations can be shown. This analysis also shows the usefulness of a data warehouse for the Austrian DRG-data which was set up some years ago.

Conflict of interest: None disclosed.

Improving data quality audits through national benchmarking

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Introduction: Approximately 12 million hospital admissions take place in England each year accounting for over 50 million bed-days across 172 hospitals. The accuracy of the data recorded for each hospital activity directly affects the way trusts are reimbursed under Payment by Results (PbR) for the patient care they provide. The Audit Commission (England) delivers a data assurance framework to ensure the accuracy of the inpatient data underpinning PbR. The assurance framework consists of an annual audit of patient records at each NHS acute provider.

The sample of records audited is identified using a national benchmarking process to identify anomalous areas of clinical coding at each trust. This analysis has also been made available to health service via an online tool to help drive improvements in national data quality and to support local decision making.

Methods: Benchmarking is a technique used to compare similar entities, looking for areas where an entity appears to lie outside the bounds of expected behaviour, known as an “outlier”. The goal of our benchmarking function was to define and develop a methodology that would help target the clinical coding audits at those areas within each trust where data quality was most likely to be an issue. This meant the solution had to be robust and reputable, as well as transparent, deterministic, and repeatable.

To undertake our benchmarking national hospital activity data is analysed using a set of 22 performance indicators and funnel plot statistical techniques which ensure the process of identifying outliers is as representative and equitable as possible. This was the first comprehensive programme of national PbR benchmarking using data from the newly implemented Secondary Uses Service (SUS), a national data repository which underpins payments made under PbR.

In brief the analytical process breaks down as follows:

- Hospital data is aggregated into a number of measures. The Commission uses these measures to construct its set of indicators.

- The indicators are standardised by gender and age (in five-year age bands) using the indirect standardisation method.
- This derives an observed and expected level for each indicator, for each treatment type and specialty combination.
- Once the indicators have been standardised two types of analysis are performed, a trust comparison and a trend analysis.
- The results of this analysis create standardised ratios which are then plotted on a funnel plot along with control lines which denote 1, 2 and 3 standard deviations (a technique known as winsorising is used to prevent extreme outliers skewing the analysis).
- Where a trust sits against these control lines defines its score for that indicator.
- The average scores for all the indicators in a specialty/treatment type is then calculated and this allows the user to identify outlying specialty/ treatment areas based on the indicator set used.

The Commission has now made our analysis freely available to the NHS as an online tool, the National Benchmarker.

Results: As part of the assurance framework the benchmarking has identified key areas for investigation which are driving improvements at a local level. At one hospital our benchmarking identified Oral Surgery as one of the areas for audit. The audit identified a considerable level of inaccuracy, and this resulted in an overcharge of 26% on the sample audited. Following the audit the provider agreed to wholesale review of the specialty to address the issue; an analysis of the mean of price of spell for Oral Surgery at this specific trust clearly evidences the impact of this review.

Outside of the assurance framework the benchmarking methodology has now gained considerable respect throughout the health community and is widely recognised for its depth and rigour. This is due to the access the NHS has to our National Benchmarker online tool which allows providers to identify potential inaccuracies in both the underpinning coding, and also identify anomalies in the delivery in different aspects of patient care. It also allows commissioners to challenge on areas for improvement and redesign to improve service delivery.

Conclusions: The NHS is, by its own admission, data rich but information poor. The National Benchmarker improves the quality of debate at a local level by providing access to a credible set of national benchmarking. There are large, and long term cost savings available nationally to the NHS through improvements in data quality and in improved information to support better decision making, and the Audit Commission's benchmarking plays a key role in this.

Conflict of interest: None disclosed.

SESSION 10: Importance of patients' characteristics in health care use and funding

Casemix and health policy: sex and health care in the Regione Emilia-Romagna of Italy

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Introduction: Comparisons between sexes on a variety of health status and health care indicators is important for monitoring health services use and for planning health care coverage and supply. This paper summarizes a population-based analysis using administrative health care data to describe differences between females and males in health status and health services use in the Regione Emilia-Romagna (RER) of Italy.

Methods: The RER Population Health Database was used for the analysis. The database includes demographic data, hospital discharge abstract data for ordinary (acute) and day hospital admissions, outpatient pharmacy data, outpatient specialty, laboratory and radiology visits, home health data, and information about each primary care physician in the region. The population consisted of all individuals living in the region for the entire year 2005 plus those who were born or died during the year (n=4,034,130).

Hospital discharge abstract data have been classified using both Disease Staging and DRGs. Pharmacy data have been classified using Chronic Condition Drug Groups based on the Italian formulary. Descriptive statistics to assess female/male differences were used for all key indicators. In addition to crude rates, age-adjusted rates were calculated using the direct method and the 2005 ISTAT (Italian Statistical Institute) Emilia-Romagna population as the standard.

Results: Overall, females outnumbered males; 51.5% of the 2005 population was female. However, until about age 50 males outnumber females. The older the age group, the higher the proportion of females; 2 out of 3 individuals aged 75 years and older were females. 45% of the RER population accessed the health system for at least one medical condition in 2005. Cardiovascular diseases were the most often treated medical conditions for both sexes.

Hospital admission rates were higher for females than for males (148.4/1,000 vs. 140.4/1,000); however, once the rates were adjusted for age, females had lower admission rates than males (138.6/1,000 vs. 145.2/1,000). Cerebrovascular disease, coronary artery disease, cholecystitis, bacterial pneumonia, and congestive heart failure were among the ten most frequent reasons for hospitalizations for both females and males, although the specific rates and the severity distribution varied substantially. Hospitalization for osteoarthritis and fracture of the femur were more frequent in females; COPD and lung cancer were more frequent in males.

Significant differences were observed in utilization rates for selected surgical procedures. For example, of 6,877 cholecystectomies, 57% were performed in females and 43% were performed in males. For females, of the total 3,939 cholecystectomies performed, 85% were laparoscopic and 15% were open. For males, of the total 2,938 cholecystectomies performed 77% were laparoscopic.

The probability that a coronary procedure would be performed during an admission for coronary artery disease was much higher for males than females for all types of procedures and for all stages. For females, of the 9,699 admissions for coronary artery disease, 45% included a coronary procedure; for males, of the 18,895 admissions, 63% included a coronary procedure.

A greater proportion of females than males received at least one prescription medication (75% vs. 65%). On average, females and males received an approximately equal number of different drugs (median: 3 for both females and males; mean: 4.0 and 3.7 for females and males, respectively). For both sexes, prescription drug use increases with age. At the age of 85 and older, both females and males are prescribed an average of 7 different drugs. A higher proportion of females (78%) used laboratory, diagnostic radiology and specialty physician visits than males (68%). Age-adjusted rates for specialty services were higher for females than males: 778.8/1,000 vs. 680.5/1,000.

Conclusions: Physical and physiological differences, different biological risks, distinct roles and behaviors in a given culture, and different exposure to and experiences of health care significantly affect the way females and males engage with the health care system. Some medical problems are clearly gender related. For other medical problems, while the same basic diseases, such as cardiovascular diseases, affect both sexes, rates and trends differ substantially between females and males. Therefore, information from population-based comparisons between sexes on a variety of health status and heath care indicators is useful for monitoring health services use and for planning health care coverage and supply.

Conflict of interest: Daniel Z. Louis – Consultancies or honoraria.

Sex differences in healthcare expenditures: A population-based study in Regione Emilia-Romagna, Italy

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Introduction: With increasing healthcare budget constraints, understanding the differences in how females and males use healthcare resources is important to the design of appropriate healthcare strategies. Using administrative healthcare data, the purpose of this population-based study was to describe differences in distribution and concentration of healthcare expenditures between the sexes in the Regione Emilia-Romagna (RER) of Italy.

Methods: We used the 2005 RER Population Health Database for the analysis. This comprehensive automated database includes demographic information for approximately 4 million RER inhabitants and captures information on services delivered in various healthcare settings, including hospital discharge abstract data, individual prescription-level outpatient pharmacy data, and specialty services data, such as diagnostic imaging and laboratory data. We estimated healthcare expenditures based upon regional DRG-based tariffs for hospitalizations, regional tariffs for specialty services, and pharmacy costs for individual prescriptions. Using a population-based approach, we computed age- and sex-specific per capita healthcare expenditures and determined the one-year concentration of expenditures.

Results: A greater proportion of females (88.5%) than males (79.6%) had expenses for at least one claim for any type of health service. A greater proportion of females than males had expenses for hospital (14.2% vs. 12.4%), pharmacy (75.1% vs. 65.2%), and specialty services (73.0% vs. 60.9%). For females, the overall expenditures in 2005 were approximately €1.851 billion; of these, 61.8% were for hospital, 23.0% for pharmacy, and 15.2% for specialty. For males, the overall expenditures were approximately €1.775 billion; of these, 65.6% were for hospital, 21.2% for pharmacy, and 13.2% for specialty. In both sexes the proportion of individuals with expenses substantially increased with age. Of the population aged 75+, 24.5% of females and 30.7% of males had hospital expenses, 92.6% of females and 93.4% of males had pharmacy expenses, and 81.4% of females and 85.1% of males had specialty expenses. The annual per capita expenditure was comparable for males and females (€908 vs. €890). However, for hospital expenses the overall per capita expenditure was greater for males than females (€596 vs. €550). For pharmacy costs and specialty costs, the overall per capita expenditure was greater for females than males (€204 vs. €192 for pharmacy expenses and €136 vs. €120 for specialty expenses). Overall, looking at the per capita expenditure by age groups, females tended to have higher expense during the childbearing years, while males tended to have higher expense in older age. Until age 19, the per capita expenditure for males exceeded that for females. Between ages 20 and 54, the per capita expenditure was greater for females than males. For instance, the per capita health care expenditure was nearly 60% higher for females than

for males for the 30-34 age group. Over 55 years of age, the per capita expenditure for males far exceeded that for females. This sex difference in per capita expenditure by age group was similarly found in a separate analysis of each type of expenditure: hospital, pharmacy, and specialty. For both sexes, health care spending was highly concentrated, with a small proportion of individuals accounting for a large proportion of the expense. However, health care expenditures were more concentrated in males than females. The costliest 5% of males accounted for 62.3% of the total spending for males, while the costliest 5% of females accounted for 54.8% of spending for females. Likewise, the costliest 25% of males accounted for 92.6% of the total spending for males, while the costliest 25% of females accounted for 88.1% of spending for females

Conclusions: Despite the fact that the overall healthcare expenditures were similar for females and males, a significant sex variability was found for expenses among types of healthcare services. More importantly, a marked sex difference in healthcare expenditures was observed at different stages of life: greater expenditures occurred in females during the childbearing years and in males in older age. Healthcare costs are largely concentrated in a smaller proportion of males than of females. The awareness of sex differences in healthcare expenditures is critical for helping healthcare policy decision makers to better allocate healthcare resources between sexes to cover their specific care needs.

Conflict of interest: None disclosed.

Case mix funding for ambulatory care: the Belgian case

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Introduction: The number of countries adopting hospital case mix funding has been constantly increasing over the last decade. By contrast, few countries have data allowing to define case mix funding for ambulatory care. In parallel, few research has been carried out to determine the most relevant determinants of ambulatory costs. As a consequence, we lack basic information to elaborate financing formulas for primary care services that adequately combine efficiency and equity objectives.

In Belgium there are two types ambulatory care financing schemes, fee-for-services and capitation payment. This last financing scheme determines the payment of physicians working in group practices, while fee-for-service applies to individual practice, which the most common use in Belgium. The per capita payment is the main concern of the present study; our objective is to find the variables that influence ambulatory costs – including primary care, drugs, use of diagnosis techniques and referral to specialist and inpatient care -, so that we can propose a financing formula that is suited to patient's needs.

Methods: We use a large data base with individual observations (n=75,000), including detailed expenditures on ambulatory care, drugs, and referral to specialist and hospital care, and a large array of individual's characteristics. Among these, let us mention in particular the demographic characteristics (age and sex), the socio-economic data (beneficiaries of reduced co-payment rates linked to low income, long-term unemployment, disability benefits recipient) and the clinical variables (disability, dependency, chronic diseases). In addition, we use area-based information through individuals' area of residence (200 to 2000 inhabitants), enabling to measure additional socio-economic variables (median income, ownership, assets, education level, inequality index).

Results: Our findings indicate that the main drivers of patient's ambulatory costs are the age, the presence of chronic disease, and the fact of being permanently disable. In addition, our study reveals the significant impact of socio-economic variables. The beneficiaries of reduced co-payment rates and the beneficiaries of social benefits have significantly higher costs, and these factors are increasingly influential as the patients gets older. The impact of area-based socio-economic factors is also observed, in particular for income and education.

Conclusions: This research shows the importance of individual and area based demographic, socio-economic and clinical characteristics on primary care costs and its consequences on referral to secondary care. We obtain a large array of risk-adjustors which should be taken into account as we seek to develop, design and implement an adequate financing formula for the per capita financing of primary care settings.

Conflict of interest: None disclosed.

Length of hospital stay and discharge destination can be modelled using a survival analysis approach. Application to the association of patients' socioeconomic characteristics with the length of hospital stay from the French national DRG database

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Introduction: Length of stay is an indicator of the efficiency of hospital activities. The identification of determinants of LOS allows a better understanding of the variation in LOS. It can then have implications in the planning of resource allocation, based upon the diagnostic-related groups (DRG). However, the empirical distribution of LOS is known to be skewed and to vary greatly across DRG which may complicate modelling.

Objectives: To assess the relevance of time-to-event models for analyzing length of hospital stay and discharge destinations.

Methods: Conventional models include standard linear regression (eventually with transformation or trimming of LOS) and quantile regression. One can also model the hospital discharge probability given length of stay until that time. The point is then to assess the association between the hospital discharge hazard function and hospital- or patient-related characteristics. Unmeasured heterogeneity can be taken into account by modifying the hazard function by a random proportionality factor (frailty), which may be hospital or patient specific. The extension of those models to the competing risks framework allows distinguishing the different discharge destination.

Results: Time-to-event methods were used in a study aiming at assessing the association between length of hospital stay and economic or social precariousness and were compared to conventional methods. Hospital discharge records were extracted from the French DRG-based information system (age, sex, length of stay, DRG) and linked to administrative data concerning precariousness including homelessness, welfare aids, health insurance and social help (Aide Médicale d'Etat, Couverture maladie universelle). We extracted 275.326 stays concerning all short-stay hospitalizations of patients aged 16 to 75 years, discharged in 2005 from APHP public hospitals.

After adjustment on age, sex and DRG, time-to-event models showed the impact of precariousness indicators on length of stay in the same way as the classical methods. Hospital- and patient-level unmeasured heterogeneity could be taken into account and specific discharge destinations could be examined.

Conclusions: Time-to-event models are a valid alternative to classical methods and allow a more precise analysis of hospital efficiency.

Conflict of interest: None disclosed.

SESSION 11: New approaches on funding

Tracking patient journeys' to enhance service development and resource allocation

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Introduction: NSW Health is undertaking the community health and outpatient care information project (CHOCIP) which will develop a patient level data collection across in scope services in NSW. It is the largest project of its type attempted in Australia which will result in the collection of 25 million unit records describing services provided in community health and outpatient care. The business rules sub-project aimed to develop a structure for collecting data on the interactions that a patient has with the public health system in respect of a set of related problems or issues. The rules will allow the resultant patient level data to be used to analyse patient journeys through the health services system in support of planning, service development and resource allocation processes.

Methods: The methodology consisted of five stages. First, reviewing existing business rules for relevant data collections including the NSW Health aggregate data collection system that counts Non-Admitted Patient Occasions of Service (NAPOOS) and systems that capture patient level data for specific community health services to determine their suitability for use in the CHOCIP data collection. Second, analysing data collection processes to identify issues with existing business rules, including problems relating to their consistent application. Third, drafting business rules that allow tracking of patient journeys to support data collection and reporting for the CHOCIP data collection. Fourth, testing and refining the draft business rules using stakeholder workshops. Fifth, preparing documentation on the business rules for use in developing Policy Directives and Data Collection Guidelines to support the implementation of the CHOCIP data collection.

Results: By reviewing existing business rules a variety of approaches to defining the data collected to describe the workload of community health and outpatient care services were found. The analysis of data collection processes revealed inconsistent counting practices resulting in the standard unit for workload measurement, the NAPOOS, being largely meaningless and not used for planning or resource allocation purposes. It was also found that the rules developed to make the NAPOOS more comparable across services were not suitable for a patient level data collection.

Thus, the NAPOOS concept was abandoned and a new concept called a service event, subdivided into individual and group service events, was defined. The service event is the base unit of measure for the data collection and the unit record data will be collected for each service event. An individual client service event is defined as an instance of service provision by one or more individual health service providers, that is targeted to a specific set of problems or issues presented by an individual registered client that warrants an entry in that registered client's case notes. A group service event is defined as an instance of service provision by one or more individual service providers that is targeted to a specific set of problems or issues shared by two or more registered clients at the group session, that warrants an entry in each registered client's case notes.

Chapters of services are then defined as a set of one or more service events provided by the same registered health service provider organisation that address the same related set of problems or issues for the same registered client/patient. Chapters of service describe the interactions between a patient and a single service provider unit for the same problem or issue. The interactions between a patient and a number of service provider units are termed a journey, defined as a set of chapters that address the same set of related problems or issues for the same registered patient.

The value of the data collection for service development and resource allocation purposes is enhanced by defining business rules that allow the collection of data for client present and client not present service events. Typical client not present service events include case conferences, case management, consultation liaison services, advocacy services, and familial/carer support services. Collection of data on these activities allows a full understanding of the resources applied to the care of patients for a set of related problems or issues.

Conclusions: Defining business rules for a patient level data collection is different to defining business rules for aggregate data collection. By defining the hierarchy of concepts as service events, chapters and journeys, the interactions of patients with the health system for the same problem or issue can be analysed. The resultant CHOCIP data will be a rich information source that can be applied to the development or refinement of patient classification systems and associated resource allocation models for community health and outpatient care services.

Conflict of interest: None disclosed.

A Process model as tool for describing, planning and evaluating patient's pathways - design, implementation and validation

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Introduction: Health care output statistics as number of admissions, beddays, visits, DRG-ratings and case costs may in bench-marking indicate that something is "wrong" or at least should be subject "to further analyses". To gain deeper understanding of factors causing unwanted variation in patient pathways it is helpful to have information telling about cause and effect. What decisions are made by whom, when and during what phase of the process, what activities are carried out and if not, for what reason. Do activities correspond to evidence? And have activities resulted in a change in the patients health. An à priori decided clinical pathway should be based on evidence but the process for a single patient can deviate from the standardized pathway for many reasons. A process model must cope with this. Hence it is important that information specifications are elaborated to a level that allows valid and acceptable process analyses from different perspectives. For example in understanding of how a health care system works not only on the micro level, but also on intermediate (mezzo) and macro levels. If so, analyses can serve as triggers for improvement work on all levels. This article describes experiences from implementation in a Swedish County Council of a nationally suggested generic process model, The Flow Model. The model is on the national level expected to be one important step-ping stone in the process of elaborating the next generation of Swedish health ICT system. The model argues that a care process can be divided into seven different sequences. Each step can be monitored using different performance measures and indicators. like medical thresholds (indications), lead times, clinical outcomes, patients evaluations and case costs. The model gives absolute freedom for a local service to include monitoring aspects to their liking. Implementation requires education and training, combining data from different systems, finding interesting and important perspectives to analyze, visualizing results and finally using data for different purposes. The article will describe, analyze and monitor patient pathways through application of a generic process model – the flow model to surgical services in a Swedish County Council.

Methods: Data is routinely registered by the professionals in everyday clinical life, either in the medical record, in registers or in the administrative system. No extra registration is demanded. The surgical unit has a "contract" with the commissioners on expected achievements. Three of the processes are chosen for more deep analyses. Analyses are focusing on the usability of the model in describing to what degree the care is in line with expectations as described in the contract for the unit. Analysis will also touch the subject of DRG-groups related to real health care processes. I order to communicate with stakeholders techniques for visualization of results will be suggested.

Results: Micro: Experiences support that the implementation of the flow model has been helpful in understanding what a clinical pathway looks like in real life. Benchmarking against other units on a detailed level is possible.

Intermediate (mezzo): One of the expectations by deploying the Balanced Scorecard is to increase the level of patient centered process orientation in all parts of the organization. The Flow Model can be used as a management tool to evaluate the performance of health-care pathways for different dimensions in accordance with the clinical value compass.

Macro: By aggregating data the model gives information on the health care systems level about availability to services, compliance to what is regarded as best practice and costs.

The model is helpful in the evaluation whether the surgical services are up to expectations as stated by the commissioners.

Conclusions: Application of the Flow Model will make it easier to evaluate clinical pathways in accordance with the clinical value compass. Are we doing the right thing at the right time with the right staff? To be able to connect the different measuring points in the process to medical evidence is a great challenge.

We have started to use the model in our organisation and are at a stage where we are defining our clinical pathways and we are starting to establish concrete aims in different dimensions. It will most likely be necessary to re-evaluate aims and methods further on.

The strategy is to increase the understanding of the model by starting to collect and present data that the model produces. We are starting at a basic level by defining process that our employees are familiar with, later on we will probably need to aggregate process-data to be able to evaluate the system as a whole.

Conflict of interest: None disclosed.

Financing along clinical service lines

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Introduction: Service lines can be one concrete way in further development of case-mix. Over the last decade, there is a slow but growing trend towards hospital management along service lines. While there is no standard definition of what a service line is, it is by and large a conglomeration of clinical services in a healthcare provider organization which have a common patient base, or a common instrument/modality installed base requirement or a common set of expertise. Examples of service lines include – cardiothoracic and vascular centre, diagnostic centre, woman-and-child centre, and so on.

Methods: Examples of services provided by key services lines are: a) Cardiothoracic and vascular service line includes Cardiology, Vascular medicine, cardiothoracic surgery, Chest medicine, Stroke intervention and Stroke neurosurgery. b) Ambulatory care service line includes Ambulatory surgery, Ambulatory Endoscopy, Ambulatory ophthalmic procedures, Ambulatory ENT procedures, Renal dialysis, Ambulatory dental procedures, Physiotherapy, Outpatient departments of all specialities, internal medicine, general surgery, Executive healthcare centre, Community healthcare services, Home health centre, Pharmacy services, and so on.

Service lines can be broadly classified into margin-oriented and quantity-oriented ones. Margin-oriented service lines are those where the procedures carried out or the patient management as a whole has a high contribution margin, for example, cardiothoracic and vascular centre. Quantity-oriented service lines are those where the procedures carried out have a lower profit margin but the quantity of such procedures carried out is high, for example, certain diagnostic centres.

Results: Given that private healthcare centres are financed largely on debt in various countries, it would be useful to look into the aspect of how these organizations finance their debt. There are four guiding principles in debt financing:

a) Character: Ethical reputation, business qualifications and operating record of the directors, managers and executives responsible for borrowing and repaying the funds.

b) Capability: Cash flows or the ability of the issuer to repay its financial obligation.

c) Collaterals: Traditional pledging of assets to secure the debt and the quality and value of those unpledged assets controlled by the issuer.

d) Covenants: Limitations and conditions on borrower's activities providing protection to lender.

Debt providers typically use these dimensions to evaluate the financial status of the borrower.

Given that the margin-oriented service lines and quantity-oriented service lines show different behaviour in relation to the four dimensions mentioned above, it will make more sense to apply for debts or issue bonds which are specific to a particular service line.

We can illustrate this with an example. Let us say that the contribution margin per procedure is high in a cardiothoracic and vascular centre raising enough operational cash flow to finance the debt. If the healthcare organization wishes to expand into a woman-and-child-centre service line or already has one but wants financing to reorganize it, then the covenants in the

cardiothoracic and vascular centre debt might prevent the organization to indulge in such riskier activities. In such cases, the healthcare provider could create a separate entity for the woman-and-child centre which assumes its own risk and could still receive the financing, although at an interest rate adjusted to the risk.

Conclusions: Such financing along service lines also adds transparency into the overall functioning of the healthcare organization – useful for different clinical and operational purposes apart from finance. Traditional financial ratio checks need to be performed to evaluate the liquidity, profitability, gearing/leverage, asset/inventory management and, if applicable, capital market status of the healthcare organization.

Service line-based analysis also helps to benchmark full service hospitals in relation to speciality hospitals provided the full service hospital also provides the service line as within the speciality hospital. This analysis is typically useful for university hospitals that now have to deal with a growing number of smaller private and semi-private speciality hospitals. A detailed comparison of this sort is currently possible only within limited boundaries given the difficulty in understanding the service-line costs of full-service hospitals. Methodologies like analysis along case-mix DRGs do go in that direction but the level of detail and dimensions analyzed is still limited.

Ethical aspects of patient care would still need to be considered before expanding into such practices to make sure there is a back-up should financial decisions might dictate an expansion or reduction of activities to a particular service line.

Conflict of interest: None disclosed.

Financing within the scope of the Integrated Disease Management – "Payment per comprehensive price"

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Introduction: The development of the integrated disease models is the main strategy and a tool for improving healthcare, better effectiveness and efficiency of the care provided. It is also an important and permanent vehicle for supporting the health decisions.

Methods: For the implementation of these integrated disease management there are several interventions to be taken at different levels, being the financing amongst the more important ones. Bearing this in mind, we defend the "payment per comprehensive price", which is the most similar to pay-for-performance model.

Results: The model "Payment per comprehensive price" is defined by an average value per patient, for a determined period of time, including all other clinical services and products and other activities considered to be fundamental for the adequate care to be provided. Within this context, it is possible to integrate the specificities of some groups of patients, which effectiveness depends upon the patients' quality and safety, to be assessed through the results based indicators. The financing is intended to become a tool for overcoming some of the constraints and problems within the existing care organizational and financing models associated with the chronic diseases. This can be achieved by using flexible implementation methodologies adjustable to the specificities of each condition and basic principles. All of this will reflect more adequate clinical practices, the growing demand of information per patient, the creation of a direct relation between financing/accomplishment of the patients' quality and safety clinical parameters and the motivation for risk sharing among the several stakeholders involved.

Conclusions: While creating the model "Payment per comprehensive price", and in order to overcome some of the associated risks, there are other considerations to be made such as the possibility of inducing the adverse selection of patients, the inadequate care, the creation of barriers for attaining determined objectives and availability of high quality of care to all patients, and the restrictions for the introduction therapeutic innovations.

Conflict of interest: None disclosed.

Using national and regional registers for health policy analysis for management of mental health care

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Introduction: In Sweden it is mandatory to register and deliver specified information to a national patient register at the National Board of Health and Welfare. This information is based on individual patient consumption. This register is covering all inpatient care and also specialized outpatient health care. It has a long history and has not been changed very much over the years. Modern psychiatry for example, has developed its way of examination and treatment radically and this has among other things led to an involvement of many outpatient treatments and other personal categories than doctors. The content of the register is now going to change in order to give valid information about mental health care. This study will give examples of added value in health policy analysis with such more accurate and up to date information. The aim of the study is to illustrate the importance of a good and detailed National and Regional Health data register for description and analyses of mental health care.

Methods: Data from the now existing National Patient Register at the National Board of Health and Welfare is used to present regional differences in utilization of psychiatric inpatient and outpatient care in Sweden. In order to illustrate future possibilities case-costing data from the Swedish Association of Local Authorities and Regions has been used. One particular county has been analyzed further. Focus is on health care consumption, starting with a broad national overview and then deepening the understanding by using regional and local data. The county under study is divided in three districts. Comparisons between these districts are made.

Results: There are differences between the counties regarding mental health care consumption. These differences are to some extent the effect of varying coding praxis and varying quality in the data reported to the National Patient Register. On the regional and local level data is more detailed and integrated with economic information leading to more valid and useful analyses. As the regulation cover the same type of data that now is registered regionally and locally in our studied counties, the future construction of the National Patient Register will probably allow more valid and useful data for health policy analysis on the national as well as regional and local levels.

Conclusions: The suggested structure of the future National Patient Register looks promising from a health policy evaluation perspective. But of course there are weaknesses. Local delivery to National Patient Register is one. Routines for reporting have to be developed. On the local level there is s need to improve the registration of data for example about what activities that the patient receives in the treatment. A possible way to standardize the capture and archiving of information can be in using archetypes as proposed in the EHRCOM standards. If the information system moves in this direction the transparency will probably improve and the interest for evaluation will increase.

Conflict of interest: None disclosed.

SESSION 12: Enhancing groupers

Refined French DRG with 4 severity levels

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Introduction: In France, GHM (French DRGs) are used for funding the acute hospital sector since 2005, with extra per day for outliers or intensive care unit, and specific payments for educational tasks, research and general interest. Although at present the fees differ for profit- and non-profit-making hospitals. But the law requires that fees must converge until 2012, with a 50% reduction in the differences until the end of 2009. France has one of the higher percentages of for-profit hospital beds in Europe. These hospitals are often very specialized. Homogenization of GHM becomes therefore a crucial issue. For-profit and non-for-profit hospitals have not the same rates and the same kinds of CC. The current version of the French DRG uses only two levels by GHM (with/without CC) and specific GHMs for major CC, as do AP-DRGs. Hence, ATIH decided to improve the way to take CC into account.

Methods: 4 severity levels were created for almost every GHM. An original method was developed, called 'isolated effect', in order to assign each diagnosis to a certain severity level. To measure the effect of a secondary diagnosis, we stratified by GHM, eliminating, however, the greater part of the effects of the accumulation of diagnoses during the same stay. For this, we started by ordering the diagnoses effects. For each stay, the diagnosis with maximum effect is retained, and is used in order to calculate the next step. Calculations are repeated until the process converges. 13.300.000 hospital stays with more than 2 nights long where analysed (2005-2006 national databases, MDC=1-13, 16-21). The method was applied on the effects of the diagnoses on the average length of stay and on the percentage of stays longer than the median. This allows ordering diagnoses by decreasing order of effects. Only diagnoses with an effect on the duration of at least 1.5 day, at least 25% in percentage, and a percentage beyond the median higher than 55%. That determines the first level (without CC). The 3 other levels of CC are obtained by maximisation of the R2 coefficient. At each step, results are validated and corrected by medical experts. Exclusion lists (principal diagnosis/secondary diagnosis) have been set up on all ICD-10 diagnoses. Diagnoses were grouped together into 2300 classes, and diagnoses which cannot be CC for medical reasons or coding problems were dropped.

Results: The method produces great changes in the CC: 950 are dropped, 3000 are added. Using only the stays with more than 2 nights, R2 coefficient increases from 23.5% to 29.3% in the non-for-profit sector, and from 32.1% to 36.7% in the for-profit one (for all stays, the figures are respectively : 42.0% to 46.7% and from 55.8% to 58.8%). The increase concerns both medical and surgical parts. Methods are tested in order to robustly estimate the cost of the 4 level groups with few stays. If we pay in day (i.e. if the price by GHM was proportional to the ALOS), 50% of the hospitals would have an at least 1.8% change, and the change would be higher than 5.7% for 5% of them. The non-for-profit hospitals would have an 0.6% increase, and the for-profit sector an 1.5% decrease.

Conclusions: This is the first French modification of the CC list. The method can be maintained. It allows to put clearly the results, and to discuss with hospital representatives. The method results in very significant changes in R2. The changes in terms of budget per hospital are, however, moderate.

Conflict of interest: None disclosed.

From Paper to Production - Going Live with HRG4

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Introduction: Healthcare Resource Groups [HRG] are the mechanism by which patient activity is classified according to Casemix in England. They are the primary funding mechanism for acute care in the English National Health Service [NHS], under the Department of Health's Payment by Results [PbR] national policy. This Department collects annual cost data ('Reference Costs'), and uses this as the basis for setting a national tariff price at an HRG level, for acute treatments, procedures and services.

The current HRG reimbursement version is HRG version 3.5. The Department of Health have announced that from 1st April 2009, funding will be based on HRG4 instead.

"Going Live"

Since completing the design of HRG4 in April 2007, the NHS Information Centre Casemix Service has been working with its business partners (DH PbR, NHS Connecting for Health and the Audit Commission) to prepare for its use by the DH, PbR team for national reimbursement from April 2009.

This work is categorised under a number of key headings: Processes; Products; People.

Methods:

Processes

i. Local data collection

Correct payment through PbR is wholly dependent on the source data collected in NHS provider organisations. The benefits of HRG4, in better reflecting patient care at a service level, can only be fully realised if the underlying data are accurate and complete.

HRG4 addresses clinical areas (for example Diagnostic Imaging, Chemotherapy and Radiotherapy) that have traditionally used departmental data recording systems that might not be linked to patient administration systems [PAS]. Often such areas are outwith the remit of clinical coding departments.

Under HRG4, some elements of treatment (such as renal dialysis and critical care) are 'unbundled' from the (core) HRG. Each occurrence of an unbundled element will generate an additional unbundled HRG, so it is important that clinicians and coders are aware of the unbundled components and clearly record and code these data.

The clinical community are embracing the benefits of HRG4, so that the introduction and implementation is not hindered at a local level. Training, education and awareness are vital to understand the steps in the PbR data process and highlight the importance of accurate data recording and communications in achieving correct payment.

ii. National costing and tariffs

Fundamental to the implementation of HRG4 is the annual collection of national Reference Costs data from NHS providers, to inform the setting of tariffs to reimburse providers under PbR policy.

The structure and scope of HRG4 differs significantly from its predecessor, HRG version 3.5, therefore costs cannot simply be mapped between these schema. Furthermore HRG4 is dependent on an updated schedule of intervention and procedure codes, and so the data for reference costs are dependent on the implementation of this revised code set.

Products

i. Groupers

HRGs are derived from care activity data, primarily ICD-10 diagnosis codes and the United Kingdom's OPCS-4 intervention and procedure codes recorded in local Hospital systems. Care events are recorded in standard datasets and processed through the HRG4 grouping algorithm to assign appropriate HRGs for each event.

Data are grouped by local organisations for two purposes:

- To support the collection of cost data for reference costing, to inform future tariff setting processes
- To provide information for local service planning.

Data are also submitted monthly to a central service, the NHS Secondary Uses Service (SUS) to support reimbursement processes and attach a monetary value to patient care.

ii. Documentation

The Casemix service has produced comprehensive web-based documentation setting out the HRG4 design and providing user guidance in the use of the methodology and its supporting toolset.

People

i. User Support

The Casemix Service has enhanced its' maintenance and support service to improve the service offered to our users. Such include:

- Establishing an online user forum (the Casemix Quality Forum)
- Developing our website to provide better access to our products and supporting information
- Publishing quarterly newsletters.

ii. Awareness

We have also been very active in supporting implementation of our methodologies in the NHS. The Casemix Service has therefore been working in conjunction with its business partners to ensure that the NHS community is aware of the structure of HRG4 and understand the need to review their data collection and coding processes to improve the completeness and accuracy of data which will be used for payment and planning purposes.

Results: Ongoing - see above

Conclusions: Reimbursement via Casemix requires a nationally integrated stakeholder approach to support healthcare providers and commissioners when translating policy requirements into local practice, to benefit patient care. In England, a variety of approaches are being adopted to facilitate this.

Conflict of interest: None disclosed.

Enhancements to the CMG+ Comorbidity Factor methodology

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Introduction: In 2007 the Canadian Institute for Health Information (CIHI) introduced CMG+, Canada's acute-care inpatient grouping methodology. CMG+ uses clinical administrative data to group patient records into clinically relevant and resource-homogeneous groups, using ICD-10-CA and CCI (the Canadian Classification of Health Interventions). CMG+ identifies approximately 560 Case Mix Groups (CMG), which are analogous to DRG.

In addition to the CMG cells, CMG+ makes use of the following five factors: age category, comorbidity level, flagged interventions, intervention event, and out-of-hospital interventions. These five factors further account for clinical and resource differences within CMG and are used in the calculation and assignment of the Resource Intensity Weight (RIW) and Expected Length of Stay (ELOS) resource indicators.

The comorbidity factor methodology accounts for the resource impact of comorbidities the impact above and beyond that of the patient's most responsible diagnosis (MRDx), intervention(s) and age. The comorbidity factor methodology makes use of a comorbidity factor code list, a set of ICD-10-CA codes with an estimated resource impact for each code. Based upon the number of these codes present on their chart and the cumulative estimated resource impact, patients are assigned to one of five comorbidity levels.

Methods: The process to develop the comorbidity factor code list involves estimation of the resource impact of each code under consideration. This is done based upon cost impacts and length-of-stay impacts, estimated using regression models. The process also incorporates the results of recent reabstraction study, removing or rolling up codes based on the quality of coding of the codes under consideration.

Also discussed is the work currently being carried out to enhance the comorbidity factor methodology. The starting point for the current comorbidity factor code list was the list from the predecessor comorbidity methodology, known as Complexity (Plx). Analysis is now underway to quantify the impact on resources of all ICD-10-CA codes. This analysis likely will result in changes to the comorbidity factor code list. Also, the current methodology does not consider interaction effects when estimating the resource impact of comorbidities. Analysis is now being conducted to estimate these interactions and incorporate them into the comorbidity factor methodology.

Results: Analysis is ongoing. Results will be discussed in the paper and in the presentation.

Conclusions: Analysis is ongoing. Conclusions will be discussed in the paper and in the presentation.

Conflict of interest: None disclosed.

DRG Grouper Design with Immediate Test of Resource Explanation

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Introduction: Every DRG system in active use is in a state of constant change. DRG's are altered, added or removed - usually on a yearly basis. The main reasons for changes are developments in medical treatment and management of health care. The two most important criteria for changes are the requirements of similar resource intensity within given DRG and similar type of patients in each DRG from a clinical perspective.

A new kind of grouper software is evolving with radically increased flexibility and ease of use. We will in this presentation explore the design criteria for this software. We will also describe an implementation in DRG Management System (DMS) which fulfils these criteria. In particular we will show how this kind of software will give an immediate answer to the question on whether changes in the DRG algorithm will explain resource usage.

Methods: For the DRG software we formulate the design criteria:

1. The algorithm must be formulated in a formalized manner such that the software can be built from this and only this documentation
2. The formulation must be understandable by people from the economic and medical professions as well as computer professionals
3. There must be testing procedures and a complete test-batch for verification
4. Changes in the algorithm must be easy to do and implement
5. Consequences of the changes in the DRG algorithm can easily be analysed with statistical methods

The Nordic countries are using DMS with the strictly defined NordDRG system. A number of database tables define the algorithm unambiguously. This satisfies the first design criteria.

Results: We will in the complete presentation illustrate how the development tools around the grouper satisfy the last four design criteria. We will describe how changes in the DRG algorithm can be done within the DMS tools itself without doing any computer programming. The effect of minor and major modifications can be tested immediately. Within five minutes on an ordinary PC a million patient cases can be tested and the implications of the results can be analyzed.

In particular we will show how the result explains the resource usage by showing variance, skewness, kurtosis and other descriptive measures. The changes in cost weights and other indicators are presented in various graphs. This will be done with patient data from the Nordic countries.

Conclusions: The integration of grouper development, testing and cost effect analysis in a seamless flow has obvious advantages. Bad ideas can early be discarded and good ones verified.

Conflict of interest: None disclosed.

Redesigning the Dutch DBC-system; towards increased transparency. From ideas and directions for improvement to implementation

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Introduction: In 2005 a new system for financing health care was introduced in the Netherlands under fairly heavy political pressure: the Dutch DBC-system. During the first years after introduction, the system has existed next to the old budget-system and therefore played a relatively small role in the actual financing of health care; the tariffs of 10% of the provided care were negotiated based on the new system. However, the intention was and is to use the system as a basis for financing the full package of care in the future.

While the introduction of the system in 2005 was a success, fairly quickly a number of directions for improvement were identified by the various users of the system: the insurance companies, the government, the doctors and hospitals and the patients. These directions included the complexity of the system (over a 100.000 DBCs exist), the particular locally developed classification of diagnoses which lacks overall uniformity, the lack of inclusion of severity of care and the insufficient medical recognisability of the system (i.e. the suitability of (a group of) DBCs to function as material for negiotiations between insurer and provider).

Methods: The Dutch organisation responsible for maintenance and development of the Dutch system, took responsibility for defining a large-scale project for improving the Dutch system: towards transparency of the DBC-system. The aim of the project is to deal with the majority of the directions for improvement in one package. While most parties applauded this initiative, it soon turned out that the speed of development which was largely inspired by political aspirations, led to major concerns of the parties involved.

In this presentation we will outline the approach that we took to rebuild to the Dutch system in a relatively short period, while at the same time sufficient input from the various users of the system could be taken into account. The latter was, and is, important for obtaining a system with sufficient quality which is supported by the users themselves. This approach includes various channels for communication with the parties involved and the use of clinical expert teams. Via a series of long and intensive workshop sessions, the clinical expert teams were enabled to provide us with input and suggestions.

Results: The first phase of redesigning the system has been carried out in a very short time. The experiences with the clinical expert teams show that the direct communication via intensive workshops works well, both to obtain large amounts of useful input and to gain much goodwill from the various parties.

Conclusions: The outcome of the first phase of redesigning the system confirms that adequate and extensive communication with all parties involved is of the utmost importance to keep all parties aboard. Currently (spring 2008) the next phase of the redesign is starting. In this phase the communication and methods of communication are further intensified.

Conflict of interest: None disclosed.

PLENARY IV: Atlas of Health Care

Rethinking Health Care: Insights from Population-Based Outcomes Assessment

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The United States has the most expensive health care system in the world. Less well known is the remarkable regional variability in spending and practice observed within the U.S. Dr. Fisher will summarize the findings of recent research showing that higher spending within the US is associated with no better – and often worse – quality and outcomes. He will then discuss the underlying causes of poor performance and the implications for health policy and clinical research. The recommendations for policy reforms have broad implications and highlight the importance of thinking clearly about how to create a "learning" health care system.

The Spanish National Health System under scrutiny

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The Atlas assess Quality from two perspectives: a) the uneven exposure of population to healthcare; and, b) the way healthcare system performs.

Several questions, relevant for policy-decision making purposes, are faced:

- Is access to an appropriate diagnostic or surgical procedure dependant on the place a person lives?
- Are the odds of a patient to suffer unneeded treatment - and having an adverse event- different regarding the provider where the person is admitted?
- Which is the cost of opportunity -for a society- of providing more services more intensively? Which is the marginal benefit –in health- associated to more intensity of resources compared with the neighboured area?

What have we learnt?

With regard to the influence of the place where people lives, although the SNHS was conceived as a universal compulsory insurance system, planned to mitigate barriers to access (primary care oriented with a mandatory gate-keeping role, negligible amount of co-payment, funded by taxes, and deeply decentralised) and developed without incentives for “doing more” (insignificant FFS payment, healthcare professional paid by salary and providers funded in a more or less retrospective way) Geographic Variations are vast, both in effective services, supply sensitive services or preference-sensitive services.

With regard to the way providers perform, there is huge variation in health outcomes, even though Quality Improvement Programs have been developed during the last decade around the country, and Quality is considered in the annual objectives of every single provider.

Sharing results, impressions and debate about the underlying factors influencing and the implications for Health Policy and Management are the goals of the presentation.

SESSION 13: Risk adjustments in the outpatient setting

Going beyond diagnosis-based case-mix systems: how adding pharmacy information to your decision support systems can improve the efficient delivery of health care

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Introduction: In many health care systems, the lack of diagnostic information makes case-mix assessments of populations difficult at best. To answer such situations, new models have been developed which rely on pharmacy codes to help identify patients who could benefit from targeted interventions.

Methods: Numerous examples will be highlighted, which demonstrate the power contained in routinely collected pharmacy codes. A pharmacy (Rx) based predictive model assists in financial forecasting as well as clinical risk identification applications or it can be used in combination with diagnosis-based PMs to more comprehensively assess population risk.

Examples cited throughout the presentation will include results from studies performed in the UK, Germany, in addition to US studies. The data sources vary by study.

Results: Numerous possible applications could benefit from the addition of pharmaceutical data into a predictive case-mix model. The various limitations are also addressed.

Conclusions: The ability to apply routinely collected pharmaceutical information enables the identification of high risk patients who could benefit from early intervention. Previously, the lag time in receiving diagnostic information lost valuable time which could have been utilized to intervene with health care earlier when, in many cases, the treatment is more effective, as well as cost-efficient.

Conflict of interest: None disclosed.

Pharmacy cost outlier patients in primary care. Retrospective application of ACG® in a Spanish context

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Introduction: The objective of this study was to analyse pharmacy cost outlier patients in Primary Care through the retrospective application of risk adjustment ACG system® in 23 Primary Care Health Centres from three Spanish regions.

Methods: Multicentre, retrospective study based on electronic records of patients seeking care during 2005 in the regions of Aragón, Baleares and Cataluña. Principal measurements: universal variables (age, sex, health service-family practice/paediatrics), dependent variables (pharmacy cost) and variables of morbidity. Patients were classified into normal users and outliers according to two statistic criteria:

a) Brute values of pharmacy cost: those surpassing T= Q3+1,5(Q3-Q1)= 991,14 € (IQR) for pharmacy cost.

b) Case-mix adjustment: those with values of studentized deleted residuals higher than 2.

Log transformation of the variable pharmacy cost was carried out to reduce skewness of the distribution and make it close to normal. Explanatory power of ACG was calculated by coefficients of determination (R2). Statistical software: SPSS, $p<0,05$.

Results: While the IQR method classified 9,4% of the study population as outlier spending 60% of the total pharmacy cost in Primary Care, when we adjusted by case-mix, these percentages fell to 1,6% and 10,87% correspondingly (n=286.450). The IQR method was therefore ruled out since, when working with brute values of pharmacy cost, we ignore those cases where high costs are justified by patient's morbidity features. The following results correspond to case-mix adjustment based patient classification (Table 1). Outlier patients are significantly older than normal users (59,31 vs. 42,63 years) with a lower percentage of female patients (50,2% vs. 54,2%) and a mean annual pharmacy cost of 2125,05€ vs. 284,97€ among normal users ($p<0,001$). Patient's morbidity: unlike normal users, outlier patients are concentrated within a low morbidity range. The negligible explanatory power of ACG for outlier patients when applying the IQR method (R2 =0,3%) corroborates the inappropriateness of this patient classification method (Table 2).

Conclusions: On the assumption that an outlier patient is one who expends more than the rest of patients with likewise clinical features, case-mix adjustment must be considered even if the interquartile range (IQR) is the most common method for outlier patients identification.

The ACG case-mix system® showed to be valid when predicting the association between clinical and economic information in the specific case of outlier patients (R2 =61,1%).

Further investigation should be done on how to forecast healthcare cost trends in Primary Care since pharmacy cost outliers are a legitimate economic concern to individual practitioners and institutions.

Table 1: Description of outlier patients according to case-mix adjustment based patient classification

	Normal users		Outliers		
	Average	CI (95%)	Average	CI (95%)	P_value
Patients (%)	98.4	98.35 - 98.45	1.6	1.55 - 1.65	0.000
Age	42.63	42.54 - 42.71	59.31	58.73 - 59.88	0.000
Number of ADG	4.27	4.26 - 4.28	2.40	2.34 - 2.46	0.000
Sex (female %)	54.2	54.02 - 54.38	50.2	48.75 - 51.65	0.000
Pharmacy cost (€)	284.97	282.87 - 287.07	2125.05	2051.51 - 2198.58	0.000
Patient's morbidity (patient %):					
Healthy users	12.2	12.08 - 12.32	15.8	14.74 - 16.86	0.000
Low morbidity	25.9	25.74 - 26.06	50.7	49.25 - 52.15	0.000
Moderate morbidity	51.3	51.12 - 51.48	30.2	28.87 - 31.53	0.000
High morbidity	9.0	8.89 - 9.11	3.1	2.60 - 3.60	0.000
Very high morbidity	1.5	1.46 - 1.54	0.2	0.07 - 0.33	0.000

Table 2: Coefficients of determination of ACG for both patient classification methods

	Normal users	Outliers
IQR based patient classification method	21,2%	0,3%
Case-mix adjustment based patient classification method	31,3%	61,1%

Conflict of interest: None disclosed.

Comparison of district physicians and family doctors care by visits to primary and out-patient secondary health care for selected chronic conditions in different co morbidity groups

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Introduction: Many international studies have revealed that more emphasis on primary health care, with family physicians acting as gatekeepers and coordinators of overall care, leads to more efficient use of health care resources. Lithuania, like several other Eastern European countries, is in the process of reforming its primary health care system. Since 1995, family doctors (FD), who are trained in the residency, or retrained from district internists (DI) or district paediatricians (DP), were gradually introduced into the system. During the training in family medicine residence, doctors acquire attitudes and skills needed for patient-centered consultations and a comprehensive approach to solving patients' problems. It is expected that family doctors will be able to solve complex health problems, and that this will lead to less secondary care utilization. However, in Klaipeda city and region still almost 30 % of primary health care providers serve as traditional district physicians. This study investigates the differences of care among patients who have several chronic conditions, are highly comorbid, and utilize the highest proportion of health care recourses. We also evaluate the efficiency of different types of primary health care providers

Methods: We studied patients with chronic conditions, asthma, diabetes, hypertension, and ischemic heart disease, who were listed to primary health care institutions of Klaipeda city and the Klaipeda region. The study sample included 244425 inhabitants and out of them 37823 patients with targeted chronic conditions in 2005. Diagnoses recorded on primary and secondary health care visits during 2005 were obtained from the "Select" sickness fund. Children (18 years and younger) and adults (above 18 years) were analyzed separately: we analyzed children with asthma and hypertension, and adults with diabetes, asthma, ischemic heart disease and hypertension. Johns Hopkins ACG software was used to select patients with chronic conditions, and to group patients into three comorbidity groups: low, medium and high. Statistical analyses were done with SPSS software version 11. For children, visit rates were obtained for patients who were listed to family doctors (FD) versus district paediatricians (DP); for adults, visit rates were obtained for patients listed to family doctors (FD) versus district internists (DI).

Results: During the one year investigation period, adults in the high comorbidity group, who were listed to a DI, visited specialists more often than their primary care doctor. Most of the significant differences of visits to secondary care occur among adults with diabetes (7.8 visits per patient who is listed to a DI, and 6.9 when listed to a FD, $p<0.001$), hypertension (5.8 visits for DI, and 5.1 visits for FD, $p<0.001$) and ischemic heart disease (7.9 visits for DI, and 7.2 for FD, $p<0.001$). Children with hypertension in the high comorbidity group have more visits to secondary health care when listed to DP. In the high comorbidity group, 9.0 visits per one child listed to DP, when compared with 6.0 visits by children listed to FD in the high comorbidity group ($p<0.05$). Family doctors had higher visit rates than district pediatricians by children with hypertension in the high comorbidity group (13.0 visits to FD compared to 8.7 visits to DP, $p<0.01$) and by children with asthma and the high comorbidity group (16.7 visits to FD compared to 14.2 visits to DP, $p<0.05$).

Conclusions: Adults with asthma, diabetes, hypertension and ischemic heart disease who have high comorbidity visit secondary health care providers more often than their primary health care physicians, when adults are listed to district internists who have not been retrained to family doctors. There are no significant differences of primary and secondary visits for children with asthma and high comorbidity. Children with hypertension and a high level of comorbidity more often visit specialists and are less often visiting their physician when children are listed to a DP.

The training of family doctors appears to raise the level of primary care and reduce the level of secondary care for complex patient. This has implications for the efficient use of resources when delivering care to the population in Lithuania.

Conflict of interest: None disclosed.

Hospital emergencies: measuring morbidity and costs in an integrated care organization

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Introduction: Appropriate use of hospital emergency services is a key issue to avoid that minor diseases consume high cost and technology servicies. Understanding morbidity of emergency services is a requirement to set up strategies for appropriate use.

Methods: In Baix Empordà county (N=90.849 residents) an integrated care organization delivers health care services to the population. A unified database on morbidity, utilization and individual costs is available. In this setting all citizens are covered under public funding and it is possible to follow all the contacts with health services within the county. Such encounters were grouped using Clinical Risk Groups (1.2 version) for the years 2004 and 2005.

Results: During 2005, there were 18.178 persons (20%) that were treated in hospital emergency services and generated 30.836 visits (3,4% of total encounters). The average of visits per person was 1.9 (S.D 3.8). More than 70% were patients with several chronic diseases. The volume of emergencies depends upon the morbidity of patients, from 290 emergencies per 1000 for "healthy" people up to 4074 emergencies per 1000 persons with three chronic diseases (ACRG3 74). The average time spent in emergencies lies between 113 minutes for "healthy" people up to 1165 minutes for patients with three chronic diseases. Those visits represented a total cost of 2.592.117€, and a mean cost 142.60 (S.D. 284.42€). This cost represents 5,1% of mean cost per patient, however depending upon the morbidity may achieve up to 24,7% of total cost. The study shows the reasons for the encounter according to the basic pathology and its costs.

Conclusions: The burden of disease is a key element to understand utilizations of services. Its analysis may help to set up specific programs to treat patients in the appropriate level of service, increasing its efficiency and effectiveness.

Conflict of interest: None disclosed.

SESSION 14: Using administrative information

Case-mix and process indicators adjustment in monitoring the quality of prostate biopsies using multivariate control charts

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Introduction: A monitoring system must be designed to quickly detect small and unsual variations in health outcome indicators. The total variation of outcome indicators between health care practitioners is linked to disparities in the case-mix of patients treated, in quality of health care processes (conformity to guidelines), in data quality and in chance. According to this virtual equation, health outcome indicators may be difficult to interpret and to compare between time periods, practitioners or structures. Control charts are commonly used tools in monitoring surgical mortality rates or hospital-acquired infections. Case-mix and process indicators ajusted control charts can be developed to detect unsual variations in health outcome indicators. In case of highly correlated variables, the multivariate T-squared control chart is preferred to detect joint out-of-control conditions without any variable violating its limit when plotting separately. Prostate cancer is the most common cancer and the second cause of leading death in men. Early diagnosis of cancer is required to improve the treatment efficacy. Guidelines recommend the use of Prostate Specific Antigen in combination with digital rectal examination as an aid to early diagnosis, while definitive diagnosis requires 8 to 10 transrectal ultrasound-guided needle biopsy cores. In this study, we aimed to compare the sensitivity between a classical XS

Shewhart chart and a multivariate T-squared adjusted control chart in detecting special causes variation in quality of prostate biopsies.

Methods: A prospective survey was conducted in a teaching hospital located in Lyon (France). The study population involved all inpatients who underwent prostate biopsy from January 1, 1998, to December 31, 2007. Among the 25 urologists who performed 2367 biopsies, we considered 4 of them who have achieved more than 200 biopsies per each between 1998 and 2007. We computed the outcome of prostate biopsies, measured by the length of needle core involved with prostate cancer (LBK), according to 5 case mix and process variables: age at biopsy date (Age), PSA value before biopsy (PSA), prostate volume before biopsy (PV), number of biopsy cores (NBC), total length of the needle cores (LBC). Indicators were extracted from the hospital information system and plotted each semester for each urologist and for all of them together on two types of control charts : a classical XS chart and a multivariate T-squared control chart. The lower and upper control limits detected assignable causes were calculated for a risk α=0,05 of false alarm probability. The detection of assignable causes of variation was pre-defined as a single point outside the upper or lower control limits. We confirmed the effects of case mix and process variables on the outcome of the biopsy by fitting a two-level mixed-effect regression model on our data to take into account the hierarchical structure of the data (the random effect was constituted by the urologist who has realised the biopsy).

Results: We monitored 1288 biopsies performed by 4 urologists between 1998 and 2007. The proportion of positive biopsies depended on urologist (p=4.E-03) but was not significantly associated with the semester of the biopsy (p=0,24). The mean LBK was 11,03 mm (95%CI=[9,77-12,29]). 655 biopsies were positive for prostate cancer with a mean LBK of 21,7 mm (95%CI=[19,51-23,87]). The univariate analysis didn't show any difference between positive (PB) and negative biopsies (NB) for LBC (p=0,13) and for the proportion of NBC> 8 cores (p=0,38). On the opposite, the mean age (65,1 years), PSA (29,1 ng/ml) and PV (40,3 cm3) for the patients with PB were statistically higher than the means for patients with NB. The two-level mixed-effect regression analysis confirmed the significant effect of the 5 case mix and process variables on the mean of LBK and the absence of random effect on the urologist variable. The classical mean and standard deviation chart failed to exhibit assignable causes of variation for the mean of LBK but detected unusual variations for its standard error. The multivariate T-squared control chart detected joint out-of-control conditions during 1998 and the 2d semesters of 2003, 2004 and 2005 ascribable to a variability in urologists' practices and in case mix variables.

Conclusions: This study shows that multivariate T-squared adjusted control charts are more sensitive than classical control charts to detect special causes of variation in the quality of prostate biopsies. Although control charts remain easier to perform than complex statistical analysis, they should include case mix and process information. In this condition, they provide a high performance monitoring system, designed to quickly detect small and unusual variations in health outcome indicators and lead to practice improvement according to Evidence Based Medicine.

Conflict of interest: None disclosed.

Clinical pathways at Norwegian hospitals 2003-2007. A general overview and special focus on cerebral infarction

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Introduction: Clinical pathways have been analyzed for all patients at all Norwegian somatic hospitals during the period 2003-2007. A clinical pathway is defined as the number of contacts and what kind of contact (outpatient visit, daycare, admission) a patient had at the same hospital each year. The paper will focus on changes during the five years, differences between university hospitals and others, and between three age groups - children (age 0-17), adults (age 18-67) and elderly (age 68+). Special focus will be on clinical pathways for patients where the principal diagnosis (ICD-10) for the first registered admission was I61,I62 or I64 (cerebral infarction).

Methods: All individual patient data (admissions, daycare and outpatient visits) are linked together using an unique patient identification number. The same patient has a different identification number at different hospitals, and the number changes from year to year. It is only possible to identify clinical pathways within the same hospital and year. Patients who were not discharged alive are excluded, and patients discharged during the month of December are excluded. Readmissions within 30 days are of special interest in this study, and we do not know if a patient discharged i December is readmitted in January the next year.

Results: The number of contacts per patient increased from 2,57 in 2003 to 2,70 in 2007. Some differences between men and women were observed. In 2003 the number of contacts per patient was 2,53 for men compared to 2,60 for women. In 2007 the figures were 2,66 and 2,72 respectively. Patients aged 70 and above had more contacts per patient than those below 70.In 2007 the figures were 3,14 (age 70+) and 2,59 (age below 70). From 2003 to 2007 the number of patient contacts at Norwegian hospitals increased by 14,9%, of which 9,4% was due to an increase in the number of patients, and 5,5% to an increase in the number of contacts per patient. Patients with only one contact with a hospital is decreasing, from 49,7% in 2003 to 48,6 in 2007. In 2003 a total of 11,8% of the patients had 5 contacts and more. In 2007 this percentage had increased to 13,0.

The most common clinical pathways were (2007):

- 1 outpatient visit and no other contact.

- 2 outpatient visits and no other contact.

- 1 admission and no other contact.

- 1 admission and 1 outpatient visit.

- 3 outpatient visits and no other contact.

- 1 admission and 2 outpatient visits.

These six pathways covered about 70 % of all patients both in 2003 and 2007. There were just minor differences between university hospitals and others. The difference is most visible for patients who had only one contact with the hospital. This contact is more often an outpatient visit at a university than at a less specialized hospital. There were large differences between the various age groups. Of patients belonging to the age group 0-17 years 53,4% had either 1 outpatient visit or 1 admission and no other contact with the hospital. Among patients 68 years or more this percentage was 40.2. A variety of different combinations of the number of admissions, outpatient visits and daycare treatments were found both in 2003 and 2007. The number of different combinations was 5006 in 2003 and 6063 in 2007.

Younger patients admitted to a hospital due to cerebral infarction and discharged alive were more often followed up at an outpatient department then elderly patients. For all Norwegian hospitals the percentages in 2007 were 46 (age below 50) and 32 (age 75 and above). The variation between hospitals was considerably. At two of the largest university hospitals the percentages were 73 and 41 (age below 50) and 56 and 21 (age 75 and above). At university hospitals, the risk of readmission for cerebral infarction-patients was reduced if the patient was examined at an outpatient department during the first 30 days after discharge. For patients aged 65 and above the readmission rate was 8,8 for patients with 1 or 2 outpatient visits compared to 12,4 if there was no such visit. This was not the situation for patients aged 64 and below. This group had readmission rates of 4,5 (no outpatient visit) and 8,9 (1 or 2 visits).

Conclusions: Elderly patients seem to have less standardized clinical pathways than younger patients. The number of combinations of admissions, outpatient visits and day care treatments are increasing. There were minor differences between university hospitals and others.

For elderly patients outpatient visits subsequent to a discharge for cerebral infarction is very important. At most university hospitals this is done at a routine basis, and the effect on the readmission rate is obvious. This was not the situation at other hospitals and for younger patients.

Conflict of interest: None disclosed.

One-year follow-up of elderly patients hospitalized for hip fracture using linkage of administrative databases

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Introduction: Hip fracture is a common clinical problem and is associated with significant morbidity and mortality, especially among elderly patients. Administrative databases could offer a practical mean to monitor and improve outcomes.

Objectives: to assess the in-hospital mortality after hip fracture surgery in elderly patients, to assess the one-year readmission rate and to assess the overall one-year mortality (indexed hospitalization and readmission mortality)

Methods: Records of hospital discharges of patients older than 75 years of which hip fracture was the principal diagnosis (using ICD-10 Classification) and who underwent surgery (arthroplasty or osteosynthesis) were extracted from the French DRG-based information systems (Programme de Medicalisation des Systèmes d'Information, PMSI) of all hospitals in Paris-Ile-de-France area. Readmissions within one year of the index hospitalisation were identified by a computerized algorithm using exact record linkage methodology. Potentially avoidable readmissions were defined as unplanned readmissions related to the indexed hospitalization.

Results: Of 7758 stays with a primary diagnosis of hip fracture in patients older than 75 years, 7033 (91%) had a valid linkage identification allowing the follow-up. Of these, a surgical procedure was performed in 6083 stays corresponding to 5982 patients (3425 osteosynthesives, 2557 arthroplasties). Concerning the index hospitalization, the mean length of stay was 15.1 (sd 9.2) days and the in-hospital mortality was 4.6%. Mean age was 85.7 years, sex-ratio (F/M) was 4.2. A dementia as a comobidity concerned 11.5% of patients. Of the 5709 discharged patients, 32.3% had at least one readmission within one year of the index hospitalization, with 83.8% readmitted more than once. (mean time to the first hospital readmission 4.2 (sd 3.5) months). More than half (56.9 %) of all readmissions within one year were potentially related to the index hospitalization). The in-hospital mortality for readmission was 13.8%.

Conclusions: The use of DRG-based administrative database may be relevant for monitoring the short-term outcome of elderly patients with hip fracture. In our study, the in-hospital mortality rates for the hip surgery hospitalization was 4.6 %, ranging at the lower limit of those reported in the literature. One third of survivor patients were readmitted within one year. The one-year mortality was below the reported estimates and was probably underestimated, suggesting the need for linkage with mortality databases.

Conflict of interest: None disclosed.

SESSION 15: Applications of clinical data

Statistics in the Thai Mental Health Case-mix Classification

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Introduction: The Thai mental health service system is facing many problems including insuficient and inappropriated budget allocation. Statistics in case-mix classification gives us choices as modelling for soving allocation problems. A suitable statistical model in creating mental health patient case-mix subclasses will improve our budget alloction system.

Methods: This study explores one possible statistical model and one currently in use, and compares their performance: the Thai Diagnosis Related Group (Thai DRG) (1) and the Thai Mental Health Case-mix Classification (Thai MHCC) (2).

Results: This study reviews literature from varied sources by using 'statistic', 'mental health', 'case-mix', and 'classification' as key words. In-patient data were collected from two psychiatric hospitals from January to April 2004. The data was classified by two case-mix approaches and their performance was evaluated in view of statistic and clinical concordance. The four techniques always used in case-mix classification are composed of regression models, artificial neural networks, discriminant analysis, and decision tree (3, 4). The most widely use statistic in case-mix classification is the decision tree as found in DRG (1, 5), the Australian National Sub-Acute and Non-Acute Patient Classification (AN-SNAP) (6), the Mental Health of Case-mix and Service Costs (MH-CASC) (7). The performance of MHCC is better than DRG in terms of variation between and within groups.

Conclusions: The results from this study support improving the Thai mental health case-mix allocation system and revision of current policy.

Table 1: Comparing of the two Thai mental health casemix classification

	Thai DRG	Thai TMHCC
Number of classes	57	52
Number of classes with subjects	29	51
Number of classes with coefficient of variation (CV) > 1.0	1	0
% Reduction in Variance (RIV)	6.15	21.15

Conflict of interest: None disclosed.

Beyond triage: Usefulness of the Manchester Triage system as case mix analysis instrument in health planning and resource allocation

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Introduction: Hospitals with open door systems, receiving patients via emergency departments (ED), are exposed to a case mix related with unpredictable demands of highly heterogeneous cases. Some efforts to adjust funding according to emergency case complexity are not new but have been very had to put into practice. On the other hand many hospitals are still not using any type of triage at ED door, while others have adopted different triage protocols. The Manchester Triage System (MTS) is a five-point triage scale used to triage patients coming into the ED. It was introduced in the United Kingdom in 1996 and is now widespread, especially in Europe, and in use in our hospital since 2000 via a computerized protocol.

Methods: We used a computerized database of 321539 patients triaged during 30 months (January 2005 to June 2007) where MTS codes, death outcomes, admission and admission route were used to estimate the proportions and association between MTS codes and remaining variables through a Qui-square univariate analysis. We additionally work the hypothesis that at least to some extent, MTS correlates with resource use directly as well as with the risk of adverse outcomes, and the costs of human and technical resources incurred in its avoidance. This paper further develops a theoretical exploration of how MTS can contribute for emergency case mix analysis.

Results: We find that MTS, besides prioritizing service to emergency patients, seems to provide additional information that is useful for emergency case mix analysis. Namely, that MTS sub-groups are associated with different propensities for indirect triage outcomes such as: death in the A&E department or being admitted into hospital, with a direct correlation between severity screened by MTS and risk of being admitted to hospital. Such information is likely to be relevant for national comparisons, healthcare service planning and resource allocation.

Conclusions: A casemix system that takes into account the sort of information provided by MTS can be helpful if considering implementation of risk-adjusted institutional reimbursement as opposed to a fixed fee per patient systems. Further such systems using MTS admission codes can hypothetically be better able to prospectively predict hospital cost creation/resource mobilization by predicting the need to hospital admission on a population scale. Besides serving as a budget tool on top of current retrospective case-mix systems it may allow allocation of personnel and bed-space according the levels and "severity" of population health needs at the door of the hospital.

Conflict of interest: None disclosed.

Applications of the 'home grown' Discovery Health 'Episode' Grouper

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Introduction: At PCSI 2007 in Venice, Riedwaan Jabaar from Discovery Health presented a paper of the development of an episode grouper using South African data and coding. This paper explores some of the initial applications which are supported by this tool; as well as discussing potential future plans

Methods:

Applications include:

- An Electronic Member Record for Discovery Health members;
- The organisation and structure of clinical and resource data in a meaningful, integrated manner in order to provide useful data to case managers; members and clinicians; and thereby encourage efficiencies and improve quality of care.

Examples will be demonstrated.

Results:

Predictive Modelling and Risk Stratification; including for:

- Fund reporting and Premium determination: The typical 'year on year' plus inflation projections are replaced by sophisticated models that use all our demographic and clinical data to predict resource usage i.e. utilisations and costs, including for hospitalisation; drug and professional expenditure
- Provider Contracting, Profiling and Peer Review: Engagement with cliniciansin regard to their use of resources and the quality of care provided is enabled by properly risk adjusted outcome measures
- Disease Mangement: The stratification of members to enable accurate identification of those 'at high risk' members who it is worthwhile to enrol in Disease Managment programs because it is possible to significantly improve their experience

Conclusions: Examples will be demonstrated.

Conflict of interest: None disclosed.

SESSION 16: Hospital management issues

Managing gaming phenomena in the Tuscan performance evaluation system

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Introduction: The problem of gaming in performance evaluation systems is a known phenomenon (Bevan, 2006, Bevan Hood, 2006) that can have place especially when there are economic incentives related to specific targets. In all Tuscan Local Health Authorities (LHAs) and Teaching Hospitals (THs) a multidimensional performance evaluation system has been adopted since 2005, based on administrative and non administrative data benchmarking. The aim of the Tuscany performance measurement system is to give a general outline for the management of the LHAs and THs, useful both for evaluating performance and for enhancing and promoting the results of the healthcare system. The performance evaluation system consist of 130 indicators classified in six dimensions: assessment of the population's state of health, assessment of the capacity to follow regional guidelines, assessment of efficiency and financial performance, clinical and health assessment, citizens and patients assessment, employees assessment. After three years of application of the performance evaluation system, integrated with the rewarding

system, improvements were achieved in most of the indicators monitored. The paper reports the effects of the performance evaluation system and how gaming phenomena were managed with a special focus on data manipulation.

Methods: The research team focused the analysis on the larger performance improvements across the years 2005-2007 to evaluate whether gaming phenomena have been taking place. The findings of this analysis were reported and discussed with top managers and professionals through individual interviews and meetings in order to detect the determinants of the results obtained.

Results: The use of data has led LHAs and THs to record faster and in a more appropriate way improving the information flows. Moreover, as top management reported during meetings, it has helped controllers in managing data. If performance improvements were not based on the evidence of organizational changes it had been assumed that they were due to gaming phenomena. In 2007 LHAs and THs whose indicators clearly show large improvement were put on evidence during meetings with the top management asking to the CEO how his/her organization reaches the results. Where no evidences were shown further investigations conducted by a dedicated commission are planned. Gaming has been found in indicators concerning small and specific areas, such as the rate of hospitalization for heart failure, while indicators that concern larger phenomena, such as the pre-surgical length of stay, were less involved.

Conclusions: The results pointed out that further developments are needed to analyse suspicious cases. The research team has been studying how to find out and overcome gaming phenomena not only related to data manipulation. The public presentation of data and the request of evidence to explain large improvements in peer reviews meetings eases the accountability process. In addiction it can be a deterrent for the future.

Conflict of interest: None disclosed.

Casemix and hospital management evaluation

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Introduction: Romania introduced in 2005 the compulsory Minimum Basic Data Set for hospital medical records in all hospitals. This was the necessary step towards the Case mix based hospital financing implemented in 276 hospitals (in 2007). Since 2007, all Romanian Hospital discharges are validated based on the MBDS sent by hospitals. Consequently, the Ministry of Health developed a set of indicators, in order to evaluate the hospital management performance. This evaluation was first done at the beginning of 2008, based on the new legal regulations that introduced Hospital Management Contracts between hospital managers and Ministry of Health starting with 2007.

Methods: The methods used were the review of the literature, description of experiences of various local experts involved in the evaluation and the critical analysis of legislation. The data used for hospital management evaluation comes from two main sources: the MBDS for the clinical data and the financial hospital reports for the financial data. The process of hospital management evaluation was done by the Public Health Authorities. The evaluation process is based on quantitative indicators (for human resources management, services utilization, financial performance and quality of care) and qualitative indicators for general management of hospital (planning, organization, coordination and control).

Results: The evaluation of hospital managers based on MBDS indicators (including case mix) is almost finalized, and the final results will be published after the judgment of the complaints of some hospital managers. The authors will have a complete picture of the final results of hospital managers' evaluation by the moment of the PCSI conference (October 2008).

Conclusions: The utilization of the MBDS and case mix for the evaluation of hospital management performance was done for the first time in Romania in 2008, but there are some problems that we have to consider in future. The main benefit of this evaluation is the idea of transparency and objectivity because the process of evaluation is based mostly on the hospital data. The things to be improved are related with: selection of indicators for evaluation, data accuracy, sources for hospital reporting and competency of personnel involved in the evaluation process.

Conflict of interest: None disclosed.

The implementation of a purchasing mechanism for hospital resource allocation in Portugal

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Introduction: Until 1997 the Portuguese hospitals budgets had been based on the previous year's funding, updated for inflation. In 1997 a new activity-based resource allocation model was adopted (through DRG) and a growing portion of the budget was based on the prevision of the hospitals activity (from 10 to 50% in 2002).

In 2003, 40% of the public hospitals received a new statute and were converted into public enterprises, with a change in management rules and financial responsibility. In 2005 more hospitals received this new statute.

With this new legal statute, hospitals are financed through a contract between the Ministry of Health, represented by the Central Administration for the Health System and the Regional Health Administrations and the units responsible for delivering healthcare - Hospitals.

The contract establishes the contracted production quantity and quality, as well as its prices. Through these contracts, the Ministry of Health, as the contracting/payer entity, identifies the healthcare needs of the citizens, plans what healthcare must be delivered and contracts the needed services so that demand may be satisfied according to the budget restrictions imposed. The hospitals assure that the healthcare are delivered according to the contracted quantity and quality and manage their own activity with an efficiency converging to the contracted prices. Both parts contract inpatient episodes, ambulatory surgery (measured using Diagnosis Related Groups and a case mix index per hospital), outpatient visits, emergency episodes and day care. A price for each line of activity is established, enabling a payment for the activity effectively done instead of cost reimbursement. Legal abortion, haemodialysis, pre-natal diagnosis, ambulatory treatments for HIV patients are paid according to a comprehensive price.

There is a price adjustment according to hospitals structure. Hospitals are grouped according to 32 variables (which include complexity of patients treated not adjusted by the casemix index, number of beds, central/community hospitals, etc), resulting in four hospital groups. Each group has the same price for each hospital within the group. Moreover, there is also a price adjustment by casemix for inpatient and ambulatory care.

Aims: Since the introduction of purchasing, how has the health care delivered by hospitals changed?

The main purpose of the present study will be to describe the current purchasing mechanism for hospital resource allocation in Portugal, to compare the production and financial performance of public enterprise hospitals and non-public enterprise hospitals and also to evaluate if hospitals became more efficient according to the prices that are being paid. Considering the healthcare that is being delivered, have hospitals effectively became more cost efficient?

Methodology: 19 public enterprise hospitals created in 2003, were generally characterized in terms of their production (inpatient and other kind of healthcare delivery) and financial performance and compared to public hospitals that were never transformed into public enterprises.

Using the national DRG database since 2000 (grouper All Patient DRG Version 21), analysis was developed in order to find the existing relation between what is being paid and the kind of healthcare that is being delivered.

Conclusions: When a new activity based purchasing model is introduced, evaluation has to be made in order to adjust this model into a continuously more liable and fair tool to allocate financial resources. As a strategic purchaser, the Ministry of Health has to know if what's being paid is pushing the hospitals into a more efficient profile and giving a clear signal of what hospitals should be doing.

Conflict of interest: None disclosed.

Can DRG's be aggregated for health policy purposes: A pilot macro model

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Introduction: In 2008, most European countries have implemented a patient classification system. Some countries have developed their own, national systems, while the majority has chosen some variant of a DRG system. All the different DRG's describe the hospital production and estimated resource use by dividing the patients into approx. 500-1000 groups. Norway has since 1997 used a DRG system for hospital funding. We operate a national variant of the Nordic DRG system (NordDRG) with approx. 600 groups for in-patients.

The DRG systems are widely used as a tool for management and funding in the hospital sector. At the same time, there are some essential needs that a traditional DRG classification system does not meet. First, health politicians demand a macro-level hospital sector information system that informs them about "what is going on". However, the picture given by DRG's with hundreds of patient groups is too detailed for this purpose. Additionally, changes in coding practice and classification rules often complicate the comparison over time when based on individual DRGs. Third, international comparisons on a DRG basis are hardly possible without customization.

Methods: Based on DRG-grouped patient data from the whole country for the period 2003-2007, we have developed a model in which patients are aggregated on clinical criteria into a handful of groups. In this model, several clinically similar DRGs are aggregated into macro-groups independent of the MDC system.

The model has macro-groups for surgery and non-surgical treatment. The surgery macro groups are selected based on anatomy and operation volume. The non-surgery macro groups are selected based on the following main criteria: symptoms at hospital admission, acute illnesses, chronic illnesses, child births and rehabilitation. The macro-groups are organized at two levels, as main groups and sub-groups, to allow easy overview.

Results: Examples of hospital stays aggregated in macro-groups are presented in Table 1. Table 1 shows a 12 % growth in heart, lung and vessel surgery. In the next table (Table 2), this macro group is presented at a more detailed subgroup level to explain the growth.

The idea with a small number of aggregated macro-groups is to enable comparison over time and across country borders, e.g. between different DRG systems. An additional purpose is to give a "snapshot" of the health care system capacity suitable for health politicians. The model allows both a volume perspective and a resource use perspective.

Conclusions: We have piloted the model by classifying the Norwegian national records for all the hospital stays during 2003-2007 in aggregate groups based on their original DRG assessment. In our presentation we will show some results and discuss potential use of macro-group information.

Table 1: Hospital stays with surgery in Norway 2002-2006

Type surgery, main macro group	2003	2004	2005	2006	Proportion of all surgery	Change 2003-2006
Abdominal	41.112	41.174	42.133	41.035	11 %	-0,2 %
Heart, lung & vessels	25.364	26.120	26.682	28.354	7 %	11,8 %
Eye	51.255	48.862	51.906	50.126	13 %	-2,2 %
Urology	22.672	23.156	23.874	23.640	6 %	4,3 %
Neurosurgery	5.351	5.374	5.585	5.363	1 %	0,2 %
.....	...	...	...	...	...	...
All surgery	370.889	379.814	392.393	384.854	100 %	3,8 %

Table 2: Hospital stays for heart, lung and vessel surgery

Subgroups for "Heart, lung and vessel surgery"	2003	2004	2005	2006	Change 2003-2006
All	25.364	26.120	26.682	28.354	11,8 %
PCI	8.503	9.010	9.781	12.473	46,7 %
Vein stripping	7.950	7.584	7.322	6.729	-15,4 %
Lung	1.673	1.629	1.582	2.113	26,3 %
Others	7.238	7.897	7.997	7.039	-2,7 %

Conflict of interest: None disclosed.

Using activity based costing to understand and manage hospital financing and costs

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Introduction: Hospitals in Portugal contract with the Ministry of health, being prices set based on the casemix index and DRG's or other medical acts. There is a perception that this prices are not adjusted to costs and that there are services provided by hospitals that are not being financed at all or are underfinanced. The challenge was to develop a costing system in pilot hospitals in order to verify whether these perceptions were right and to create a basis to redefine prices and study alternative methods for hospital financing. The system calculates costs of services provided in an hospital, the cost of DRG's and in some cases the cost of each pathology. The cost for pathologies is a first base to understand the full life cycle of a patient, mainly for hospitals where a continuum of care is provided, such as for oncology. Another benefit for costing pathology costs is to serve as a basis to measure the cost effectiveness of different therapies. Activity based costing is also a valuable tool for management as it allows to better understand the cause of costs and take measures to correct high costs (that can result from poor efficiency) but also low costs (which can result from poor quality). This tool can also facilitate the promotion of changes in hospital management as it can be used to evaluate services and performance when combined with other tools, such as Balanced Scorecard.

Methods: We used activity based costing as the basis for calculating costs for all major medical acts, DRG's and in certain cases, pathologies performed in an hospital. This method has been widely used in other industries and there are also some success stories in healthcare in other countries. This method allows us to calculate costs taking into account all activities performed to deliver a service. By using a causal effect relationship we assure that only costs that can be directly affected by performing more of a certain activity or service are part of that cost. This is better that traditional systems, as this systems don't distinguish the activities performed and as a consequence use more general criteria for the imputation of costs to services.

Results: The result of this project showed us that:

- Hospitals can develop a tool that can be used as a basis to calculate costs in different hospital settings and to adjust financing system and pricing based on them;
- Prices are not always adjusted to costs and different ways of financing healthcare in hospitals can be used
- It provides the basis for costing benchmarks and promotes cost effectiveness environments.

Conclusions: This system proves to be very useful for policy decisions and also to benchmark hospitals performance. It can be easily extended to other levels of care, such as primary care, mainly in disease management where benefit will be greater, and it can be complemented with measures of quality that allow decision makers to evaluate cost effectiveness in healthcare.

Conflict of interest: None disclosed.

SESSION 17: Resource intensity

Estimating resource intensity weights for CMG+ atypical cases

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Introduction: In 2007 the Canadian Institute for Health Information (CIHI) introduced CMG+, Canada's acute-care inpatient grouping methodology. CMG+ uses clinical administrative data to group patient records into clinically relevant and resource-homogeneous groups, using ICD-10-CA and CCI (the Canadian Classification of Health Interventions). CMG+ identifies approximately 560 Case Mix Groups (CMG), which are analogous to DRG.

In addition to the CMG cells, CMG+ makes use of the following five factors: age category, comorbidity level, flagged interventions, intervention event, and out-of-hospital interventions. These five factors further account for clinical and resource differences within CMG and are used in the calculation and assignment of the Resource Intensity Weight (RIW) and Expected Length of Stay (ELOS) resource indicators.

In CMG+, transfer, sign-out and death cases are referred to as atypical cases. These patients make up about 10% of the acute inpatient population. The course of treatment and length of stay for an atypical case may differ considerably from that of a typical patient.

Methods: While the intent of the RIW methodology for typical cases is to assign an RIW to a case based on the average cost of patients with a similar grouping assignment (i.e., same values for CMG and the five factors), the atypical RIW is meant to capture more fully the cost of each atypical case. The atypical RIW methodology is based upon per diems and atypical cost curves. The atypical cost curves adjust the per diem of each case based upon the patient's length of stay. RIW values are assigned to each atypical case using the per diem, the atypical cost curve effect, and the total length of stay of the case.

The atypical RIW methodology is discussed, including how the atypical RIW logic differs from that of typical cases, the estimation of the atypical per diems, and the fitting of the regression model that estimates the atypical cost curves.

Over the last year work has been carried out to enhance the atypical RIW model. These enhancements are discussed as well.

Results: The exploration of enhancements to the atypical RIW methodology demonstrated atypical RIW values that more accurately reflect the cost of the atypical cases and improve the performance of the atypical RIW methodology.

Conclusions: Based on the results, improvements to the atypical RIW methodology were implemented in fiscal year 2008-09.

Conflict of interest: None disclosed.

Using available cost data for producing optimal DRG costweights - The experience in Turkey

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Introduction: In Turkey cost data have been collected from an initial 50 pilot hospitals using a standard cost sheet approach. In the first year of collection, 2006, responses from hospitals were mixed and quality and completeness of costing data varied. The choice of the level of detail built into any costing applications varies according to:

- The data available to use in the costing study,
- The resources available to undertake the study
- The frequency of the costing process and
- The objectives of the costing study.

The objectives of the costing components of the Turkish casemix development work to date have been:

- To demonstrate costing was possible within Turkish hospitals given the current level of hospital information systems.
- To provide skills transfer to ensure to ensure that future cost studies could be undertaken locally, without significant international involvement.
- To develop a series of cost weights for DRGs for preliminary use within Turkey.
- To develop a framework for the ongoing improvement of costing within Turkey.
- To achieve the previous objectives within the budget available to the project.

A number of problems were associated with the 2006 Study from which data were available. Nevertheless it was important for building momentum to make the best use of available results. To achieve this, a number of corrections based on benchmark data from a reference source was necessary while continuing to use the basic Turkish cost data.

Methods: The key problems and the associate approaches to adjust the 2006 weights to overcome or reduce the impact of these problems were:

- Under reporting of secondary diagnoses: calculate weights at the Adjacent DRG level using Turkish cost data and then use the Australian published relativities between DRGS in each DRG family to set Turkish DRG weights.
- Missing DRGs: set based upon the adjacent Turkish DRG weights for adjacent DRGS with similar costs in the Australian data.
- Sub-optimal cost allocation between DRGs: Identify cost buckets where per diem allocations are likely to distort Turkish costs and redistribute Turkish costs using Australian (Victorian) data. Estimated per episode and daily effects within each DRG/Cost Bucket were developed and used to redistribute Turkish costs. This technique involves using regression techniques on the Australian and has been used in a number of international settings (New Zealand and Ireland) where local data were missing.

Results: Using these methods and a follow up clinical review process a useable set of initial weights with relevance to Turkish clinical practice was established. Various refinements to the regression parameters have been recommended as a result of the review and a process of further refinements of the weights has been established. Comparisons with options for using weights from other sources are also discussed and evaluated.

Conclusions: While data quality issues remain, the objectives of the project as outlined above have been achieved. Preliminary Turkish weights have been developed, costing skills have been transferred to local team members, and a process for the ongoing collection and improvement of costing in Turkey has been established. Potential next steps are considered in the context of the current health reforms in Turkey.

Conflict of interest: None disclosed.

Comparison of Cost Weights developed by USA and Malaysia using IR DRG

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Introduction: One of the most well researched uses of the Diagnosis Related Groups (DRGs) is its application to develop Cost Weights (CW). These cost weights can be used for many purposes, the most common of which is the reimbursement of the services offered by the healthcare services providers. Malaysia and Indonesia are moving forward with national implementation of IR-DRG classifications. The research question is the following: Can the 3M IR-DRG classification cost weights be used to compare services and their costs across geographical borders?

Methods: The Hospital University Kebangsaan Malaysia (HUKM) developed cost weights based on Malaysian data that will be used for the initial national implementation in 2009 of the International Refined Diagnosis Related Groups (IR DRG) V2.1. For this evaluation, the Malaysian cost weights were compared to cost weights developed by 3M using a representative sample of US data (HCUP public sample for 2005). For the sake of simplicity of the analysis, we present results only for inpatient surgical cases from HUKM in Major Diagnostic Category (MDC) 05 (Disease and Disorders of Cardiovascular System). This MDC was selected because diseases belonging to the cardiovascular system are the most common reasons for admission in our hospital. Results are presented only for the DRGs that had at least three cases in each level of severity. The US and Malaysian cost weights were normalized to the HUKM casemix, so that the overall average patient cost weight is 1.0.

Results: In general, the cost weights for inpatient stays for cardiac procedures in US are larger than for the same episodes of care in Malaysia. This indicates that these procedures are more expensive, relative to the cost for treating the average patient, in the US than they are in Malaysia. Within each base DRG, the cost weights are observed to increase as the severity of illness level (SOI) increases. Furthermore it is seen that the percentage increases with severity subclass within a base DRG follow similar

trends between Malaysia and US. Cost weights for Indonesia have recently been calculated. Because of the similarity between the medical practice patterns and costing protocols between the two countries, it is expected that cost weights from Indonesia will be more comparable to those of Malaysia than are the cost weights from the US. The authors expect to be able to include a comparison with the Indonesian cost weights in the full paper.

Conclusions: This paper supports the use of exogenous cost weights in developing countries for trending purposes, as an interim step which supports the development of their own weights. It highlights the applicability of using cost weights from more than one country, especially those countries with similar medical practice patterns, resource utilization profiles, and relative costs to justify direct comparisons.

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Conflict of interest: None disclosed.

Patient Classification System based on Dependency of Nursing Care (PCS/N)

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Introduction: The authors present the Patient Classification System/Nursing (PCS/N) model created by a Portuguese nurse's team, its development and implementation results. The PCS/N application in Portuguese NHS hospitals allowed the development of mechanisms by hospitals to improve the provision of care, through a more accurate identification of their "clients'" needs. The system also enables discussions with central administration concerning hospitals global needs in nursing resources and adjustments to it based on activity reports.

Methods: This system has been developed from the GRASP (Grace-Reynolds Application and Study of PETO) methodology and it consists in classifying inpatients by critical activity indicators, according to their needs of nursing care.

Results: To evaluate the performance of this method in the Portuguese reality and the adjustments required, five hospitals belonging to the National Health Service (NHS) were selected and the areas targeted were internal medicine and surgery. Nowadays, the system is also developed to be applied in the following areas: obstetrics, orthopaedics, paediatrics, rehabilitation and oncology. The information circuit begins with the identification of the nursing care dependency levels, for each patient, per day. The nurses classifying the patients are the responsible for this step and this is the starting point for the use of the system. The application of the system is voluntary and it depends on the interest of each hospital Management Board. PCS/N is used in about fifty National Health Service hospitals, distributed all over the country.

Conclusions: The most important achievement of the PCS/N is its contribution in the improvement of the organisational and managerial systems of the hospitals through the availability of structured, on time and objective information. The use of PCS/N has influenced in a very positive way the organisational culture once nurses became dynamically involved in the management of care and inpatient units. It should also be stressed that the Administration Board has an objective information system available that can help it to take decisions concerning the daily and strategic management of the hospital.

Conflict of interest: None disclosed.

Patient classification, nurses and the professional literature

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Introduction: Since Connors's (1960) seminal research in patient classification and nurse staffing, the two phrases have become inextricably linked in the United States. Connor's techniques and most of those that have followed, seek improved ways to manage the workforce in nursing. Controlling nurses, their number and cost has been paramount. Lost in this equation has been the perspective on nursing that emanates from the nursing literature. Nearly all those who have written on the subject of nursing theories, for example, have described an explicit or implicit uninterrupted relationship that nurses can, do or should have with patients. Controlled variable staffing uses patient classification information to reassign interchangeable staff from one unit to another to smooth workload variability, reduce cost and prevent continuous relationships from forming. By the same token, one would be hard pressed to discern from the theoretical literature just what a nurse does in a relationship. On reviewing influential work written by Nightingale (1863), Weeks (1889), Hampton-Robb (1912), Harmer (1934) and Henderson (1978), there is clarity about the importance these writers placed on the work nurses perform. Common to all these written works that have been used to teach professional nurses is the emphasis placed on the interventions nurses execute. Because procedures are observable and measurable in time and cost, the tasks have achieved prominence in nursing workload enumeration. At question here is the

prospect of considering both the performance and the bonding components in developing a patient classification instrument that may not diminish the chance that nurses can have relationships with patients as continuous as nurses seem to need.

Methods: Our work with diagnosis related groups (DRG) and patient classification by nurses over the past thirty-three years offers insight on how to reconcile work management with nurse-patient relationships using patient classification methods. We switched the unit of interest from nurse management to patient management and included daily measures of nurses and patients. We then sought evidence from Henderson & Nite's (1978) synthesis of nursing knowledge that both task performance and continuous assignment could produce results consistent with the professional literature.

Results: Chapter 50 of Henderson & Nite is illustrative in describing death and dying practices. Using patient classification tools, we accurately identified dying hospitalized patients mid stay and developed treatment plans and nurse assignments consistent with evidence based, end of life service. As a number of these patients were in intensive care units, the care they subsequently received was efficient, effective and consistent with the International Council of Nurses, Basic Principles of Nursing Care (1997) description of nurse function in achieving peaceful death.

Conclusions: We devised a nurse and patient classification scheme based on the Nursing Minimum Data Set and nursing literature and used it successfully to identify and pro-actively treat selected patients more consistent with the professional nursing literature.

Conflict of interest: None disclosed.

SESSION 18: Population morbidity

Challenging the idea of epidemiology by focusing the burden of morbidity in an individual perspective

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Introduction: A manuscript titled "Burden of morbidity in an individual perspective – the case of sick-listed patients in primary care" has been submitted as an original research article to a scientific journal. Based on that article and some studies performed prior to that, we want to bring forward three issues in a PCSI session, namely:

1) challenging the present base for epidemiology where diagnoses are presented isolated, by focusing on patients with one or more diagnoses in stead;

2) stressing the need for the completion of diagnoses in patients with more functional status measures as ICF;

3) enforcing primary care physicians to register all adequate health problems seen into the electronic patient record.

The aims, methods, results and conclusions in the submitted article are shown below.

Aims: The aim of the study in the submitted manuscript was to explore the burden of morbidity in an individual perspective based on diagnoses from sick-leave certificates and patient medical records, respectively.

Methods: The study was based on sick-leave certificates issued by physicians in primary care and registered at one social insurance office in Sweden. The certificates for 279 individuals were used, and the medical records of those patients were retrieved covering for a period of twelve months backwards from the date of the certificate were retrieved. The diagnoses registered in the certificates and in the records were collected, and a secondary coding of diagnoses was done based on the free-text part of both sources. Personal identity numbers were encrypted and the patients were grouped by the Adjusted Clinical Groups® case-mix system.

Results: The burden of morbidity in an individual perspective emphasized the multi-/co-morbidity pattern of patients in a sick-listed population. Eighteen patient categories comprised 90 % of all patients and a multi-factorial pattern of morbidity was shown for about 68 % of all patients. The dominating diagnoses included musculoskeletal and or mental disorders, in total about 83 % of all diagnoses in the sick-leave certificates, and about 67 % of all diagnoses in the medical records.

Conclusions: The burden of morbidity in terms of patient categories elucidated a pattern of the morbidity burden in a population that could challenge the traditional aspects of epidemiology based solely on the mere statistics onon diagnoses. Data from the medical records, including a secondary coding of information in free-text parts, reveal a more complex panorama of the burden of morbidity than can be shown presented by data from sick-leave certificates. Efforts to improve the completeness of coding of diagnoses in medical records are urgently needed.

Conflict of interest: None disclosed.

Evaluation of clinical risk groups to describe and monitor the population morbidity and resource utilization by Ribera department of the region of Valencia

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Introduction: La Ribera Department 11, manages Primary and Specialised Care for 250 000 inhabitants. It has an integrated computerized medical record. It is capitated by the Local Government. This Department goal is to improve the health management in the Department setting up Chronic Disease Management Programs. 3M Clinical Risk Groups (CRG) Grouper was obtained in 2006. This study aims to validate the capability of CRGs to identify the population health problems and the variation in the medical services use by the different CRG. The project was financed by the General Directorate of Quality and Patient Care (Consellería de Sanidad, Valencia Goverment) Primary Care data was provided by the Abucasis Office (Consellería de Sanidad)

Methods: All 2.627.512 encounters from inpatient and ambulatory locations of services were collected and their diagnoses used. Data for all inhabitants during 2006, was collected from the integrated medical history and processed by the CRG software. The CRG group assignments were collapsed to fit our specific needs into 6 new categories: 1-Non users and individuals without diagnostics but with services (subset of ACRG 1), 2-Pregnancy & Obstetrics (Subsets of ACRG 1-2); 3-Healthy & Acute Disease (Subsets of ACRG 1-2) ; 4-Minor Chronic Disease (ACRG 3); 5-One or two moderate or dominant chronic disease(s) (ACRG 4-5); and 6-Three or more dominant chronic diseases or advanced cancer or catastrophic conditions (ACRG 6-9).

Results: The new categories were distributed by age groups (Table 1).Older age groups became progressively iller but the oldest group that became relatively healthier. There is a monotonic increase of all resource utilization parameters as the severity of the new categories increases. (Table 2). Data showed 34% population had chronic diseases (New Categories 4, 5 and 6). These used 69.3% of ambulatory visits, 70% of inpatients stays (79% of all hospital days and 86% of All Patients DRG23 case-mix weight); 62.6% of all physician primary care visits, 68.2 % of nurse visits but only 38% of emergency visits. The mean number of total contacts per patient increased by group severity. A local chronic disease prevalence substudy was done to identify potential groups that might benefit from Chronic Disease Management Programmes: Diabetes, 5,34%; Chronic Obstructive Pulmonary Disease, 2.15%; Chronic Heart Failure, 1.69%; Chronic Ischaemic Heart Disease, 2.71%; Cerebrovascular Disease, 2.14%; Depresion , 2.14% and dementia, 0.59%. These prevalences are slightly below than expected and most likely the more severe cases are identified. Our population with multiple chronic problems consume most of the resources as identified elsewhere (Halvorston, G.C., Kaiser Permanente, Finding the right balance between Acute and Chronic Care, World Congress 2007).

Conclusions: The CRG software identified and discriminated well patients with chronic disease in different severity groups. As expected more severe chronic disease patients used more medical resources. Hence, Disease Management Programmes can be implemented and better monitored with the help of this tool.

Table 1: Distribution by age groups of new categories of CRG. La Ribera 2006

Age group	Non-users and users w/o Dx codified	Pregnancy, Obst, New-born	Healthy & acute diseases	Minor chronic diseases	1 or 2 dominant or moderate chronic diseases	>2 Dom. Chron. Dis., Adv Malign or catastrophic	Total
0 – 4	3,38%	29,45%	60,79%	2,23%	4,04%	0,11%	100%
5 – 9	9,49%	0,09%	80,99%	3,85%	5,54%	0,03%	100%
10 – 14	11,81%	0,14%	77,20%	4,46%	6,26%	0,13%	100%
15 – 19	17,36%	1,33%	71,71%	4,68%	4,85%	0,08%	100%
20 – 24	19,62%	3,67%	64,99%	6,71%	4,93%	0,08%	100%
25 – 29	22,16%	7,14%	57,07%	8,04%	5,46%	0,13%	100%
30 – 34	23,54%	10,9%	50,68%	9,44%	5,99%	0,26%	100%
35 – 39	24,26%	5,77%	49,49%	11,82%	8,26%	0,41%	100%
40 – 44	23,36%	1,40%	48,87%	14,32%	11,38%	0,67%	100%
45 – 49	21,80%	0,36%	43,19%	17,17%	16,86%	0,62%	100%
50 – 54	18,38%	0,09%	36,84%	18,31%	25,38%	1,00%	100%
55 – 59	13,52%	0,04%	30,52%	20,15%	34,26%	1,51%	100%
60 – 64	10,13%	0,10%	23,94%	19,45%	43,98%	2,41%	100%
65 – 69	7,50%	0,11%	18,03%	18,28%	52,50%	3,58%	100%
70 – 74	6,68%	0,07%	13,92%	16,05%	58,39%	4,90%	100%
75 – 79	6,30%	0,05%	12,20%	12,98%	62,16%	6,31%	100%
80 – 84	7,03%	0,01%	12,31%	11,58%	62,24%	6,82%	100%
≥ 85	17,13%	0,08%	14,36%	8,87%	53,19%	6,37%	100%
Total Pop.	16,25%	3,92%	45,93%	11,61%	20,87%	1,40%	100%

Table 2: Number of inhabitant by new category of CRG, av. N. of outpatient visits, avrege LOS pere inhabitant, av. AP DRG V 23 cost weight, and average n. of emergency visits. La Ribera Department, 2006.

Mean Medical Contacts per Inhabitants in Primary Care & Inpatient Care									
Code	New CRG categories	Inhab.	Outpat.	Inpat.	LOS	APDRG23 Weight	Emergency	GP contacts	Nurse contacts
1	Non-users and users w/o Dx codified	40 609	0,22	0,00	0,00	0,00	0,03	0,31	0,21
2	Pregnancy, Obst, New-born	9 787	2,37	0,34	1,06	0,22	1,31	7,79	4,59
3	Healthy & acute diseases	114 650	1,14	0,01	0,05	0,02	0,30	3,47	0,94
4	Minor chronic diseases	28 980	3,09	0,04	0,11	0,04	0,36	7,81	1,77
5	1 or 2 dominant or moderate chronic diseases	52 086	4,58	0,15	0,75	0,29	0,51	10,42	5,05
6	>2 Dom. Chron. Dis., Adv Malign or catastrophic	3 503	11,18	0,89	5,44	2,14	1,65	13,18	8,61
	Total Pop.	249 615	2,12	0,07	0,31	0,11	0,37	5,22	2,02

Notes: Inhab.: Inhabitants of La Ribera Department 11 Health Services; Outpat.: Ambulatory visits; Inpat.: Inpatients admissions; LOS: Hospital days; APDRG23 Weight: All Patients DRG v 23 case-mix weight; Emergency: emergency visits; GP contacts: Physician primary care visits; Nurse contacts: nurse primary care visits

Conflict of interest: Jon Eisenhandler, Marc Berlinguet, Luis Ruiz de la Prada and Ignacio Gimenez – Other

Population based register studies of cancer in Southern Health Care Region in Sweden - phase 2

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Introduction: A project in the Southern Health Care Region in Sweden will study the care process for cancer health care with the aim to give methods and platforms for continuous follow-up. Is it possible that early symptom can lead to faster diagnose and treatment? The aim in phase 2 is therefore to study how frequent patients visit doctors before cancer diagnosis.

Methods: Individual data from period 2000-2005 from register of cancer in the Southern Region for five cancer forms (colon, rectal, lung, breast, and prostate) has been combined with data from patient registers in Skåne and national health care registers (including drugs on recipes). Totally, the processing covered 27 188 reported tumours for 26 800 persons.

In phase 1 we studied indicators as incidence, own-produced healthcare, costs and survival per county council, age and gender. In phase 2 we studied all visits at doctors 2000- 2006 for patients in Skåne who had got a cancer diagnosis 2004 or 2005. This study was done per month; every patient was grouped based on which month they got their diagnosis, totally 24 groups. The amount of visits in every group was compared with visits of total population during one year (2003). The results are standardized by age and gender in the study.

Results: Phase 1 showed that men have worse survival than women in colon, rectal and lung cancer and many cancer forms shows differences in incidence and survival, especially for prostate and lung cancer. Phase 2 shows that patients in all cancer forms have more visits than expected 1-12 months before cancer diagnosis. For colon, prostate and lung cancer an increase can be seen even before 12 months of diagnosis. This increase was more pronounced for men in colon and lung cancer.

A higher incidence could not be seen neither for the group with more than 50% of all visits or for the patients with more than 10 visits per year before their cancer diagnosis. But in common the diagnosis of hypertension indicates a higher risk for all cancer forms and for patients with lung cancer some common bronchitis and psychiatric diagnosis also indicates a higher risk.

Conclusions: A larger study is planned including more years and possibility to make comparisons with total population for more than one year. The future study will concentrate on these steps: Do patients get similar treatment at different stages in the Southern Health Care Region? Patients with co morbidity, which treatment do they get?

Conflict of interest: None disclosed.

Is the health of the spouse affected by tumour disease in the wife or husband? A part of Population based register studies of cancer in Southern Health Care Region in Sweden-phase 2

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Introduction: A project in the Southern Health Care Region of Sweden will study the care process for cancer healthcare, based on an episode-of-care and health economy approach. Being diagnosed with cancer affects not only the patient but also the partner of the patient. The present study was focused on the partner. The aim of this study was to examine health care use among partners of patients with cancer.

Methods: The registry study was population based and retrospective. Partners of patients with colon-, rectal-, lung, breast- and prostate cancer were identified (n=11076). Health care use (number of out-patient contacts, in-patient episodes and number of days in hospital) and total costs of health care was studied pre- and post-diagnosis of the cancer patient. Diagnosis of the partner was compared before and after diagnosis of the patient.

Results: Health care use and consequently health care costs increased for the total sample when comparing one year pre diagnosis to one year post diagnosis. All studied groups had higher health care use the year post diagnoses; the largest increase was seen in the group of partners of colon cancer. In-patient care increased more than out-patient care. Health care costs increased for the total sample, with the largest increase in the group of colon cancer. The pattern of increased health care use remained for all studied groups the second year following the cancer diagnosis. Comparing diagnoses of the partner showed an increase the year following the patients cancer diagnose. Psychiatric diseases were the diagnosis that increased the most for the total sample. Differences were seen between the studied groups regarding increase in psychiatric diseases and age. Other diagnoses that showed an increase for some of the groups were haematological and respiratory diseases.

Conclusions: Health care costs for partners increased the year following the cancer diagnoses of the patients compared to the year before. Spouses of cancer patients had an increase of psychiatric diagnoses the years following the cancer diagnoses. The present study supports a family approach to study morbidity and health care costs.

Conflict of interest: None disclosed.

Designing National Register and Network for patients with SCI sequel

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Introduction: Health, social and economic condition of persons with sequel post trauma - spinal cord injury (SCI) or other disabling spine injuries, is generally poor in Romania, especially for those living in rural areas. Usually they live isolated and don't work. There is no public information available about how many persons live with this condition or what their health needs are. National social health insurance fund does not cover all their health devices or materials yet, as there is no strict evidence of these patients and their needs after hospital episode.

A National Excellency Research Project – RISCI has been developed by a Consortium during 2006-2008 in order to design and initiate a virtual network for these patients with special needs.

Purpose: Identifying the persons living with SCI sequel and creating a database with their relevant data, in order to:

- Set up the National register of patients with SCI sequel in Romania, to be used by health decision makers.
- Create a virtual network for these persons and specialists.
- Facilitate the insurance coverage of specific devices/materials needed by these patients, based on their current status and specific needs.

Methods:

- Setting the diagnostic and procedures code list to be used in DRG database query.
- Query on the national DRG database according to a diagnostic and procedure code list, in order to identify hospital episodes of SCI patients during 2004-2007, as main (at trauma moment) or secondary diagnosis.
- Creating a database of SCI patients (chronic) from the lists of family physicians through the public health authorities per districts, as reported on Spring 2008.
- Using all data collected and extracted in dynamic clustering for the virtual network dedicated to SCI patients by using their social and clinical data.

Results: Database with socio-demographic and clinical data of SCI sequel patients at national level based on DRG data and family physicians reporting; National Register of SCI sequel patients available for MoH – health planning and policy; evidence of health condition and needs of these patients post trauma; unique network for SCI patients with data protection possible linked to national DRG database; analysis of SCI sequel; documented health policy and tailored services for these patients in near future. Beneficiaries: SCI patients, specialists and specialty hospitals/wards, MoH, National Health Insurance Fund, health researchers and professionals.

Conclusions: Persons with special needs as SCI sequel patients need to be subject of a national electronic register including socio-demographic and clinical data in order to benefit on adequate social and health services plus coverage. Given the situation of these patients in Romania, a network with dynamic clustering designed for SCI patients is useful especially if connected to the DRG national database and properly promoted.

Conflict of interest: None disclosed.

ABSTRACTS

POSTER PRESENTATIONS

POSTER A: Studies in the hospital settings which focus on DRGs

Quality monitoring in thyroid surgery by Shewhart control chart.

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Introduction: The outcome of thyroid surgery is usually assessed according to two major complications: recurrent laryngeal nerve paralysis and hypoparathyroidism. The purpose of the study was to monitor the outcomes of thyroid surgery using Shewhart control charts and then to identify possible ways to improve quality by exploring the special causes of variation in the observed complication rates. This study aims to assess the feasibility and usefulness of this method in the daily practice of a surgical team.

Methods: A prospective survey was conducted in a teaching hospital located in Lyon (France). The surgical team under control included three surgeons specialized in endocrine surgery performing 700 thyroidectomies a year. The study population involved all inpatients who underwent thyroid surgery from January 1, 2006, to December 31, 2007.

The quality of thyroid surgery was monitored in years 2006-2007, according to in-hospital rates of immediate postoperative recurrent laryngeal nerve palsy (RLNP, assessed by direct laryngoscopy) and hypocalcaemia (serum calcium level <2mmol/L). Indicators were extracted from the hospital information system and plotted each month on a longitudinal P-chart. The central line value was determined from the average rate of complications. The limits for detecting special causes of variations were calculated monthly, from the corresponding binomial-based Standard Deviation (SD). Identification of these special causes was then based on: #1) the logbook in which all changes in the care process were continually reported by surgeons; #2) the interpretation of control charts by the surgical staff every four months.

Outcome of thyroid surgery was also assessed in years 2004-2005, to compare surgeons' performance before (baseline period) and after (monitoring period) the control charts implementation. Data were manually extracted from the medical records of 346 randomly selected inpatients. Baseline rates of immediate RLNP and hypocalcaemia were 6.4% and 32.3%, respectively.

Results: The outcomes of 1114 thyroid procedures were assessed in the years 2006 and 2007. Among these procedures, 84.4% were bilateral thyroidectomies, and 23.5% concerned patients with thyroid carcinoma. Median patients age was 51 years (range, 9 to 93), and 78.7% were women. Average rates of immediate RLNP and hypocalcaemia were 7.2% and 20.9% during prospective monitoring, showing a decrease in hypocalcaemia rate after the implementation of control charts (Chi-squared test, $p < 0.0001$).

Process was under control, excepted during the third quarter of 2007. The composite indicator of complications (immediate RNLP and/or hypocalcaemia) crossed the upper control limit (3 SD) in July, then the upper warning limit (2 SD) in September, pointing out a special cause variation. The logbook and chart review meetings revealed that the surgeons had moved over the summer from their regular operating room to another place, involving temporary changes in the organization of the surgical practice. It led to a substantial reduction in the operating room time slots available to the surgical team (from 7 to 5), accounting for a sudden switch from 42 to 32 hours dedicated weekly to endocrine surgery. Moreover, one surgeon performing high volume of procedures was on vacation in July 2007, while the average monthly number of thyroid patients operated on by the surgical team remained the same: 55 thyroid procedures were done in July 2007 versus 47 in July 2006, while the average number of procedures per month was 54.8 in 2006-2007.

Conclusions: Monitoring quality and patient safety in thyroid surgery using Shewhart control charts based on major complications of thyroidectomy is feasible and useful in the daily practice of a 'high volume' surgical team.

Reduction in rate of immediate postoperative hypocalcaemia may arise from an Hawthorne effect and frequent indicators feedback to the staff, contributing to surgeons' motivation for improving their performance.

The poor performance highlighted by the control chart during the third quarter of 2007 was related to changes in surgeons' working environments and the excessive workload that disrupted their habits and possibly led to burn out. One way to prevent the recurrence of such troubles is to maintain a rational operations schedule that guarantees no sudden increase in workload for surgeons.

More research is still required in the field of statistical process control when applied to thyroid surgery to develop the best chart to balance scientific and pragmatic needs.

Table 1: Patients characteristics during the monitoring period

Stays characteristics	2006 n = 587	2007 n = 527	Total n = 1 114
Patients demographics			
Women *(%)*	461 *(78.5)*	416 *(78.9)*	877 *(78.7)*
Median age *(range)*	51.9 *(8.8-93.5)*	51.3 *(11.6-86.4)*	50.6 *(8.8-93.5)*

Stays characteristics	2006 n = 587	2007 n = 527	Total n = 1 114
Thyroid disease *(%)*			
Malignant neoplasm of thyroid gland	135 *(23.0)*	127 *(24.1)*	262 *(23.5)*
Nontoxic single thyroid nodule	91 *(15.5)*	73 *(13.9)*	164 *(14.7)*
Nontoxic multinodular goitre	302 *(51.5)*	261 *(49.5)*	563 *(50.5)*
Thyrotoxicosis with diffuse goitre	46 *(7.8)*	35 *(6.6)*	81 *(7.3)*
Others	13 *(2.2)*	31 *(5.9)*	44 *(3.9)*
Type of surgery *(%)*			
Lobectomy	81 *(13.8)*	82 *(15.6)*	163 *(14.6)*
Total thyroidectomy	428 *(72.9)*	379 *(71.9)*	807 *(72.4)*
Extended thyroidectomy	46 *(7.8)*	28 *(5.3)*	74 *(6.6)*
Completion of thyroidectomy	28 *(4.8)*	31 *(5.9)*	59 *(5.3)*
Others	4 *(0.7)*	7 *(1.3)*	11 *(1.0)*
Immediate postoperative outcomes *(%)**			
Recurrent Laryngeal Nerve Palsy	39 *(6.7)*	40 *(7.7)*	79 *(7.2)*
Moderate Hypocalcaemia <2 mmol/L	93 *(19.0)*	100 *(23.0)*	193 *(20.9)*
Severe hypocalcaemia <1.8 mmol/L	25 *(5.1)*	25 *(5.8)*	50 *(5.4)*
Length of stay >2 days	90 *(15.7)*	95 *(18.1)*	185 *(16.8)*

* Sample sizes: RLNP, n = 1 098; Hypocalcaemia, n = 923; Length of stay, n = 1099.

Conflict of interest: None disclosed.

Crude versus case mix adjusted complication rates in monitoring the quality of thyroid surgery using control chart

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Introduction: Quality monitoring based on health outcome indicators is prone to misinterpretation related to changes in the case mix of patients treated. In thyroid surgery, reported complication rates may vary widely depending on the extent of procedures performed and the severity of operated thyroid diseases.

There is a strong interest in integrating Shewhart control charts into clinical practice to detect special causes of variation in quality of care. Validation of control chart based on crude complication rates implies ensuring that it detects special-cause variation similarly to control chart based on case mix adjusted complications rates. This study aimed to compare the detection of special-cause variation between crude and case mix adjusted control charts in thyroid surgery.

Methods: A prospective survey was conducted in a teaching hospital located in Lyon (France). The study population involved all patients who underwent thyroid surgery from January 1, 2006, to December 31, 2007. Patients with a pre-existing or unpreventable complication because of an infiltrated carcinoma requiring nerve or parathyroid resection were excluded.

The quality of thyroid surgery was monitored in years 2006-2007, according to in-hospital rates of immediate postoperative recurrent laryngeal nerve palsy (RLNP, assessed by direct laryngoscopy) and hypocalcaemia (serum calcium level <2mmol/L). Indicators were extracted from the hospital information system and plotted each month on two types of longitudinal P-chart.

1) Central line value of P-chart based on crude complication rates was unchanging and determined from the average rate of observed complications in 2006-2007. The limits for detecting special-cause variation were calculated monthly, from the corresponding binomial-based Standard Deviation (SD).

2) Central line value of P-chart based on case mix adjusted complication rates varied monthly. The expected complication rates were calculated each month according to case mix adjustment based on multivariable logistic regression models. Variables used in models were age, sex, the operated thyroid disease and the performed thyroid procedure. The limits for detecting special-cause variation were based on the binomial-based SD of the expected rates of complications by month.

Results: The outcome of 1091 thyroid procedures was assessed in the years 2006 and 2007. Among these procedures, 162 were lobectomies, 802 were total thyroidectomies, 69 were extended thyroidectomies and 58 were completions of thyroidectomy. Operated thyroid diseases were thyroid carcinoma (22.8%), nontoxic single thyroid nodules (14.8%), nontoxic multinodular goitres (51.1%) and other diagnosis including thyrotoxicosis with diffuse goitres (11.3%). Mean patients age was 50.5 years (range, 8.8 to 89.2), and 855 (78.4%) were women.

Average rates of observed RLNP and hypocalcaemia were 6.3% and 20.5%, respectively. According to the P-charts based on crude complication rates, the indicator of immediate RNLP was always within the limits, whereas the indicator of immediate

hypocalcaemia crossed the upper warning limit in July 2007. According to the P-charts based on case mix adjusted complication rates, the indicator of immediate RNLP crossed the upper warning limit in July 2007, whereas the indicator of immediate hypocalcaemia crossed the upper warning limit in May 2007 then the upper control limit in July 2007.

Conclusions: This study suggests that case mix adjusted control chart would be more sensitive than crude control chart to detect special-cause variation in thyroid surgery.

There is still debate about the use of crude or case-mix adjusted control charts in monitoring the outcomes of care. The major advantage of crude control chart lies in the simplicity of its development that makes a high reactivity in performance feedback to the teams feasible. However, according to this study, control chart should be based when possible on case mix adjusted outcomes in order to increase the accuracy of quality monitoring by erasing part of residual variability.

Conflict of interest: None disclosed.

Feasibility Study of Casemix Funding in Low Resource Countries: An Iranian Example

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Introduction: Adopting a blue print of the casemix funding mechanism without due consideration to the country specific health structure and challenges would be a risky decision. A series of questions that should be asked to evaluate implementation of casemix funding model (CFM) in the existing environment are: Is CFM an appropriate alternative for the current funding method of hospital funding? Is casemix funding a feasible model in a specific country context? Has an appropriate classification system been selected?

Objectives: This study investigates the feasibility of CFM in Iran as well as providing a model for evaluating the practicability of casemix in general

Methods: The methods includes: a) a literature review; b) a survey for measuring knowledge of and attitudes towards CFM; and c) a pilot study to review the adequacy of the existing data for classifying patients into relevant DRG and estimate accurate DRG cost weights based on 'activity-based' cost accounting or cost-modelling. d) In a separate study, using 465,531 hospitals separations to measure AR-DRG performance and the effects of different trimming methods, reduction in variance (R2) and coefficient of variation (CV) were applied to measure model fit and within-group homogeneity.

Results: The survey participants don't have good information about the current funding system, casemix and DRGs. Data problems included invalid age, sex, and length of stay. File structures were in a different form and format from that required by the grouper. There were no standard quality controls to ensure the accuracy of coding, and morbidity coders were neither trained nor skilful for this purpose. The existing accounting system does not cover all input costs. Incomplete data does not allow allocation of costs to specific cost centres. Costs of medical supplies, such as prostheses provided directly by patients, are not recognised, nor are the costs of material and equipment provided by donors, nor costs of out-of-scope services. Using a cost-modelling approach the average DRG cost weight was estimated as 2.723 million Iranian Rials (equal to US $295). A regression coefficient of 0.14 (CI = 0.12 − 0.16) suggests that the average cost weight increases by 14% for every one day increase in average length of stay

Conclusions: The implementation of the CFM in Iranian hospitals is quite feasible and AR-DRGs would provide a useful basis for introducing CFM. However, the effective implementation of the CFM would depend on: active cooperation and contribution of hospital managers and staff; updating hospital information systems; improving the quality of costing information and choosing an appropriate costing model; adopting an appropriate classification system; and, finally, adequate scrutiny of health care providers behaviours through regular assessment of hospital performance and quality of care using safety and quality indicators.

Conflict of interest: None disclosed.

Using Case Mix System in Uruguay: Experience and perspectives

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Introduction: This paper presents the experience of using the AP-DRG system in two public hospitals in Uruguay, and discusses the convenience of continue on working in that direction by implementing a Patien Classification System (PCS) for the whole Health Care System.

Methods: In 2003 the authorities of the Network of Public Hospitals in Uruguay decided to implement a PCS based on DRG. There was a licitatory procedure for contracting a Consulting Agency. Two hospitals were chosen to implementing a pilot project

and there were also training for the hospitals personnel in DRG and coding with ICD10 for diagnosis and ICD9-MC for procedures. The project finished in 2005 and it didn't continue because there was a change in the Government Administration.

Results: At present, Uruguay is undergoing a health system reform. There is a National Integrated Health System created by law, where there are public and private health care services, paid "per capita", adjusted by age and sex.

Conclusions: There are some health care services trying to implement DRG systems, and also the Ministry of Health is analysing that possibility, but there is not – by now – a decision about which PCS is going to be used.

Conflict of interest: None disclosed.

The real effects of special conditions for reimbursement of in - and out-patient's system in Hungary

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Introduction: In Hungary the health providers receive the reimbursement fee for their activities based on HBCS cost weight for inpatient care and based on point-values of so-called OENO system as fee-for-service like payment for outpatient care. The HBCS system is the special modified version of DRGs, and the outpatient code system for items of services reimbursed was adapted from the ICP Medicine Geneve which was publicised in 1978 by WHO.

Methods: The target of providers considering the incentives of the present system is to reach the highest revenue possible; therefore on reporting their performance, they maximize the best of the possibilities given by the reimbursement conditions in a way to achieve their aim.

Solutions

In order to avoid unlimited reimbursement various conditions are used for payment both in inpatient an outpatient system. The application of settlement rules is necessary in both system for the HNIF (National Health Insurance Fund) to be able to check the abiding of the vocational rules electronically before making payments. These settlement rules are discussed in our paper.

The preconditions rules of inpatient system - Strict monitoring in the process of accounting

1. Examinations or treatments in out-patient's units done on the first or last day of hospital admission will not be paid.

2. Parallel attendances in inpatient and outpatient care are prohibited.

3. Controlling of overlapping with so-called in course care, other inpatient care, out-patient's care (one person can not be hospitalised in more hospitals in the same time, or can not be accounted as out-patient's cases)

4. Controlling of repetitive admissions with the warranty rules within hospitals, countrywide, for out-patients care, after discharge of hospitals within upper trim-point

5. Controlling of competency: some special HBCs (marked with asterisks): only special hospitals are allowed to do them

6. Limitation for accounting based on capacity: the number of treated patients and days cannot exceed the number of beds available in the departments.

The settlement rules of out-patient's system – focusing on the real needs and requirement

1. Quantitative limits for one visit, or for one day, or other.

2. Certain procedures must not be accounted together with one another.

3. Certain procedures must be accounted together with one another

4. Professional competence

5. Indications are allowed for the accounting of procedures

The majority of the limitations are checked or offered by medical protocols or suggestions of medical boards.

Results: These techniques helped us to share the sources more correctly in the health services.

Conclusions: In Hungary two methods exists for keeping the health care budget within limits: on one hand fiscally the total revenue of providers is fixed, and on the other hand profession based settlement rules integrated in the system. The accounting limitation rules in many cases support the better quality of the health care also.

Conflict of interest: None disclosed.

Diagnosis Related Groups: Do you know what they are? – A student's perspective

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Introduction: The National School of Public Health (ENSP), has created a benchmark for health management in Portugal. Its traditional teaching methods have provided the industry with well-trained and influential hospital administrators. Its alumni are widespread nationwide, enhancing its crucial role in the Portuguese health system. This school is responsible for the production of hospital administrators for over 25 years, being known for its excellence, it is currently with its 37th annual course in Hospital Administration underway. Considering the above it is of great importance to validate whether or not certain concepts in this area, namely associated to Diagnosis Related Groups (DRGs), are well defined, given its role in the Portuguese health system's financing.

Methods: The study is based on a questionnaire applied to students currently enrolled in the Hospital Administration degree at ENSP. Similarly, it was also applied to students currently attending the Masters program in Health Management. The data collected referred to 70 students in total. The questionnaire was applied at the end of the academic year, to ensure that the teaching process was complete. The document consists of 8 questions, varying from the history of the institution, to the history of DRGs financing in Portugal and culminating in its financial and management applications.

Results: Upon analysis it was found that overall the student's value and recognize ENSP's history and role in the Portuguese health system. Despite the presence of DRGs for over 25 years in Portugal, some concepts and some of its applications are still a matter of distress and confusion.

Conclusions: In the curriculum of either one of the courses, DRGs are front stage. The students are motivated to investigate and apply DRGs throughout the learning process, both through Hospital Production Management and Financing. Despite the emphasis given, it was found that the underlying problem resides not in the teaching process yet, in the acquisition, in other words, the learning process should be scrutinized. All those involved in Health Management mustn't overly trust their first contact with this area of study; the key is to continue investing in the area through continuous education in order to assure that the DRGs full potential is achieved.

Conflict of interest: None disclosed.

Development of a DRG system based on the German G-DRG system – Experiences of the development of a Swiss DRG-Grouper

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Introduction: Switzerland decided to implement a DRG system as a remuneration system. Therefore the German G-DRG system version 2006 was chosen as a highly differentiated DRG system, which contained 954 DRGs. It should be the basis for further advancement. In order to develop a SwissDRG-Grouper, which works with the Swiss classifications ICD-10 (version 1.3 of WHO) and CHOP (Swiss procedure classification), the German DRG-algorithm (based on ICD-10-GM (German Modification) and OPS (Classification of operative procedures)) had to be adopted. This could be realised with the help of a mapping of both classifications. During this process several problems became obvious and had to be addressed, due to the fact, that especially the OPS is much more detailed than the CHOP and the existence of different coding standards. The experiences which were gathered at an earlier time in the development of the G-DRG System based on the Australian AR-DRG system had a great influence on this project.

Methods: The mapping between the Swiss and the German classifications followed a by a Swiss group of experts consented concept in which the procedural method was defined. Additionally it included examples and agreements how to decide in special situations of mapping. Basically there are four different types of mapping which had to be considered: A classificatory, medical, logical and extended logical mapping. Classificatory and medical mapping means that the assignment of codes regards only classificatory and medical aspects. A logical or extended logical mapping follows also the definition of the grouping algorithm. As a single classificatory and medical mapping will not lead to a useful DRG assignment of codes a logical and extended logical mapping also took place. A finally established so called "reverse-mapping" of every OPS-code to a CHOP-code enabled the verification of the completeness of the mapping. Due to the fact that especially the German procedure classification OPS is much more detailed than the CHOP used in Switzerland, an equivalent CHOP could not be found for certain German codes, which were created to identify high cost therapies. By the deployment of so called "Map-markers" constellations like these could be detected. On the one hand a certain demand of advancement in the classification and on the other hand a special demand of adaptation to the Swiss situation of coding was detected.

Results: By the help of a mapping which did not only consider medical and classificatory but also aspects of the grouping algorithm it was possible to establish a SwissDRG-Grouper, which works with Swiss classifications based on the German DRG-algorithm version 2006. Some DRGs for example for intensive care treatment could – at this point – not be defined in the

SwissDRG-Grouper because of the non existence of codes. In these cases the Swiss procedure classification had to be expanded to enable the implementation of specific DRGs. Such demand of adaption and development of the classification was announced by the "Map-markers". As a result there are already several procedures which could be implemented into the following versions of CHOP. Moreover there are some adaptations of grouping algorithm concerning the Swiss coding standards which could be integrated recently.

Conclusions: The development of a DRG system based on an already existing DRG system implies on the one hand a great effort but otherwise also a lot of benefit for both countries. The grade of differentiation of a DRG system is closely associated with the classification upon which it is based on. Differences between the different classifications become apparent during the mapping process. Basically, a less differentiated classification system is not necessarily an obstacle for the development of a DRG system based on a highly differentiated system. One of the preconditions which need to be met is the establishment of a methodology which announces the demand of adaptations such as the "Map-markers". Thus, manifested haziness could be seen as useful indicator for further development.

Conflict of interest: None disclosed.

The data collection process established for the German DRG system over the last six years with focus on data quality

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Introduction: A key aspect of developing a successful DRG system is the quality of the underlying data. In Germany about 18 million patient data and four million detailed patient cost data are collected annually to obtain an accurate and up-to-date basis. Though routines are established in the collection process it has been developed and refined over the years (2002 to 2007). This leads to a continuous upgrading of data validation.

An overview over the process of data collection is given, with focus on the following questions:

- What happens to data in order to analyse successfully and apply the results in the further development of the G-DRG system?
- How can improvement of data quality be achieved? How can it be measured?
- How are about 18 million cases collected every year (data flow)?
- Which results are published to guarantee transparency?

There is an obligation for nearly all German hospitals (about 1,800) to transfer patient data according to a certain law of hospital remuneration. In addition, detailed patient cost data and augmentative patient data are provided by nearly 270 hospitals that participate voluntarily in a partial census. The collection of hospital data in Germany runs annually through a standardised technical process including several quality checks.

The data collection process from hospital into the relational databases of the German DRG Institute (InEK) is described and details about the communication process and data security are given.

Methods: The German DRG dataset is complex and voluminous. It covers nearly the complete range of German hospital structure data and case related service data.

The dataset is described and some figures of the amount of data over the years are provided. The necessary technical equipment to control and carry out the processing is mentioned.

In order to ensure a high level of data quality complex data validation procedures are installed. The complexity of data validation is described. The experience from the previous years is always integrated into the development of new and more differentiated checks. The communication with the participating hospitals plays a vital role for the continuous improvement of data quality as they have the possibility to resend their data several times – after having studied validation reports.

An overview over the technical processes installed by InEK to carry out the procedural tasks is given. Proprietary software tools used to support the validation process are shown.

Results: After data collection and reassessment the data is intensively used for further development of the G-DRG system (i.e. to calculate an accurate baserate or simulations). Deep insight data analyses to several aspects are carried out with the DRG data. In Germany an obligation exists to publish the data to obtain transparency. An overview over the required publication is provided and an example of a certain data browser (concerning the secondary research) is given.

Conclusions:

1. Data quality is essential for a data-driven DRG system.
2. To achieve a high level of data quality
    2.1. intensive communication with the participating hospitals is needed,

2.2. experience from previous years should be integrated into the development of data validation.

3. Even with a large amount of high quality data there are still questions unanswered concerning the allocation of services to remuneration. Expert analyses beyond standard techniques are essential.

4. Publication of data, methods and results leads to transparency and acceptance.

Conflict of interest: None disclosed.

A Model to account for the cost of blood in a Hospital

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Introduction: The Accounting System for Activities in the Hospitals SCAH is outlined to evaluate detailed cost elements, understanding cost behaviour, which can facilitate future policy decisions, because policy makers have the opportunity to more fully understand the implications of incremental changes. How blood cost should be measured is an open question. The blood and its components are becoming increasingly costly and scarce. We decided to apply the SCAH to the Blood bank of IPOFG Lisbon, in order to evaluate a far more appropriate actual cost of the blood in our Institution.

Methods: We used an activity – based approach to more fully account for the cost of blood, than present estimates, derived from the concept of activity-based costing (ABC). We applied this method to the process Chart flows of activities associated with blood collection facility and the others associated to the transfusion service.

Results: The Annual hospital's blood bill represents 1.2% of total hospital budget. The transfusion related costs is far higher. If we add all the crossmatching and costs to administer the transfusions, it will reach 4-5%

Conclusions: Estimating blood costs is a complex undertaking. The cost of blood is continuing to drive upward and it has been underestimated.

Conflict of interest: None disclosed.

First Implementation of IR-DRG in Uruguay. Challenges of doing it from scratch

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Introduction: In 2007, the law creating the National Integrated System of Health (SNIS) was passed, which reforms the current health system with the aim to achieve universality, integrity and equity of services, along creating the National Fund of Health (FONASA) which pays to suppliers of public and private services per capita, adjusted by gender and age. Also payment for carried out activities has already been projected.

There are no previous consolidated experiences of using systems to patients' classification so as to evaluate the activity of health care centres. Although there is adequate handling and experience with the International Classification of Diseases 10th edition (ICD10), codification of procedures is not habitual

The American Hospital is a Health Care Centre, part of the 'Federación Médica del Interior' (a Medical Corporation), it is equipped with 140 beds and has about 8.000 annual discharges.

In 2006, they strategically decided to begin working to implement Patients' Classification System (PCS) for the family of the Diagnosis Related Group with the aim to improve the quality of their services and become adapted to the Health System reformation.

The following are the main issues to address in order to achieve a successful implementation:

- Use of previous national experiences
- Team of the interdisciplinary shape project
- Codification team integrated by doctors and technicians in medical records.
- Assuring that all the medical records are available and reliables
- Election of coding and DRG system that best adapt to local reality
- Buying the software as the last step of the process

Methods: Description

Results: na

Conclusions: To sum up it is possible to implement the DRG system from the very beginning point. The lack of previous experience in the topic can become an opportunity to choose the tool that better adapts to the needs of every country, and that the creation of a group of technicians specialized in different disciplines who lead the project is of vital importance, as well as it is to be provided with a long-term and solid strategic decision.

Conflict of interest: None disclosed.

Cancerology and Hospital Health planning: Case mix Utility and Limits

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Introduction: In France organisation and planning of oncology has recently been submitted to several changes since a National Cancer Scheme in 2003 and a cancer planning legislation in 2007. Hospitals have to organise cancer coordination centres, to implement specific announcement disposals and to organise multidisciplinary coordination meetings. Hospital authorisation to perform surgery and chemotherapy are submitted to an activity threshold in each site. The hypothesis is that the more an activity is performed, the more teams are trained and quality is improved. Activity thresholds are 30 hospitalisations for breast surgery, digestive surgery, urology and chest surgery and 20 hospitalisations for gynaecology and ear and throat surgery. For chemotherapy the threshold is fixed at 80 patients per year per site. Hospitals Case mix database contains lots of information, however it was not due to analyse oncology activity. Thus an algorithm was proposed by a national instance of cancer in France to identify cancer activity from case mix database. Oncology activity analysis emphasizes necessity of hospital planning changes to concentrate cancer activity and encourage hospital cooperation. Our purpose consists of presenting an example of regional case mix use to identify and quantify hospital cancer activity to contribute to Oncology Health Planning.

Methods: Oncology activity was extracted from a regional case mix database (Haute-Normandie) from 2004 to 2006 according to a national algorithm. Database contains an identifier per patient then we could trace their care pathway between hospitals. We studied the impact of activity threshold variation on the number of authorised hospitals to perform surgery and whether this impact varied according to the specialty considered. We estimated which hospitals admitted most patients for discovery of cancer to determine hospitals most concerned in cancer announcement disposals. Then we identified most common patient care pathways between hospitals to approach hospital cooperation already existing.

Results: From 607023 hospitalisations realised in 2006, 84069 were extracted as oncology (13.8%) concerning 22093 patients. Amongst 36 hospitals, 10 realised 75% of oncology hospitalisations. Distribution of this activity varied between specialties. The effect of activity threshold variation on hospitals authorisation was different according to specialties considered. The more the activity was concentrated in the territory the less it was influenced by threshold variation. Specialities most influenced by threshold variation were digestive and ear and throat surgery, with a loss of 44% and 75% of authorised hospitals with a threshold variation from 20 to 70 hospitalisations. On the contrary threshold level had no influence on thoracic surgery whatever was the threshold variation.

For 75% of Patients, discovery of cancer was identified in 10 hospitals amongst 36 hospitals with at least one discovery of cancer.

For Chemotherapy threshold variation had less impact on hospital authorisation, as amongst 16 hospitals realising chemotherapy two didn't reach the 80 patients threshold. By studying care pathways, we could identify main types of cooperation already existing between hospitals (Table1).

Main limits were due to lack of exhaustiveness, coding errors, uncertainty about determination of cancer discovery. And there is no indicators of quality in case mix database which could have been helpful to determine most effective cooperation.

Conclusions: Oncology activity is rather concentrated in the region, implementation of thresholds could accentuate this phenomenon. Case mix database is helpful in oncology planning.

Table 1: Concentration of main care pathways in Normandy (France) for each cancer speciality between 2004 and 2006

Cancer specialties	Number of treated patients	Number of patients admitted in at least two different hospitals (percent)*	Number of care pathways realised by 50% of patients in each specialty : Main care pathways
Digestive system	8992	1069 (11,9%)	29
Gynaecology	8087	288 (3,5%)	12
Urology and nephrology	7957	409 (5,1%)	21
Dermatology	7195	175 (2,4%)	16
Haematology	4820	538 (11,2%)	6
Pneumology	4150	465 (11,2%)	7
Ear and throat	2493	270 (10,8%)	9
Nervous system	1407	230 (16,3%)	5

* percent of patients admitted in at least two hospitals for a cancer in a specific specialty amongst all patients admitted for a cancer of the same specialty whatever hospital they were admitted to in the Normandy region.

Conflict of interest: None disclosed.

Review of and customisation of the IR DRG v1 in South Africa by Discovery Health

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Introduction: Diagnosis Related Groups (DRGs) have been widely used for clinically meaningful and resource homogeneous grouping of diagnoses for the purpose of evaluating resource utilisation and reimbursement in hospital industries. In South Africa DRG's were first evaluated in 1999 and used by Private Health Care funders for casemix analysis and in some Alternative Reimbursement arrangements since 2001. The first grouper was the Swiss Grouper which used ICD-10 diagnoses and ICD 9 – CM procedure codes. In 2001 this was replaced with the IR DRG grouper, which was based on ICD -10 and CPT codes.

This was developed for South Africa by 3M Corporation, but they subsequently withdrew from the South African market. Consequently, CPT 2003 codes, which were used in this grouper, have not been updated. The comprehensiveness of the grouper is thus compromised, in light of the numerous new CPT codes and changes made since, reflecting technological advances and new techniques including in the arena of organ transplants and inter-vertebral disc replacement etc. In addition there has clearly been a pressing need for local customisation to improve local applicability of the grouper, whose performance on local data could be far better.

Discovery Health (DH) has undertaken a review and revision of the IR-DRG grouper to update the grouper with the latest CPT codes and to better reflect local needs. This has strategic importance for increasing the application of Casemix adjustment measures and for entering into fair Alternative Reimbursement contracts.

Methods: Using Data Mining tools (SPSS's Clementine tool) and the application of statistical methods, the data was examined and compared with the current version of the IR- DRG Grouper. This has resulted in the restructuring of many DRGs especially in the Cardiovascular and Musculoskeletal chapters. It has also been possible to create more complex relationships in DRG where combinations of procedures are common as well as being able to define more effective relationships between diagnoses and procedures.

Results: The Grouper has been updated to include all the CPT codes to current. ICD-10 diagnosis codes have also been updated to include all changes introduced by the World Health Organisation to date.

Around a third of the MDCs within the Grouper have thus far been evaluated. However, these represent about 65% of the hospital admissions. The evaluation and review process has resulted in the creation of 57 additional DRGs, mainly in the Cardiovascular, Musculoskeletal Chapters and Organ Transplantation groups. The proportion of cases grouper to non specific 'Other DRGs has been reduced from 19% to 5%.

The review process has resulted in the improvement of the untrimmed R2 from 43 to 51%.

Conclusions: Further work will continue to be undertaken to improve both the clinical integrity as well as the categorisation of the groups.

Conflict of interest: None disclosed.

Final assessment of the ambulatory transfer potential for the coronary angiography patients in a teaching hospital in Malaysia

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Introduction: Our prior work over 2005 and 2006 validated the feasibility of our method to identify retrospectively transferable cases using IR DRG inpatient groups and exclusion criteria based mainly on severity of illness for same encounters. Now we want to implement such behavioral changes from the clinicians. In order to do so, we needed to demonstrate the full transferability and savings using our approach.To do so we applied the standard validity testing with a gold standard. We also tested additional global criteria of health status taking into account all clinical conditions over the last 3 year period would add to the retrospective predictions.

Methods: All the 718 patients who did undergo single vessel angiography in either inpatient or outpatient settings at Hospital UKHM from 1 January 2003 through 31 December 2005 were included in the study. Out of these 298 were inpatients and rest were outpatients. The patients who were treated as inpatients are kept as main object of our study. Our initial retrospective ambulatory substitution criteria include patients that live less than 100 km from the hospital; have a length of stay of no more than two days; do not have an IR-DRG severity of illness level 2 or 3; and were discharged back home at the end of the episode of care i.e. discharge status of 04. Our prospective criteria are the same as the retrospective criteria except that we dot no consider length of stay. We applied these ambulatory substitution criteria on the inpatient group, to assess how many of these patients treated in an inpatient setting could have been shifted to outpatient. We summarize all the clinical information from all the inpatient encounters of these patients for the whole 3 year period. All the diagnoses in these episodes of care are then coded and grouped

with 3M CRG (Clinical Risk Groups) software to rate their global health status (nine statuses and 27 subgroups using severity of illness). Two cardiac surgeons independently assess the potential transferability of the inpatients. We show them only the clinical abstracted information for all these inpatients stays: differences are resolved by consensus, adding the author judgment. At the end we are able to construct a screening validity two-by-two table to assess the sensitivity, specificity, positive predictive value and negative predictive value of our tool. We also compare the above indicators adding the additional criteria of exclusion of most severe health status and severity of illness based on CRG. Cost weights are assigned to these patients to estimate the savings if these patients are successfully transferred from inpatient care to outpatient care. The final results of this research will be presented in detail during the conference.

Results: Results will be presented in detail during the PCSI conference

Conclusions: Based on this work, we will decide to include a CRG retrospective criteria to monitor the performance of transferability of our angiography cases. This work will be used to convince successfully our clinicians not to admit automatically patients undergoing this procedure. The potential Impact of this information will demonstrate the savings as a result of such transfer.

Conflict of interest: None disclosed.

Assessment about Spanish weights for the International Refined DRGs (IR-DRG)

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Introduction: Healthcare decision-makers require a means of making relative comparisons of the services and resources patients consume and their corresponding quality and performance. These decision-makers also prefer a single patient classification system that can encompass a wide variety of coding systems and clinical practices in both inpatient and ambulatory settings.

Our aim was to obtain Spanish weights for the IR-DRG Patient Classification System, from a sample of public hospitals from the Spanish National Health System (NHS) for the monitoring and evaluation of hospital care. The source of data is the Minimum Basic Data Set (MBDS), established in 1987.

Methods: Using the information from the Minimum Basic Data Set (MBDS) and Cost data at patient level, taken from a sample from a public hospital, for inpatient and Major Ambulatory Surgery, as a first step, we join both data sets to analyze the quality of the data.

The total datasets were grouped using the grouper IR-DRG v.2.0 (3M). The grouped data were reviewed analyzing untrimmed data. The methodology used consisted of relating the specific costs of each DRG to the average patient cost for the whole system.

The study was carried out in the frame of the annual calculation of national weights and costs for the All Patients DRG (3M), which are obtained each year from a sample of 35 general NHS hospitals. The study was planned and coordinated by the Ministry of Health and the Autonomous Communities through a work group and commissions for clinical and cost information and methodological issues.

Results: The final result is a double data base (inpatient and Major Ambulatory Surgical) containing the cost and the relative weight per each DRG, based on Spanish patients and cost.

Conclusions: It has been shown that the proposed model of analysis is viable and brings relevant knowledge about patterns of use and hospital performance.

The analysis allowed us to determine patrons and differences between hospitals using IR-DRG, for comparison purposes.

Hospital outcomes analysis requires adjustment studies to make the conditions under which providers are acting homogeneous. As this was the first experience we expect more solid results with a bigger sample, statistically representative of the National Health System.

Conflict of interest: None disclosed.

POSTER B: Studies in non-hospital settings (ambulatory and integrated care themes)

Catalogue for Ambulatory Procedures (CAP)

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Introduction: While for the classification of diseases the ICD-10 or for coding of drugs the ATC-code are commonly used, there is no system available that would likewise be accepted worldwide as common standard for the classification of medical procedures, and this despite the existence of a number of classifications, e.g. OPS in Germany, CCAM in France, or TARMED in Switzerland. Several attempts have been made to compile a common classification for Austria in the area of outpatient procedures, none of which were so far successful. Therefore, the Austrian Ministry of Health commissioned the compilation of a common catalogue for medical outpatient procedures in Austria until the end of 2007. The project was called "Catalogue for Ambulatory Procedures", hereinafter referred to as CAP.

Methods: The structure of our Catalogue is based on the French CCAM with it's multi-axial systematic. Three main axes, which are independent of each other, are defined. This guarantees the flexibility and the extensibility of the classification. The order within one axis is alphabetical, i.e. the range is always between A and Z, not only between 0 and 9. Experience has shown that for example the OPS in Germany has reached its end far too quickly to be able to keep up with the medical progress. A multi-axial structure on the other hand is far more flexible. As in CCAM, three main axes plus two additional axes were defined for the Austrian catalogue.

Prior attempts to create a common classification for ambulatory procedures mainly failed because of the intention to set up a complete and all-embracing catalogue. All project participants reached consensus on the impossibility of this endeavour, especially given the short time-frame of twelve months. Instead, already existing fee structures were used as a basis to set up the new catalogue.

To define which procedures should be included in the catalogue, inclusion and exclusion criteria were defined. These criteria were applied to the fee structures of the Social Security Institutions as well as to the outpatient hospital catalogues of the four participating Provinces.

The inclusion criteria were defined as follows:

- Lowest frequency/lowest output figures: The procedure is provided at minimum 5 times per 10'000 inhabitants in private practices or 3 times per 10'000 inhabitants in ambulatory care in hospitals (per year).
- Relevance: Those procedures that cover 80% of all provided procedures within a special medical sector.
- High-frequency procedures: The procedure is provided more than 100 times per 10'000 inhabitants in private practices or 50 times per 10'000 inhabitants in ambulatory care in hospitals (per year). (Procedures, that would not be included normally because they cost less than 10 Euros are included due to their high frequency.)
- The procedure is provided by a large medical device, such as CT or MRT.
- Basic procedures, such as anamnesis.
- Mandatory criterion: Procedure is part of an existing catalogue and complies with the gold standard.

The respective exclusion criteria were defined as follows:

- The procedure is a pharmaceutical product or the application of it.
- The procedure is a dental procedure.
- Procedures that represent trivia, such as injections, blood collections, etc.
- The procedure costs less than 10 Euros.
- Violation of catalogue principles: The procedure is always part of a complex procedure, the name of the procedure contains a diagnosis, etc.

Results: The final catalogue, which was compiled from more than 1800 procedures provided by the participating institution, now contains about 360 ambulatory procedures. Even though it covers up to 95% of the actually provided ambulatory procedures, it is by far not complete and will need further enhancement and revision.

Conclusions: Several steps are necessary before introducing the CAP as a common classification for ambulatory procedures in Austria:

- All Provinces that have not yet participated in the project will need to get involved.

- Procedures performed by practice-based physiotherapists, speech therapists, or occupational therapists need to be included in the catalogue too, as currently only procedures performed by practice-based physicians are accounted for.
- A concept for further maintenance of the catalogue needs to be developed.
- The appropriate infrastructure (e.g. IT) that enables documentation as well as data transfer needs to be set up.

Conflict of interest: None disclosed.

ATC -> ICD – Evaluating the reliability of prognoses for ICD-10 diagnoses derived from the ATC-Code of prescriptions

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Introduction: Currently, the lack of standardized, reliable and systematic coding of diagnoses in the Austrian outpatient sector renders the availability of valid epidemiological data impossible. Moreover, diagnoses are the basis for an assessment of the cost-effectiveness, a quality monitoring and the calculation of Diagnosis Related Groups (DRG). Therefore, the department for Evidence Based Health Care in the Main Association of the Austrian Social Insurance Institutions has initiated a project to obtain valid diagnoses from the outpatient sector.

Methods: The aim of the project is to evaluate and analyze the reliability of prognoses for diagnoses derivating the ICD-10 from the ATC-Code of pharmaceuticals prescribed. In order to provide empirically measurable results, data from several Social Security Carriers will be statistically evaluated by the University of Technology in Vienna. This requires the use of certain statistical methods, e.g. neural networks, classification trees and support vector machines. Moreover, experts are assigned to create hypotheses to link ATC-Codes to ICD-10 Codes.

Due to the high amount of data, the statistical analysis requires a software with a lot of capacity and high performance. As an adequate statistic software, the program “R” developed by members of the University of Technology will be used.

Results: The results will either prove or disprove the theory stating that diagnoses can be obtained derivating the ICD-10 Code from the ATC-Code.

Conclusions: The aim of the Austrian health care system is to ensure adequate and nationwide health care provision. To meet future needs, there is an ongoing discussion about reforms. Therefore, different systems and measures need to be developed and taken. One of these measures could be the implementation of a DRG-system for the outpatient sector. In order to carry out valid DRG-calculations you need main and secondary diagnoses, among other components. A DRG system for the outpatient sector has not been implemented yet. Therefore, this project will provide a basis to evaluate the feasibility of obtaining diagnoses necessary for the calculation of DRGs from the standardized classification systems ICD-10 and the ATC-Code.

Conflict of interest: None disclosed.

Pharmacy data and predictive modelling in primary care

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Introduction: Predictive modeling has been used for some time now in the health care field as a tool to improve both clinical and financial management. Diagnostic codes have frequently been a part of this process, having a significant impact on the explanatory power and predictive ability of mathematical models. Pharmacy data are a useful alternative when available.

Methods: This study is based in a primary care setting, in Catalonia, Spain. A database with approximately 80,000 patients is available, for at least two years. The Adjusted Clinical Groups (ACG) software was used to classify patients into morbidity clusters, given information on age, sex, diagnostic codes and drugs prescribed (using the WHO's ATC coding system). Logistic regression models are used to identify high users of primary care, in terms of the number of visits to providers, referral rates, total primary care and pharmacy costs.

Results: (Work is still underway, so results at this point are few and preliminary.) Clinical data (both diagnostic and prescription) improve providers ability: i) to explain resource use patterns well over common demographic variables like age and sex (from 20 to 40% of variance explained in linear regression models) and ii) to identify patients who might benefit from specific interventions (e.g. case management initiatives) (up to 0,86 in terms of the AUC in ROC analyses).

Conclusions: Clinical data, like diagnostic codes, improve providers ability to predict future resource use patterns and to identify patients who might benefit from specific interventions. Pharmacy data are an alternative not only when diagnostic codes are not readily available but also as a complement to these. Both the WHO's ATC coding system and the ACG classification system seem to perform well in these circumstances.

Conflict of interest: None disclosed.

Resource allocation in Swedish Primary health care using the ACG CASE-MIX system

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Introduction: Adequate Resource allocation is an important factor to ensure equity in health care. Explanatory model based on individual need has not yet been used in Sweden to allocate resources. The aim of this study is to examine to which degree the ACG case-mix system can contribute to explaining and estimating costs in Swedish primary health care on an individual level in combination with age and gender.

Methods: The inhabitants in Blekinge County council were for three different years, 2004, 2005 and 2006, retrospectively classified in six different Resource Utilization Bands (RUB) by the ACG case-mix system. The individual patient costs were calculated and used in a linear regression model to assess the explanatory factor of the RUB:s.

Results: The ACG case-mix system as classified by the RUB:s did explain 46.1-52.7 percent of the variance in individual patient costs. By also using age, gender and Primary Health Care Centres as explanatory factors the degree of explanation was 52.1-57.5. By excluding high-cost patients the result increased further, ranging from 58.4 to 64.0 percent of explanation of variance in individual patient costs.

Conclusions: The ACG case-mix system explains patient costs in primary care to a high degree. By adding age, gender and primary health care centre as explanatory variables the degree of explanation is only slightly extended, but the highest single factor of explanation is still comorbidity as measured by the ACG case-mix system.

Conflict of interest: None disclosed.

Impact of morbidity on the use of resources in primary care: Retrospective application of ACG® at a Spanish interregional level

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Introduction: The objective of this study was to describe the effect of patient's morbidity load in relation to resource utilization in Primary Care (measured by pharmacy cost and visits) trough the retrospective application of ACG® in 23 Primary Care Health Centres from three Spanish regions.

Methods: Multicentre, retrospective study based on data from electronic records of patients seeking care during 2005 in the regions of Aragón, Baleares and Cataluña. Principal measurements: universal variables (age, sex, health service-family practice/paediatrics), variables of morbidity (resource utilization bands [RUB]) and dependent variables (visits, episodes and pharmacy cost). The ACG case-mix system software® (version 7.0; n=106) classified subjects into a single category for a given annual resource consumption. A log transformation of dependent variables was carried out to reduce skewness of the distribution and make it close to normal. Statistical software: SPSS, $p<0,05$.

Results: Study population: 286.450 (Aragón: 49,3%; Baleares: 23,2%; Cataluña: 27,5%), annual coverage: 75,5% of the population, patient's mean age: 42,9±23,6 years, percentage of female patients: 54,1%, mean number of consultations: 7,3±7,1; 6,6±7,0 and 8,0±8,1 correspondingly, $p<0,001$. Patient's case-mix: 55,0% of the study population were grouped into 10 ACG. A high variability was observed among regions with differences in the average values of RUBs (2,9 ± 0,8; 2,3 ± 0,8; 2,4 ± 0,8) and pharmacy cost (361,67€ ± 762,84; 242,01€ ± 564,06; 290,89€ ± 636,35), $p<0,001$. The explanatory power of the ACG classification system® was 30,7% (Ln: 41,2%) for visits, 87,6% (Ln: 87,1%) for episodes and 21,3% (Ln: 39,9%) for pharmacy cost, $p<0,001$. The cross correlation matrix (Spearman's rank correlation) is shown in the table below.

Conclusions: The fact that patient's morbidity load is adequately correlated with attended consultations and pharmacy cost reinforces the appropriateness of the ACG system® when associating clinical and economic information from health care centers in Primary Care. In consequence, case-mix adjustment must be considered for clinical decision-making and financial management in Primary Care.

Table 1: Correlation matrix

Correlation matrix	RUB	Visits
Visits	0,492	
Pharmacy cost	0,472	0,507
Signification: p<0,001		

Conflict of interest: None disclosed.

Ambulatory Drug Consumption in the Oporto Oncology Hospital and its Economic and Financing Impact

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Introduction: Characterization by pharmacological and therapeutic group of the drug consumption. Description of the off-label prescribing in ambulatory in 3 pathologies: Lung, Breast and Haematology. Comparison in those pathologies, of costs versus financing. Comparison of the evolution of costs and illness. Proposal of possible changes in financing hospital ambulatory.

Methods: It was analysed the ambulatory drug consumption, in the day hospital and outpatient visits, in the Oporto Oncology Hospital, in the year 2007, for 3 pathologies and for patients with 16 years old or more. The consumption data was obtained from 2 separate electronic applications, one from the pharmacy and another from the day hospital. The drug consumption analysis was characterized using the ATC classification. The off-label use research was made in the antineoplastic group, using the criterion drug choice by illness histology, being used EMEA and FDA databases. It was used the Hospital cost centre allocation rules, for calculating costs and the contract with National Health Service in 2007 for the financing calculation. For the illness and costs evolution analysis, made only to solid tumours (Lung and Breast), it was used hospital oncology registries data.

Results: Day Hospital and outpatient visits represent about 70% of the drug costs. The antineoplastic and immunomodulating is the group with larger costs, having a level between 82% and 97%, in the studied pathologies. The off-label level in ambulatory prescription is very high in Lung Cancer, representing 70% of the overall consumption costs and reduced in haematology (10%) and with no representation in Breast. Comparing costs and financing, all 3 pathologies had deficit. The financing of Haematology cover 30% of costs, Lung 50% and Breast 55%, even if the breast cancer was the most deficit pathology in overall costs. In Haematology, when considered only drug costs, the financing wasn't enough and in the day hospital, financing covered just 80% of drug costs. The cost and illness evolution showed that costs rise with severity of illness.

Conclusions: The ambulatory should be considered the most important area in the drug consumption. The off-label use showed that the economic evaluations made at the central level should be complemented by hospital monitoring through different prescriptions, in order to confirm the cost-effectiveness. There is a need to look and correct the hospital oncology ambulatory financing in order to have some correspondence with reality. The real possibility of inserting the severity of illness in the financing is one of the hypotheses.

Conflict of interest: None disclosed.

Role of a teaching hospital in providing equitable health care: an evaluation by Adjusted Clinical Group

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Introduction: A teaching hospital usually has a mission of teaching primary care to medical students. Naresuan University Hospital (NUH) has recently accepted people in its catchment areas to be registered populations and provided access to care as practiced under the universal coverage policy.

This paper is to evaluate the changes of morbidity burden of users at this teaching hospital in 2006 and 2007. Hospital resource uses and casemix indices were compared to assess equity of health care delivery of this teaching hospital to all types of clients.

Methods: All outpatient visits to NUH in 2006 and 2007 were analysed. Adjusted Clinical Group (ACG) software from Johns Hopkins University version 7 was used to evaluate the function of teaching hospital as primary care provider.

Results: There were 30,505 people attending outpatient services at NUH in 2007, with a gross increase of 48%. Users of the universal coverage (UC) scheme increased 4.1 times. The casemix index of the UC increased 2.1 times by mean and 1.4 times by median. The total cost per patient decreased 0.4 time in the UC but rather stable for the better off (civil servant medical benefit scheme). For the catchment areas of NUH, there were 8,192 people attending NUH in 2007, with a 186% increase. People who joined later had higher casemix index (from 0.870 in 2006 to 0.966 in 2007). People who used NUH both years had even higher casemix index (1.320), with a quarter of them maintained the same ACGs (average casemix index 0.813). In terms of resource use adjusted for casemix index for these catchement populations, the annual resource use of the UC was as high as the CSMBS. However, the lowest annual resource use was found in the social security scheme (covering working population in private sector). This raised the question whether which scheme achieved the most efficient resource use.

Conclusions: The increase of the UC population to the teaching hospital to teach primary care patients has attracted higher morbidity burden cases. The difference of resource use adjusted by casemix index should be further explored to search for higher efficiency or the narrowing of inequity gap originated from the inverse care law.

Conflict of interest: None disclosed.

Accurate coding of clinical data - Code of ethics and practice standards

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The Swedish Society of Clinical Coders has developed a code of Ethics and practice standards to define the principles governing the conduct of its members. Every member of the Swedish Society of Clinical Coders shall abide to the code of ethics and practice standards to promote the objectives of being a clinical coder. Any action which is in violation with the spirit and purpose of this code shall be considered unethical.

Code of Ethics

The clinical coder has a skill and working knowledge of medical science and terminology and shall assists clinicians in making decisions about the appropriate codes to assign. The clinical Coder will communicate and cooperate with collegues to secure correct and consistant interpretation of coding rules.

The Clinical Coder makes sure that coding is based on documentation in the medical record and shall consult the clinicians when appropriate.

Selection of main condition (primary reason for care) is done in accordance with Classification guidelines provided by The Swedish Board of Health and Welfare.

Practice Standards

Clinical Coders:

- Shall not misrepresent or falsify their education, qualifications or experience and not make speak in the name of the Society outside their realm of knowledge
- Shall refuse to participate in fraudulent or unethical acts or processes
- Will not code with the purpose of maximizing reimbursement by upcoding, nor add or alter codes against classification rules to increase reimbursement by canged casemix allocation.
- Support and assist managers and clinicians in guidelines and practices that support ethical coding
- Participate in ongoing education to ensure that the Coders´ skills and knowledge meet the appropriate coding competence
- Initiate and maintain communication with other health care professionals and relevant organisations to improve development in quality and accuracy of coding
- Liaise with other professional bodies in order to strive for advancement of quality health care
- Maintain the integrity of the Swedish Society of Clinical Coders and not make unsanctioned representation on behalf of the society

Conflict of interest: None disclosed.

Key conditions of pro-market health reform. The case of the Czech Republic

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Introduction: Despite the general agreement of necessity to reform the health care system; formulation about nineteen concepts of the health policy; and changing nine ministers of Health in the office; no reform has been implemented during past ten years in the Czech Republic. The new cabinet introduced the health reform after the election in 2006 and the first part of reform (increasing patients' co-payments) was implemented in 2007.

Aside from other aspects the new reform proposal emphasizes principles of managed competition and managed care more than all previous ones. Because of these pro-market changes, the first aim of the paper is to analyze whether the new health reform proposal fulfill conditions which are theoretically considered as crucial for the proper performance of pro-market health care system. It is supposed that the system of managed care fails if these conditions wouldn't be fulfilled.

Special stress is put on, one of given condition, the problem of obligatory providing health services in limited time and restricted area and its consequences for postponing of the health care. The reform proposal supposes that one of patients' rights is to get the health service in given time and local availability. The list of time and areas limits is expected to be set for each of diagnosis related groups. The problem is how to determine the optimal groups and optimal limits. Therefore the second aim of the paper is to determine list of possible solutions how to achieve the optimum and identify consequences in the case of failure.

Methods: There were determined a list of key conditions of successful pro-market health reform: Clear determination of property rights (e.g. Maynard 1991); necessity of conscious patient (Agraval, Veit 2002); clear differences between insurers companies from the patients' point of view (e.g. Kerssens, Groenewegen 2003); necessity of patient's involvement in costs (e.g. Marquis et. col. 2007, Kerssens, Groenewegen 2005); determination of quality standards (standards of health services) (e.g. Hoedemaekers, Dekkers 2003); adequate level of regulation – time and local availability of services; prevention of postponing care (i.e. unmet need, delay in care, etc.) (e.g. Donelan 1996, Prentice, Pizer 2006, Bonet 1998, Munro 2000).

Each condition represents some kind of threat for pro-market health system in the case of non-fulfillment. The main data were gathered from intended five health reform laws as well as general aims declared by the Cabinet were taken into the consideration. The fulfillment of determined conditions was evaluated based on evidence of possible solutions; direct mentions or evidence that authors of reform laws consider given threat.

The analysis of the second part is based on studies (e.g. Bonet 1998, Hendryx et. al. 2002) focused on consequences of postponing health care and with respect to the reform proposal are suggested possible solutions. The basic statistical methods are used for secondary data analysis.

Results: Past all doubt the only one of conditions (clear determination of property rights) was fulfilled. Most of determined conditions could be considered as partly fulfilled. Finally two of conditions (i.e. risks of postponed health care; necessity of conscious patient) seem to be not sufficiently covered in the current reform proposal. The implication of this result is escalation of the risk of implementation failure. For each of conditions are finally considered possible solutions and consequences for proper function of the health system.

The early result of the second aim (effects of non-optimal availability limits) shows a risk of costs growing in the case of "unreal limits". On the other hand the risk of conservation existing waiting lists and other inefficiencies is rising in the case of "soft" limits. The analysis is still in progress.

Conclusions: The analysis is in progress. General conclusion is that most of identified problems could be resolved by modification of reform laws. However if these problems would be ignored, there is a danger of malfunction of the health system. The last consequence of such malfunction could be the rejection of whole reform proposal beside of the quality of main ideas. It is obvious that final reform laws will be modified, but the discussion seems to be more focused on technical aspects than the integration of functional principles.

Conflict of interest: None disclosed.

A statistical evaluation of two payment methods for the funding purpose of thalassaemia diseases

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Introduction: The Universal Coverage (UC) Scheme is a public welfare. This scheme is paid per capitation for outpatient services and inpatient payment is according to diagnosis related groups (DRGs) with global budget. Capitation payment for outpatient care under the UC scheme will transfer the financial risk to health care providers which responsible for chronically ill patients. The aim of this paper was to compare two payment methods for outpatient care: capitation (adjusted by age and type of diseases) and risk-adjusted capitation by adjusted clinical groups (ACG). Thalassaemia diseases are selected for the study from their nature of chronic illness conditions.

Methods: Individual data for outpatient services in the year 2005 were available from a teaching hospital. Information was composed of demographic and clinical data. For the purpose of assessing the performance of two payment methods, the application of morbidity measurement by ACGs was applied. The unit of analysis was individual patient. A statistical analysis composed of coefficient of variation (CV), reduction in variance (RIV), and clinical concordance.

Results: The results show that ACGs provide better statistical casemix in terms of CV and % RIV (CV range from 0.70-3.62, %RIV = 9%) than the capitation (CV range from 1.81-4.33, %RIV = 3%). Both payment methods are good clinical concordance, but ACGs had more detail information than risk-adjusted capitation.

Conclusions: The results indicated that it is desirable to develop a casemix system for outpatient care that reflect burden of illness in a population. The results also show that risk-adjusted capitation by using the ACG system provided better statistical evaluation than capitation payment method.

Conflict of interest: None disclosed.

Business Intelligence in the Health Care System

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Introduction: Business Intelligence is to be understood by definition as a set of systems and processes to conduct a systematic analysis of business data, using electronic methods. The Austrian Social Security Institutions process health care data according to the principle of Business Intelligence. A central data warehouse allows a feasible data management. There is a special reporting track for conducting analyses and a knowledge management tool that enables the user to obtain the results of these analyses. This concept is referred to as BIG – Business Intelligence für Gesundheitsplattformen (Business Intelligence for Health Care Platforms).

Methods: The Main Association of the Austrian Social Security Institutions is responsible for collecting and administrating various data from different sources, e.g. physicians' claims data, prescription of pharmaceutical products, hospital treatment data, etc. The data is stored in the datawarehouse of BiG and provided to the users via several databases and a web interface. The users can conduct queries independently by retrieving the databases or use web-based standard reports containing a set of fixed parameters, which can be modulated for specific questions. Related reports are grouped in modules. The used software (MIS Alea ®) can be integrated into MS Excel ®, which allows the user to further process the data via spreadsheet analysis. Additionally to the software packages for the queries and the web interface, there is an application for knowledge management integrated into the software bundle. The knowledge management tool supports the identification of knowledge carriers and experts and helps to make their knowledge accessible for the whole organisation.

Results: BIG was created to support the work of representatives of the Social Security Institutions in the regional Health Care Platforms. Data from various health insurance sectors are being processed electronically in order to gain information and to identify special fields of activity for the platforms. Achieved aims:

- Clustering of data and information for health insurance issues
- Description of the current use of funds and resources in different sectors of the health care system as well as the deviation of the actual value to the target value (identifying potential imbalances in the provision of health care services)
- Communicating the use of resources and funds transparently, which creates a better basis for planning and governance
- Mutual benchmarking of the health insurance funds using a standardized, structured and transparent database
- Identification of fields of activity and required measures for the Sickness funds and the regional Health Care Platforms
- Communication and discussion of the obtained results across the network of Austrian state sickness funds

Conclusions: The developed Business Intelligence Model for health care data can support the decision-making process in the Austrian healthcare system by providing information on the scale of resource utilization. It enables the Health Insurance Funds to conduct mutual benchmarking in order to identify fields of activity for measures regarding cost containment and efficiency of existing structures. Furthermore it helps to distribute the knowledge gained to experts and decision makers alike.

Conflict of interest: None disclosed.

Integrated care funding, the silo killer

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Introduction: The Dutch Ministry has introduced a new approach to promote integrated care delivery for chronic diseases using the DBC concept and the care standard concept.

Methods: The Dutch Diabetes Federation, the organisation of care providers and the patient association have agreed on a standard for Good Diabetes Care. As the number of Diabetes Patients is growing and the appliance of the standard is limited, a new policy was developed. The policy was to contract Diabetes Care according to the standard by a Care Group and a Health Insurer using the casemix concept.

Results: The introduction of the Diabetes Care Product for contracting care has been the katalysator of the innovation of health care delivery in the Continuum of Care. It created a new wave of innovation and initiated a process to focus on reorganising chronic care by condition , initiating new dimensions in ICT use between health care providers

Conclusions: The application of Case Mix tools in the care continuum is slowly breaking through, the paper will elaborate on the potential of this approach.

Conflict of interest: None disclosed.

Assessing resources allocation among the different levels of care in the NHS (2003-2008)

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Introduction: The financing of health services, including the allocation of resources among different levels of care is, together with investment in health and healthcare, one of the three strategic functions of the National Health Service (SNS). One of the main roles of the Health System Central Administration (ACSS, Ministry of Health), as an entity responsible for managing economic and financial resources of the SNS, is to define funding and payment models, that ensure a balanced implementation of the national heath's policy. The total expenditure on health was in 2005, 10.2% of GDP, a figure above the 9.2% European average (EU15) in that year. The value of public spending on health carries great importance in the current state expenditure and had in 2005 a weight of 27.2%. In this context, the funding model used and the allocation of resources among different levels of care, is a capital issue given the significant economic and social role that the health care accounts for.
Methods: In the last decade, the funding model shifted from a public integrated model, based on retrospective funding to a model with prospective financing, and subsequently to a model for public contracts, based on assessment needs and negotiation. The primary health care and the hospital care absorb the vast majority of financial resources allocated.

Regarding primary healthcare, funding models shifted from historical models to models adjusted by "geodemographic" criteria such as the resident population density, the rate of ageing and the geographical accessibility. With regard to hospital care the financing models used, also progressed from an historical payment basis to a philosophy of payment for activity, based on production to hire (production lines and volume), prices and the value associated with the convergence of budget targets and performance.

Results: With the evolution of the funding models a bigger and better control of public spending on health has been achieved over time, accompanied simultaneously by a positive trend in the level of production and response. Better results in efficiency have been achieved. It has become clear a greater accountability of the hospital's board of directors, which have to answer for results and commitments. The development of a national monitoring system of the hospital's activity was also one of the capital gains from this process.

Conclusions: Despite the favourable results already observed, there is a need to move towards the integration of new elements in the funding model, such as the quality of services provided and the health's results obtained.

Conflict of interest: None disclosed.

POSTER C: Other hospital coding systems and applications

Coded adverse events in Austrian hospitals from 2001 to 2006

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Introduction: Adverse Events (AEs) are unintended injuries or complications resulting in death, disability or prolonged hospital stay deriving from health care management. The problem of medical errors was brought to the attention of a larger audience in late 90s by the report "To err is human" by the Institute of Medicine. So far, Critical Incident Reporting Systems or Risk Management Systems are not yet implemented nationwide, but the concern about patient safety in Austria is growing constantly. The aim of this report is to present Austrian reimbursement hospital data concerning adverse events from 2001 to 2006.

Little is known about the frequency of AEs in Austria. The reimbursement data of hospital discharges include ICD-10 coded diagnosis data; diagnosis group T36-T50 represents AEs caused by a variety of drugs, T80-T88 represents AEs as a result of surgical interventions or other medical procedures. We investigated if these data could be used reliably to show the incidence of AEs.

Methods: We examined the frequency of diagnoses from the ICD-10 groups T36-T50 and T80- T88 during the years 2001 to 2006, either as "Main Diagnosis" or as "Secondary Diagnosis". We investigated the age distribution, the frequency of stays in the intensive care unit and length of stay. We looked also into the death rates related to AEs, furthermore we were interested in the amount of money spent on the DRG system for AEs.

Results: During the years 2001 to 2006 294.848 hospitalisations were caused or complicated by AEs out of a total of 13.841.467 hospital stays, for 2 % of the hospital episodes AEs were coded as main or secondary diagnosis. Coding of AEs as a result of surgical interventions or other medical procedures has increased during this 6 year period (on average 87 % of all coded AEs) whereas coding of AEs caused by drugs decreased (on average 13 % of all coded AEs). Death rates of hospital stays with AEs are 2,3 % compared to 1,66 % of all hospitalisation episodes. 1,2 billion € were spent on hospital episodes, where AEs happened.

Conclusions: The literature shows different rates of AEs in hospitals, from 2,9 % up to 16,6 %. The Austrian hospital reimbursement data can be used with caution only. The rate of coded AEs caused by drugs in our reimbursement data is much lower than reported AEs caused by drugs in other healthcare systems. Correlations can be noted between surgical procedures, the length of stay and AEs. 37 % to 51 % of AEs are said to be avoidable. Therefore, at least 19000- 25000 AEs per year could be avoided in Austria.

Conflict of interest: None disclosed.

Treatment- and diagnosis-related benchmarking of population groups in Austria. A dynamic information tool

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Introduction: In the past, a nationwide analysis of hospital data has not been realisable for the Austrian sickness funds, due to the federal character of the Austrian health care system. However, decision-makers within the Social Security and in the Health Care Platforms need this nationwide analysis to gain the information and knowledge for governing and planning the health care system. In order to supply support for this decision-making process, the Main Association of the Austrian Social Security Institutions – umbrella organisation of all Social Security Funds –started to develop a software-based benchmarking system that allows a comparative analysis of the hospitalization rate as well as the related diagnoses and medical treatments for all Austrian regional population groups. For the analyses we use the hospital data, which is being reported by the public hospitals to the Ministry of Health and provide the results via an OLAP database and web-based standard reports on the Social Security Intranet.

Methods: Working with treatment- and diagnosis data, the frequency of hospital stays for the regional population groups in Austria is evaluated. The performed analysis has its focus on the patients' place of residence and does not account for the location of the treating hospital. As a result, we analyze the hospital treatment data for a regional population no matter in which Austrian hospital the treatment was given. Treatment- and diagnosis data are calculated per 10.000 inhabitants of a population and the figures are related to the Austrian average as a benchmark. The result is the proportional deviation of the regional number compared to the Austrian average of the reference number. Results can be calculated allowing for age-standardization. The underlying software tool allows to systematically conduct this calculation for each procedure or diagnosis listed in the official reimbursement-catalogue. In addition, the aggregation of related procedures or diagnoses is possible. The calculation can be parameterized, whereas the parameters can be combined and are automatically considered by the software program when calculating the reference numbers. The results are presented via tables and diagrams or a geographic information system (GIS). The evaluation process was standardized and mapped with a business modelling software. The process helps the user to detect inappropriate health care services – on the level of single procedures and diagnoses or on an aggregated level - for regional population groups in a systematic way and to compare the results to other regional populations. Moreover, it supports the user in identifying the treating hospitals and in displaying the regions where treatment is provided by a particular hospital.

Results: We developed a process-oriented, software-based and dynamically parametrizable model to systematically quantify regional imbalances of health care services provided by hospitals for the Austrian population. Assuming that the provision of health care in Austria is adequate and equally distributed on a national level, the provision of hospital treatments for every regional population is reported corresponding to the Austrian average. This model also allows to identify potential medical causes and problems that arise because of the way the Austrian health care system works. It can be accessed via a web-based software tool by all Social Security Funds.

Conclusions: The model can help decision-makers of the Austrian Social Security and other governmental bodies to identify imbalances in the health care provision and to reveal fields of activity for governing and planning measures. Especially with respect to the ongoing discussion on health care reform, accompanied by a discussion on efficiency and costs of provision structures, results like the ones of this model will be needed for developing steering measures and assessing the efficacy of the action taken.

Conflict of interest: None disclosed.

Regular updating of grouping and reimbursement parameters for case-mix system in Hungary – Experiences and future possibilities

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Introduction: Since 1993, when it is new case-mix type reimbursement system was introduced on Hungary, several legal, structural, and methodological measures were established in the interest of the target that they are the grouping system as the basic of the reimbursement and parameters used to define the fee regularly onto a review, let them get to a refinement. The measures it was served, that in the renewable system defining the reimbursement parameters are uniform, standard, transparent

for concerned stakeholders and it is verifiable, clear-cut, on a manner which can be interpreted. There are strong needs for regular updating because of the new technologies, changes of the treatment-process and cost of resources needed.

Methods: There are ministerial decree regulating the total process of the refinement of reimbursement parameters and grouping system. The regulation defines the tasks constituting the part of the refinement, the stakeholder's task and his responsibility, the main standards and rules of the definition of the parameters, and the manner of the transparency. The refining process can be initiated three ways. The process may be a special, unscheduled up-dating procedure, for example introducing a new procedure, general up-dating procedure covered all items reimbursed (not every year), or scheduled yearly updating based on work-plan for selected areas. The key actors in the process are the National Health Insurance Fund involved organization of case-mix development (GYOGYINFOK), Ministry of Health, Payment System Updating Committee, which is the advisory board of the minister of health and professional colleges and professional organizations.

The database for updating is collected by hospitals' collaboration. Informations which are necessary for the calculation on increasingly more areas of health provision insures by so-called medical-reimbursement protocols if they are the high rate of all expenses in the care process meaning the measure of those expenditures which are very well definable (pl. chemotherapies). It is necessary that the data of real resource consumption are collected or define at the patient's discharge level for hospital cases and on the separate way for medical services at case's level.

The method of calculation is uniform for all services. Unit of calculation of resource consumption data collection is patient's departmental case in hospital. The direct resource consumption data for each cases builds on the data of individual medical service items as intermediate input. Direct cost of medical services builds on items observed by recording to quantity of resource consumption as work time, medicines, blood or blood's products or other materials, equipment. There are several questions arise about calculatiom. One of them is which prices use for calculation (for example in cases of medicines price of generic or original product, etc.). This is important to determine how much indirect costs will be allocated to the cost-unit. There are influential factor how it is do considering issues of requirement of utilization rate accepted, income level ensured, etc.

Results: The process of price-setting is controllable by stakeholders. The basic methods of price-calculation is feasible, relatively proportional profitability insurer, normative system. At least, the database of price-setting useful to the check of minimal quality requirements, assessment of health technology, the create of medical protocols reimbursed patient's path. The data were utilized in the analyses of the hospital management.

Conclusions: Considering the health market financed by social insurance, the certain market's function replaces by the regulation of the price-setting and a product-definition. The manner of price setting influences the service providers' behaviour fundamental, the efficiency of the source allocation, the validation of the equity and the cost-containment. Presently the target of the refinement of the process for price setting relates to the developing connection directly to the process of HTA and coverage's decision, and more accurate process for analyses, calculation.

Conflict of interest: None disclosed.

The reliability and precision of ICD coding for the DPC disease name in Japanese DPC system

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Introduction: In Japanese patient classification system of DPC (Diagnosis Procedure Combination), the DPC coding is performed by the disease name in which the most resources are consumed in the treatment which is called "DPC disease name". The ICD code corresponding to the DPC disease name belonging to the DPC category code is shown in the DPC system. In the report data, however, the discrepancy between DPC disease name and DPC category code is found in some cases. The selection of DPC disease name could leads to up-coding and to get more income in the prospective paying system (PPS). The precision of ICD coding for DPC disease name is also related to the reliability of DPC data and DPC system. The reliability and precision of ICD coding for the DPC disease name was investigated by using the DPC data collected in Japanese DPC Associations.

Methods: A meaning of DPC code consist of 14 digits is shown as follows: The first 6 digit is "DPC category code" corresponding to diagnostic disease name, four digits from ninth to twelfth mean the treatment and thirteenth digit means the existence of co-morbidity/complications. The ICD code belonging to the DPC category code is defined in DPC system. About 82 thousands cases for twenty DPC categories in 25 hospitals were investigated. The error rate of coding for DPC disease name was estimated from the number of cases with wrong coded DPC disease name.

Results: The rates of wrong coding for DPC disease name are shown in Table 1. The highest error rate of 63% was shown in the DPC category "060130" (esophagitis, gastroenteritis, duodenitis) and the second high rate 16% was shown in "060210" (intestinal obstruction without hernia). In the other DPC categories, the values of error rate were lower than 3%. The error rates in some hospitals are always higher than those in other hospitals.

Conclusions: The error rate for coding of DPC disease name is different among the DPC categories and the hospitals. The relations of error rate to up/down coding, precision of ICD coding, skill of ICD coder and/or the other reason were investigated.

Table 1: The rates of wrong coding for DPC disease name for 19 DPC categories

DPC category code	Name of DPC classification	No. patients	No. of wrong codes	Error rate (%)
040080	Pneumonia	12.607	263	2,09
050050	Angina	9.237	109	1,18
020110	Cataract	6.640	17	0,26
010060	Cerebral vascular disease	5.891	62	1,05
040040	Lung cancer	5.072	95	1,87
060100	Small and large intestine benign tumour	4.560	61	1,34
110280	Chronic nephritic syndrome	4.184	138	3,30
040100	Asthma	3.954	52	1,32
150010	Viral gastroenterocolitis	3.313	77	2,33
050130	Cardiac failure	3.081	83	2,69
060050	Hepatic and intrahepatic malignant tumour	2.741	47	1,72
060020	Gastric malignant tumour	2.612	26	1,00
100070	Diabetes mellitus (type II)	2.532	46	1,82
060035	Large intestine malignant tumour	2.427	42	1,73
060160	Inguinal hernia	2.406	5	0,21
060130	Esophagitis, gastroenteritis, duodenitis	2.351	2.218	5,50
060210	Intestinal obstruction without hernia	2.195	1.975	1,15
030250	Sleep apnoea syndrome	2.139	2	0,09
120180	Problems on partus	2.045	22	1,08
090010	Breast cancer	1.847	12	0,65

Conflict of interest: None disclosed.

A generic flow-model as a base for constructing work- and monitoring processes in psychiatric care

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Introduction: This abstract describes a structured approach on reorganizing clinical pathways of a psychiatric department and the adjustment of information systems for planning, monitoring and evaluating. The redesign activities started in 1995. At that point in time the department was structured in geographic catchment areas. All kinds of patients where treated by the geographical team. Unwanted variations in practice were recorded for the same type of patient between areas, especially for non-pharmacological interventions. In order to cope with this problem the geographical approach was abolished and three specialist teams were set up, each working with diagnostically different groups of patients. The department now has three different clinical pathways;

1. Short-term therapy for patients with anxiety, depressions and phobias
2. Long-term therapy for patients with personality disorders
3. Treatment for patients with psychoses

The change led to intense internal discussions. How to direct patient flows to each team? A supporting tool in this discussion was that an education of the staff in the use of the DSM-III diagnostic system recently had been carried out.

Another problem was that the information system did not help in finding out if a single patient for the prevailing mental health problems had contacts somewhere else in the health care system.

The main idea then was to build clinical pathways- and information flows where the single patients psychiatric problems should be the drivers of treatment choices. The new concept should use diagnostic procedures, start with a distinct evaluation phase, followed by a likewise distinct treatment phase and in the end result in a choice of where the patients oncoming contacts with health care should be.

In order to achieve stability in the allotment of patients to any of the three teams or pathways, it was decided that all referrals had to pass the head of the dependent for an evaluation for further distribution to the different teams. The head also decides when a case should be closed. Start of en episode of care at the department and the ending of it is by this routine strictly regulated. Now the system is running continuously. Every care-plan is ex post evaluated. Evaluation also targets whether goals for changes in the patients conditions are achieved.

This concept is in line with the Flow-model and the information system at the psychiatric department is currently in a developing process aiming at supporting the concept of the model. The organization and management of the processes in the department take the model as a starting point. But also information necessary for monitoring and analyzing is in line with the model. The flow model concept applied in these ways has helped the unit in mainstreaming its processes in order to deliver cost-effective and evidence based practice to its patients.

Methods: Data are collected from the information system of which the flow model is one component. Statistical analyses will show what the pathways look like and what the results are for patients.

Results: In the article to come will be shown with statistical data how the three different processes look like in real life. How data can be used to draw conclusions to what degree the processes levels up to demands stemming from evidence based medicine will be presented and discussed. It will also be presented how flow model data in combination with information from other data sources can help in evaluating the departments achievements in relation to the contract with the commissioners.

Conclusions: The model has helped us in defining our processes. In this early stage that we are we are learning about harvesting data and reporting internally in the unit and with our commissioners. It is necessary to creatively develop visualization techniques and to develop a new "process language" in communication of results.

Conflict of interest: None disclosed.

Analysing cost outliers at Karolinska University Hospital, Sweden

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Introduction: The DRG-system was implemented for reimbursement of health care in Stockholm County (SLL) in 1993. To calculate DRG weights in SLL two essential components are needed;

- Net costing
- Cost per case

The Cost per case system is a crucial tool to be able to analyze cost outliers and the cost driver components.

Since 2003 cost outliers at Karolinska University Hospital are reimbursed separately.

Methods:

The presentation will deal with the following:

- The role of patient injuries in cost outliers
- The net costing and cost per case model at Karolinska University Hospital
- Analyse cost drivers by using cost per case data

Results: Cost outliers were analysed regarding quality of medical care, coding, and patient costs. Medical audit using "Global Trigger Tool" revealed preventable patient injuries.

Cost driver varies depending on MDC, DRG and major diagnosis. In general a cost driver is a rarely occurring event in the specific DRG's.

Conclusions: The conclusions will be presented at the conference. Still working on it.

Conflict of interest: None disclosed.

Visualisation of the Flow Model - the patients pathway through healthcare

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Introduction: This article describes how Blekingesjukhuset (Hospital of county Blekinge) in Sweden implemented and use the Flow Model - a tool for managing and monitoring the key healthcare process. We decided to create a graphical visualisation of the most important parameters and the result is that we today have a powerful and supporting tool that help us to plan and govern our daily work, accessible from the very top to the bottom of our organisation.

Methods: The Flow Model has been developed by a number of Swedish county councils and regions where the region of Blekinge was one of them. The work with the model started in 1996 and has subsequently developed into a cohesive, national basic model and method för the systematic collection of information on the flows of healthcare.

The implementation started in 2003 and took about 1½ year at the Blekinge hospital where every department had to invent the working process resulting in major or minor changes in their routines. All this to gain time and quality at the end. It was a new way of thinking - process thinking! One example: before the use of the Flow Model the same healthcare-problem could have three of four different ways of registration that made it impossible to compare data.

Results: After about six mounths our data ware-house contained a significant amount of data giving us the possibility to evaluate the data down to the transactional level. We use our intranet system for presentation of the results - all in graphics, tables and numbers. The software we use is the most user-friendly tool we ever had, helped us initially in the phase of validating data and finally presenting results ad hoc. You just click and view!

We can for the whole organisation measure and visualise the inflow of referrals, follow events during the process, reasons why people seek care, dates for decisions on undertakings and activities, lead times and waiting times in the flow of care, identifying bottlenecks and also gives us the possibility to se whether the healthcare guarantee has been fulfilled.

All parameters that are registered are also shown transparently - no more hiding of data.

We have also added DRG to the application. This makes it possible to follow for example the variation of DRG for a certain healthcare problem, or if any specific doctor has referred especially expensive patient groups to the hospital.

To visualise casemix also makes it possible to look at the weight of work during a period of time, follow a diagnos through different medical specialities, se enclosed table.

Conclusions: The Flow Model is, with our graphical presentation, a very powerful management-tool from the top till the bottom. It also makes it easy to follow a healthcare process from the start till the end. You can follow a single patient, a specific group of patients or the whole stock of patients at the hospital. Every single employee have the possibility too use the Flow Model from their own aspect. The hiding-data-time is over, we can se each other processes, number of referrals, reasons of interruptions and learn from each other. Our data is now possible to compare and are continuously validated. We can also follow DRG (Nord-DRG) at any level.

The biggest profits we have done by implementing the Flow Model is:

1. Validated data from the same source.
2. Gain of time
3. Possibility to follow the healthcare process
4. Se if the healthcare guarantee has been fulfilled
5. and a lot of other things...

Table 1: DRG and Case-mix surgical out-patient (first visit)

Department	Number of visits	DRG (p) aggr	Case mix	Case mix(%)	Cost (DRG-price)
	4 390	1 711,7	0,09	100%	67 .148.966
ER (surg) Karlshamn	9	302,7	0,07	75%	11.834.172
ER (surg) Karlskrona	23	441,2	0,08	91%	17.242.128
Surgical dpt Karlshamn	1 685	414,1	0,11	125%	16.296.115
Surgical dpt Karlskrona	2 673	553,7	0,10	112%	21.776.552

Conflict of interest: None disclosed.

The Dutch DBC Systems switch to the Electronic Health Record

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Introduction: The Dutch DBC system was introduced in the late nineties as a separate registration of clinical data on episodes of care provided by a hospital specialty for a specific health issue.. All hospitals had introduced a DBC system consisting of three main parts, 1. The registration of the DBC episodes with principal clinical data, which was primarily done by clinicians with specialized DBC systems. 2. A validation system which linked services data to the DBC episode to describe the care profile of the episode and determine the treatment of the patient, 3 the billing and reporting system which was the basis for a national DBC database which collects all data about the episodes and their profiles. The introduction of the DBC system thus created a totally new dimension of the registration and reporting of Dutch health care data. But this was only step 1 of a process which aimed at integrating the episode based care administration into the health system.

Methods: After the first year of implementation the stakeholders executed a review to assess the issues related with the implementation of the DBC system. The procedure was no longer the base for the billing process, but the DBC care product had to become the focal point for costing and contracting. In the report “DBC’s Simply Better” the analysis was made how the system could become easier and sustainable. A series of 10 points of improvement was the result of the discussion of stakeholders and was presented to the Minister of Health. The major issues were to harmonise the systems components, like the Diagnosis and Treatment by shifting to one Diagnosis system, the ICD10 and extension of the services recorded within the system.

Another major issue was the adoption of the vision that the DBC system should be integrated within the registration of the care process. It was agreed by the care providers that the information for the DBC system and the Discharge System LMR should all

be based on the " one time care registration " systems. The latter being very close to the Electronic Health Record system, which was still under debate and certainly not widely implemented.

Results: Based on this accord DBC Onderhoud started to elaborate the DBC registration model to encompass this new strategy. The strategy was based on a five step process starting with the recording of the care related information based on the health issue of the patient. At a logical point in the care process , the end of the initial treatment of the diagnosis stated for the health issue of the patient the first billing moment will arise. To determine the DBC care product a summary of the care delivered, has to be autorised by the treating clinician. The summary is then processed by the national DBC grouper, returning the DBC careproduct. The billing process then determines the insurer and the price to be charged, and the DBC information is also send to the national DBC Information Database (DIS). The insurer checks the bill to the contract and pays the bill to the hospital. Within this process flow the care providers are responsible for step 1 : the documentation of the care process and thus the introduction of the Health Record. DBC Onderhoud is responsible for defining the interfaces to the DBC system and its reference tables, like diagnoses and procedures.

Basically this is the DBC process which will be introduced in the coming years. A major challenge for the hospitals and the clinicians to introduce the new way of documenting the care process. The role of DBC Onderhoud is to define the requirements of the DBC systems, without any responsibility on the organisation of the IT systems in the hospitals. The DBC registration model however describes the interfaces and requirements of the DBC systems and gives thus direction to the systems to be implemented.

The DBC Registration Model

In 2007 the registration model has been developed based on the consensus of the stakeholders and their agreement with the ministry. Two major tasks were taken, one to describe the requirements for the episode based health record to be the base for providing the relevant data to the DBC system. The other was the development of the DBC Classification system and grouper. To prepare the decisions about the introduction of the DBC ICD10 based classification the Registration model played an substantial role. Although the long range plan was accepted and the vision was approved, hospitals had many reservations about the scope of the short term changes. A quite peculiar situation as one of the reasons to change the dataset was to adhere for complexity, specificity and quality management.

Conclusions: In the paper the process to reach consensus on the episode based registration will be elaborated, It is a long way, but the direct link with the funding systems helps to create the path to the implementation of Electronic Health Records in clinical practice.

Conflict of interest: None disclosed.

Redesigning the DBC system in the Netherlands, background and context

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Introduction:

1. Sketch of the situation in the Netherlands

- 100 hospitals, budget for hospitals (based on a small number of parameters)
- Inefficiency, ageing and rising costs and a great need for innovation
- Government: create a free (liberal) health market. Possibility for entrants, with free market prices and competition on price and quality
- Therefore needed: DBC system

Methods:

2. Introduction DBC-system in 2005, characteristics, background and objectives

- Reason for the release DBC system;
  - Transparency (explanation of understanding),
  - Regulated liberalisation of the healthcare market, 10% free pricing with desire to 60-70% of free pricing
- Features of the DBC system; episode based, medical specialty based system, cost homogeneous but not medically recognizable; tariffs containing costs hospitals and fees doctors

Results:

3. First results, findings with the DBC system

- Too many chargeable products (40.000)

- Disadvantages speciality based approach (different descriptions and pricing for the same care)
- the healthcare products are cost homogeneous but not medically recognizable
- Conclusion: a renewed system is necessary for further liberalisation of the healthcare market

4. Features renewed DBC system

- mapping of DBC diagnosis on ICD-10 blocks, healthcare products independent of medical specialty
- Deduction based on activities of healthcare products, introduction grouper
- medically recognizable and cost homogeneous healthcare products
- still an episode based system

Conclusions:

5. Introduction of the renewed DBC-system, context and planning

- live on January 1, 2010
- Shadow run in 2009
- Grouper ready in October 2008
- liberalisation of healthcare market in 2010 to 50-70% of total turnover (€ 6-8.500.000.000)
- International context, DBC vs DRG
- Analysis of differences and similarities between both systems

Conflict of interest: None disclosed

DRG in the Czech Republic – advantage or impediment for interest groups?

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Introduction: First steps towards implementation of DRG as a means of reimbursements of health care provided by hospitals appeared in the Czech health system already in 1995, i. e. two years after the system's transformation. Within the pilot project operated by General Health Insurance Company, being the major on the Czech health insurance market, DRG started to be used by nineteen selected hospitals in the fourth quarter of 1997. However, these attempts have not led into broader implementation of DRG, but, by contrast, reimbursements based on lump-sum payments for hospitals have prevailed.

Since then, many proposals on potential utilization of DRG have appeared. Many of health sector participants regard the implementation of the DRG as not only the way how to make reimbursements for hospitals more efficient, but as a criterion for measuring the quality and effectiveness of health care as well. Technical and methodological support for the DRG application is provided by the National Referential Centre, operating as a joint platform of health insurance funds and associations of hospital providers since 2003.

The most essential issue discussed in the paper is, what (or who) is the key element determining the incomplete implementation of DRG as a main reimbursement mechanism, even despite launching a project of financing 5, respectively 10 % of health care provided in hospitals by DRG in 2004-5. Since 2006, the gradual deflection from DRG can be detected; and, at present, the DRG is used especially by health insurance funds for the purpose of controlling the case-mix of hospitals and thus adjusting the amount of lump-sum money.

The reasons of this development can be seen either in an insufficient amount of financial resources needed for the successful and complete DRG implementation or in missing health policy in this field, nevertheless, these are not necessarily the comprehensive list of potential reasons. The authors assume that failing DRG implementation might be better explained by studying the roles and positions of key interest groups (healthcare providers, health insurance funds, IT suppliers etc.) within the health sector. In other words, together with the DRG implementation, the rate of satisfying the interest groups should be considered as well. Therefore, the aim of the paper is to analyze the process of implementing DRG in the Czech Republic just from the interest groups' point of view.

Methods: The first part of the paper is dedicated to the analysis of relevant legislation and annual reports of health insurance funds and the reimbursement mechanisms are introduced briefly. In compliance with the aim of the paper, the most cardinal interest groups in Czech health sector and their reactions to the DRG implementation are subject to the analyses in next parts. The authors assume that once the interests of some group are not met, it has the power to block the usage of this means of reimbursements.

Results: The outcomes of this study are still in progress. However, the authors presume that even it is possible to identify the opponents of the DRG implementation (because of either the details of DRG classification or the propensity to preserve the status quo – the "zero-sum game"), there are no remarkably antagonistic interests regarding the DRG core principles within the key participants. Moreover, it can be supposed that just in the issues regarding the DRG it is possible to find a consensus which is cardinal for implementation of any changes in health sector.

Conclusions: Utilization of DRG in Czech health sector is a future challenge. It can be assumed, that the role of DRG will be rising either in reimbursements mechanisms or in assessing the quality of health care, providing for the possibility to compare the case-mix of single providers. From the analysis of the DRG implementation and the interests of key participants follows that the Czech health sector lacks a more significant support of every of key participants to not only the extending use of DRG but the further development of already existing system as well.

Conflict of interest: None disclosed.

Comparisons between outliers and inliers

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Introduction: Stockholm county council, Sweden, implemented DRGs as a base for reimbursement in the early '90s. We nowadays use the system for several purposes, e.g., benchmarking, quality, effects, and effiency.

Earlier, outliers were defined by length of stay. From 2003 a transformation to cost outliers began. At the same time our weight lists became more homogenous, both medically and economically for the inliers.

If a patient is not correctly coded with the right diagnosis, the patient might be assigned to a DRG with a different outlier threshold than the DRG that it should have been assigned to with correct coding. Serious consequences can occur by a erroneous DRG, i.e. wrong case-mix, wrong allocating and wrong reimbursement.

The main questions to answer in this session are:

- Are there – and if so, to which extent - among patients in both audit groups (cost outliers and inliers), cases that are incorrectly coded and therefore are defined as outliers or inliers, although they shouldn't have been?
- What are the consequences of an incorrect coding, i.e. in the case-mix description?
- Are the effects of a wrong code the same for all cases? Are the effects different in outliers and inliers?

Methods: In phase 1, a coding audit was performed of 277 records (randomly selected among all cost outliers) from Karolinska University Hospital in Stockholm. In phase 2 and 3, a medical audit was performed of these 277 records. In phase 4, an audit of inliers was performed to investigate if this group could be a reference to the other audits. 124 records were randomly selected for this.

Results: The results from phase 1 showed that 24% were assigned to another DRG after corrected coding; 19% to a DRG with a higher weight and higher outlier threshold, and 5% to a DRG with lower weight and lower outlier threshold. From phase 2 and 3 a review will be performed on a sample of the cases that after the coding audit still were outliers. Phase 4 results showed that 13% had the wrong main diagnosis, which lead to that 14.5% had the wrong DRG code.

Conclusions: In this session we will try to make some assumptions and conclusions about the whole audit project. We are going to answer the following questions:

- What actual assumptions can we make with the results from this study?
- What knowledge have the studies given us to use in the future when we perform more audits?
- How should we actually achieve a better quality in our primary and secondary classifications? Is this the way to go?

I presume that we all have different solutions to this issue. We struggle with all kind of data and want to be sure that the quality is the best or at least "good enough".

Conflict of interest: None disclosed.

Redesigning the Dutch DBC-system; towards increased transparency. A novel algorithm for DBC assignment

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Introduction: After the successful introduction of the Dutch Health Care system (DBC system) in January 2005, further development and improvement of the DBC-system was needed.

Unlike most DRG systems, the Dutch DBC system describes the total episode of care delivered in hospitals: so not only the inpatient care but also outpatient and day care.

Initially developed as a system with a local diagnosis classification for each medical specialty separately, the system required to be linked to international standards. By increasing the uniform use of diagnoses within the DBC-system, a better comparability with the international casemix systems is made possible.

Methods: The improved DBC-system will be introduced in 2010. This paper describes the design process including the grouping design tool, the grouping criteria, the clinical involvement and the methods for grouping and classifying data.

Results: During the conference the results of this major process of change will be presented. The focus in this paper is the description of the design process and DBC-Classification based on International Standards.

Conclusions: The first results of redesigning the DBC-system towards more transparency is promising.

Conflict of interest: None disclosed.

DRG-based clinical productivity reporting in university hospital setting

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Introduction: Helsinki and Uusimaa Hospital District (HUHD) constitutes of Helsinki University Central Hospital (HUCH) and of four smaller hospitals. It provides secondary and tertiary care to a population of 1.5 million. Current strategy aims at annual productivity increase of 2-3 percent. Strategy implementation requires - in addition to a concrete productivity improvement programme - relevant and implementable productivity indicators and information system to monitor productivity improvement.

Since the end of 1990's, HUHD has participated in a national productivity benchmarking program where productivity is expressed as weighted episodes/costs in a hospital and specialty. Usability of the benchmarking for hospital management is less than optimal due to time lags, reporting at specialty level only and lack of sufficient accuracy of allocation of total costs to cost centers responsible for service production. Therefore a more timeliness monitoring method for productivity was needed.

Methods: Method implemented in HUHD for monitoring clinical productivity is based on DRG grouping of patient encounters. The "full" version of NordDRG grouper is used which groups both "classic" inpatient and also outpatient encounters with extended clinical data content for e.g. non-surgical procedures and medication. Annually HUHD calculates average costs for both outpatient and inpatient NordDRG groups from actual per patient usage of intermediate products (nursing and medical services and supplies etc.). These average costs are used to calculate relative cost weights of each DRG group.

Patient encounter and intermediate product data is extracted from patient information systems on a continuous basis. In- and outpatient encounters are grouped using the NordDRG grouper. Multiplying the number of encounters within one DRG group by the corresponding DRG cost weight gives the measure of production within one DRG group (DRG points). Production for a clinical unit is obtained by totaling all DRG groups and their accumulated DRG points within specified time period. Production costs are the sum of intermediate product costs consumed by the unit within the specified time period. The average cost of a DRG point (total production costs/all DRG points) is used as a measure of the overall productivity. Correspondingly, number of DRG points per person-year is used as a measure of labour productivity.

Existing clinical data warehouse application is used for productivity reporting. Data warehouse is updated monthly from patient information, financial accounting and personnel IT-systems. Stationary html-reports and OLAP cubes are published in hospital intranet. Reporting includes trends and various comparisons of performance indicators.

Results: Labour productivity in the non-psychiatric specialties in HUCH improved 1.7 per cent (range from 0.1 to 2.9 per cent) in the period from January to May 2008 as compared to the previous year. Average non-deflated cost of a DRG point increased in HUCH from 584 euro to 610 euro (4.4 per cent increase). Decrease in overall productivity for the Department of Medicine was 3.6 per cent, 4.0 per cent for the Department of Surgery, and 6.8 per cent for the Department of Gynaecology and Paediatrics. The Finnish hospital cost index for this period grew roughly 4 per cent, mainly due to due to wage increases. Thus, even after taking into account growth of input costs, overall productivity shows a slight deterioration and also displays significant variation between clinical units.

Conclusions: DRG-based productivity reporting in HUHD gives monthly feedback about trends in overall and labour productivity. Productivity can be compared between successive years despite continuous shift towards ambulatory treatment since the system makes the inpatient and outpatient production comparable in terms of productivity. Early results show that productivity reporting may be used as an early warning system about unwanted trends and may be used by the hospital management as an initial analysis tool for corrective actions.

Several improvement areas have already been identified. Immediate actions include better integration to general ledger and payroll systems. Adding new structured items in the patient information systems and in the clinical data warehouse will increase accuracy of productivity reporting. Methods for collecting more accurate data about per patient nurse and physician work time already exist and will be incorporated in the system. NordDRG definitions also need further development especially in the outpatient area.

Conflict of interest: Esa-Matti Tolppanen – Stock ownership.

PRE-CONFERENCE WORSHOPS

Statistical methods with applications to DRG analysis

Presenters: Prof. Walter Sermeus (Center for Health Services & Nursing Research, Leuven University, Belgium) and Prof. Jason Sutherland (Center for Health Policy Research and Reform, Dartmouth College)

Introduction

This workshop is relevant to professionals who routinely analyze data from case mix classification systems, such as DRG. The properties of the most common statistical methods will be discussed, assumptions explored, and alternatives debated. This workshop will provide a thorough grounding in the statistical methods used for DRG analyses and will review methods used.

This workshop is intended for quantitative professionals with experience analyzing data with some background in statistical methodology. All conference participants are welcome, though the material will be directed towards methodology.

1) Introduction to DRG analyses

Through the use of examples, sources of variability in medical practice will be linked to DRG cost and LOS analyses. Characteristics of summary statistics will be reviewed, including common measures of location and spread. The properties of the mathematical average are compared to most robust measures of location.

2) Trimpoint Definition and Outlier Identification

In DRG analyses, determination of inliers and outliers is an important consideration of statistical analyses. Advanced measures of DRG analyses are discussed with practical examples.

Model performance is an important objective when comparing classification systems. Common measures include R2 and MSE are sensitive to the definition of DRG trimpoints. This section will review outlier identification methods used by various countries and their resultant economic incentives.

3) Cost Modelling and Cost Weight Calculation

The distribution of patient costs (and LOS) within DRG is most often right-skewed. The most common approach is to log-transform cost and apply linear models. The statistical properties of this technique are investigated and results discussed. Alternative strategies are explored. Cost weights (and tariff levels) represent ratios of expected costs; the properties of the ratio estimate are developed and adjustments are proposed with examples.

- Log Transformations and Model Performance
- Other Non-linear Transformation Methods
- Cost Weight Calculation and the Ratio Estimator

Multivariate analyses are commonly used to model costs. Linear regression, weighted regression and non-linear models are explained, including error distributions and alternatives for link functions. Bayesian models are explored for incorporating prior information into cost modeling.

Cost weight calculation involves controlling for facility (hospital) level effects. We explore various alternatives, such as using fixed effects, random effects and the hospital specific relative value (HSRV) method.

Cost weights are point estimates; estimates of cost weight variability are rarely presented. Methods for variance calculation are discussed, including parametric and bootstrap estimates.

There are countries where the cost data is sparse or of poor quality. We discuss alternatives for developing cost weights in this environment, including use of proxies and assessing fitness of use of data from other countries.

4) Robust Estimators

Parametric models are often applied to analyzing DRG data. Since DRG data often fails the underlying assumptions, such as normality, robust estimators provide an alternative methodology. Different types of robust estimators are explored and their impact on measures of location discussed in the context of specific DRG examples. This section will also include data envelope analysis (extreme point method) in the context of efficiency measurement and will introduce robust regression.

5) DRG and Survival Analysis Methods

Length of stay data are typical time-to-event data. Common methods for time-to-event data are introduced, such as the Kaplan-Meier estimator and the proportional hazards model. There are situations, such as when patients are transferred or deaths, when patient data should be treated as censored data. The most common methods for analyzing censored data are discussed in the context of DRG analyses and their relative effects discussed.

6) Design Considerations for Case Mix Classification Development

Many countries have developed adaptations of DRG to suit local needs and priorities. However, methods for designing case mix systems employ a variety of statistical methods:

- Incorporating clinical input into case mix system design
- Criteria in developing grouper
- Considerations for data inclusion/exclusions
- Validation samples methods
- Statistical methods to assist in developing grouper cells (decision tree software, mixture distributions)
- Use of length of stay in the absence of cost data

Duration: All day

A smooth introduction to case mix for new comers

Facilitator: Jean-Marie Rodrigues

Presenters: Dana Burduja, Terri Jackson and Jean-Marie Rodrigues

Goal: To give to new comers a basic knowledge of case mix and to inform them how to go further if they need

Program

1. Introduction and Basic Principles (Jean-Marie Rodrigues – 20 minutes)

2. Overview of Case mix implementations in the world (Dana Burduja – 30 minutes)

3. Case mix and quality of Care (Terri Jackson – 30 minutes)

4. The topics of a week Summer School (Jean-Marie Rodrigues – 10 minutes)

5. Discussions all 30 minutes

Duration: 2 hours

Presenters' Biographies

• Jean-Marie Rodrigues

Jean Marie Rodrigues is Professor of Public Health and Medical Informatics in Saint Etienne Medical School. He has worked extensively on the health information system. He was during five years (1982-1986) DRG project director and later on (1988-1994) strategic adviser of the Smart Card Department within the French department of health. He is presently member of scientific committees on DRG's, ICD 10 and surgical procedures in France. He has been involved in several European projects on case mix, health services research and clinical terminology. He is presently the editor in charge of maintaining 3 European standards including one on surgical procedures coding systems within the European standardisation body CEN, member of a EU funded roadmap for semantic interoperability (Semantic HEALTH) and of an emerging WHO network on clinical terminology.

• Dana Burduja

Dana Burduja is Program Director at the Centre for Health Policies and Services (CHPS) in Bucharest since September 2005; and an associate lecturer at the National School of Public Health from Bucharest. She is also serving at the moment as a long term international consultant for the projects related to the Infrastructure Development for Health Financing Reform in Turkey (after Bulgaria and Albania). Dr. Burduja has been the Project Coordinator for the Romanian National DRG project during 2000-2003.

• Terri Jackson

Dr Terri Jackson is an Associate Professor with the Australian Centre for Economic Research on Health at the University of Queensland (ACERH UQ). Her major research interests focus on issues of technical efficiency in the provision of hospital-based care and in funding systems which make use of casemix adjustment. She is currently undertaking studies of the costs and outcomes of adverse events in hospital care.

Improving data quality through national benchmarking

Presenters: Howard Davis (PbR Benchmarking Manager), James Peskett (PbR Policy Manager), Peter Saunders (Head of PbR Assurance) - Audit Commission (Health) – United Kingdom

Program

1. Introduction to the Assurance Framework (15 mins)
2. The goals of the benchmarking (15 mins)
3. The methodology (30 mins)
4. Outputs (30 mins)
5. Challenges (15 mins)
6. Outcomes and benefits (15 mins)
7. Q&A (15 mins)

Goals of the workshop: To share learning from the benchmarking aspects of the Payment by Results Data Assurance Framework:

- The process itself - identifying anomalous areas, handling large datasets, developing reputable indicators
- Operational issues - national data quality, delivering to tight timescales, managing relationships with other national bodies
- Policy - working within the context of a national framework, realising the benefits of the benchmarking, engaging the NHS

Duration: 2 hours 30 minutes

Coding & case mix distance learning

Goals of the Workshop: To have attendees leave the workshop with ideas on how to implement case mix in their country, and a method for overcoming language and other problems that can be aided by distance learning and web resources.

What: Focus is on the need for distance learning for the 2nd, 3rd, and 4th world setting for case mix installation, coding training, and coding application in non major language settings.

Why: To assist 2nd, 3rd, and 4th world health care managers and administrators in a low cost method for starting implementation with a discussion of needs, requirements, pitfalls & potentials.

Who Should Attend: Any individuals interested in installing Casemix systems in their national health system setting, or develop a method for overcoming the problems of coder shortage and on line training for coders, as well as reference for coding questions and disputes.

Chairman: Dr. Syed Aljunid (MD, PhD, UNU-International Institute For Global Health, Professor of Health Economics and Consultant in Case Mix, Malaysia)

Moderator: Jacob Hofdijk

Presenters: Dr. Syed M. Aljunid (MD, PhD, UNU-International Institute For Global Health, Professor of Health Economics and Consultant in Case Mix, Malaysia), Dr. Alicia Ferreira (MD, Ministry of Health, Uruguay. Health Care Management and Health Information Systems), Dr. Shahram Ghaffari (MD, PhD, Consultant Case Mix Methods and Hospital Manager), Mr. Kevin Ratcliffe (RN, MBA, Ministry of Health Tasmania, Australia and project manager designee in Mid East Health Case Mix Project), Mr. Thomas Schongalla (BS, MBA, Health Policy Analyst, Case Mix Expert & Health Economist)

Program

1. Introduction of Workshop Panel Members & Discussants (Thomas Schongalla)
2. Capacity Building in Implementation of Case-Mix System in Developing Countries: Role of UNU-IIGH (Syed Aljunid)
3. Practical problems in installing case mix and coding training in 2nd, 3rd, and 4th world settings (Alicia Ferreira and Shahram Ghaffari)
4. Experience with installing case mix in Tasmania and requirements for installing in new non English speaking setting (Kevin Ratcliffe)

5. Overcoming language barriers in Coding of Diagnosis and Procedures and Use of Public Domain Software: A life focus of Romania, Uruguay, Mongolia, and Andhra Pradesh (Thomas G. Schongalla)
6. Discussion of presentations by panelists.
7. Response and Discussion to questions presented by Workshop attendees.

Duration: 2 hours 30 minutes

Groupers, groupers everywhere…

Presenters: Gareth Dear and Peter Broughton (Senior Information Design Consultants, The NHS Information Centre for Health & Social Care, United Kingdom)

Introduction: Currently within England, several different grouper software applications are produced; each has a slightly different purpose, ranging from collection of costs for a particular patient event, through to local payment. Significant resources are required to develop and maintain these groupers which are provided free-of-charge to all hospitals and healthcare commissioners in England.

Aims: This workshop aims primarily to:

- Explore the need for different groupers for different purposes;
- Assess the development cycle and timescales required;
- Discuss the continuing maintenance and support role required during the groupers cycle;
- Discuss our experiences of working with a software developer.

The workshop will also investigate how grouper output can be used to help improve data quality through the use of data validation.

Learning outcomes: Lessons learned in England will be shared, and attendees will be invited to participate in an open-floor discussion to compare international experiences in this area.

By the end of the workshop, delegates will have a shared understanding of the various grouper requirements, grouper software development cycle and customer support provided by The NHS Information Centre's Casemix Service to the wider English National Health Service. They will also gain knowledge and share best practice of grouper software development in the countries of other workshop participants.

Duration: 2 hours 30 minutes

Exploring case mix applications beyond the hospital stay

Presenters: Dr. Karen Kinder Siemens, Stephen Sutch, Dr. Paulo Boto

Aims: The advantages that case mix offers toward more efficient management of patient care are not restricted to the hospital setting. As has been demonstrated in both public and private healthcare systems around the globe, case mix applications contribute to improved delivery across the entire health care system. These include the ability to:

- Predict high-risk users for inclusion in care management
- Determine government- or employer-budgeted payment to health plans
- Allocate resources across regions, clinics or programs
- Set capitation payments for provider groups
- Evaluate access to care Assess the efficiency of provider practices

The aim of this workshop is to provide an insight into the numerous applications of case-mix in the ambulatory health care sector, from integrated care networks to primary care clinics and, finally at the individual provider level.

Methods/Schedule: The Workshop will open with an introductory presentation on the numerous applications of case mix within the integrated and ambulatory care sectors. Following a coffee break, the workshop would be divided into groups to discuss real world scenarios demonstrating three applications:

- Population Management /Resource Allocation / Population profiling
- Performance Management / Provider profiling
- Case Management / Patient Identification

The workshop would conclude with a plenary session which would summarize the take home messages of the groups and include a discussion on the future of ambulatory case-mix.

Presentations: Examples of case-mix applications will demonstrate the results of studies from several countries, including Spain, Sweden, Malaysia, the UK and the US.

Audience: The workshop is intended for policy decision makers, payer organizations, health care managers, health care consultants, and all those interested in improving the delivery of primary care.

Duration: 2 hours 30 minutes

Case Mix and Clinics – From case mix to clinical applications

Organizers and Presenters: Michael Wilke, Carlos Elvira, Maria Angeles Gogorcena, Henrique Martins, Marc Berlinguet

Goal: To find out, which added value for clinical work and for the measurement of quality in healthcare systems can be drawn out of CaseMix – routine data.

Aims of the workshop

1. Presentations on the use of CaseMix data in clinical contexts
2. Background information on existing methods of quality evaluation in healthcare
3. Collaborative discussion
4. Creating inspiration for the participants
5. Possibilities for international collaboration

Workshop presentation: We would like to conduct a workshop open to participants from all countries and learn from examples as well as discussing the ifs and odds of the issue.

The following topics should be reflected:

- Extending the benefits of CaseMix data
    - Quality indicators (AHRQ, OECD, others)
    - Prevalence or incidence statistics drawn out of the data
    - Morbidity and mortality reporting
    - Quality indicators as quality of coding
    - Linking inpatient and outpatient data to create “pathways” or “episodes of care”
- Chances and limitations
    - Are the allegations among clinical researchers real limitations or is it a question of communication culture?
    - What could be done to promote the multidisciplinary use of the data?
- International implications
    - Where do we have data that could be used even for international comparisons?
    - The experience of a Ministry of Health: health indicators of CaseMix data

Workshop presentation:

14:00 Opening, introduction – Michael Wilke

14:10 Introduction & expectations

14:30 Theme 1: Quality Indicators – Marc Berlinguet

14:55 Theme 2: The use of indicators for a National Health Service – Maria Gogorcena

15:20 Theme 3: Ucoding infections – Michael Wilke

15:45 Coffee break

16:00 Theme 4: Linking Patient Classification (PC) and Clinical Practice (CP) – Henrique Martins

16:25 Theme 5: Practical experience applied to a hospital - Carlos Elvira

16:50 Discussion & wrap-up

17:00 The End

Background to each theme:

Theme 1: Quality Indicators

"The limitation of administrative data sets are the classifications used that do not incorporate all the meaning of say the lab and imaging results, and the sheer fact of secondary coding from medical charts and abstracts. However, many clinical quality indicators can still be documented, Hence outcome quality indicators like the risk of mortality, potentially preventable complications (*) and potentially preventable readmissions can be derived, These and other quality indicators proposed the Agency For Health Research and Quality (AHRQ) in USA and the OECD can be generated and be useful for clinical applications and future research. "

(*)Especially when the notion of Present on Admission (POA-now mandated for documentation by CMS in USA) is available.

Theme 2: The use of indicators for a National Health Service

From Minimun Basic Data Set and CaseMix, the Ministry of Health of Spain has designed a system of analysis based on indicators to know the operation of hospitals in different regions of the country. Knowing how the casemix and the availability of standards for hospitals compared allows advance the indicivual own analysis of each hospital

Theme 3: Uncoding infections

In many countries vast data collections are existing, which all – more or less – are containing coded patient informations. These data collections are mainly used for administrative purposes especially in the CaseMix settings they are used for funding, reimbursement, planning, etc. On the other hand the data contain – at least if the respective country is 'mature' in CaseMix – multitudes of clinical and medical information. In some countries even medication information (using ATC-codes) such as France or the U.S. are collected and stored.

Surprisingly enough there are comparatively few publications that are using these data collections to reflect on clinical research questions on a broader basis than e.g. in the own hospital settings. About the reasons can only be speculated, a common allegation – at least among clinical researchers – is that the data quality is not eligible for clinical research as it was collected for 'administrative' purposes.

On the other hand vast data collections are waiting to be exploited and years of workpower for extra double or triple data acquisition for various purposes could be saved.

Theme 4: Linking Patient Classification (PC) and Clinical Practice (CP)

Patient classification (PC) is often looked down by clinicians. It is frequently perceived as an unnecessary activity of health organizations or worst as something to do with management or finance services only. This lack of interest is sometimes accompanied by a lack of collaboration in implementation and development of better systems. Likewise, clinical practice (CP) is often misinterpreted by the people involved in classification systems that should represent it. This means CP may be perhaps oversimplified, or worst misrepresented with implications for adequate funding and sometimes acting as a disincentive mechanism for certain specialities or procedures. Thus, there is in fact a PC-CP gap. This would likely need to be closed if both areas are to benefit from further improvements in the future. Both management areas of complexity and system thinking as well as information system use and knowledge management are likely to be helpful when trying to address this issue.

This theme with try to explore the dynamics between patient classification systems (existent or new) and clinical practice (current and desirable), while introducing concepts from complexity theory and human resource management potentially useful in the approximation of PC and CP.

Theme 5: Practical experience applied to a hospital…

It is customary to use the casemix as an element of support for funding and as a tool for comparison and analysis of clinical practice in terms of efficiency (compared to average stays for example). But analysis of casemix allows other perspectives oriented quality of clinical practice or to obtain information to provide value to assistance. Here are some examples from the experience of a hospital in his introduction.

Audience: Intended preferably to: clinicians dealing with CaseMix; b) IT – experts; c) CaseMix economists; d) Clinical coding staff. Ideally participants should be knowledgeable of their respective local CaseMix System; have some clinical background. Have some knowledge of data structures and content that is today mainly used for CaseMix

Duration: 2 hours 30 minutes

Presenters' Biographies

- **Dr. med. Michael Wilke, Dr. Wilke GmbH – inspiring.health, Munich, Germany**
    - CEO of Dr. Wilke GmbH – inspiring.health since 04/2007
    - Business Manager at Ramboll Management 2005 – 03/2007
    - Head of DRG Competence Center, Munich Schwabing hospital, 2001-2004
    - Clinical work as surgeon, intensive care and emergency physician 1994 – 2001

- Member of PCS/I since 2001
- Member of CaseMix advisory committee in the German ministry of health, 2002-2004
- Member of the German Association of Medical Controllers

- **Dr. Carlos Elvira, MD**
  - Chief of the Admissions and Health Information Service, Hospital Universitario San Carlos de Madrid, Spain
- **Henrique MG Martins, MD, PhD (Management Studies)**
  - Assistant Professor, Faculty of Health Sciences, UBI, Portugal
  - Internal Medicine resident, Serviço de Medicina I, HFF, Portugal
- **Marc Berlinguet, MD., MPH**
  - International Medical Manager, I.B.U., 3M Health Information Systems, 100 Barnes Road, Wallingford, CT, USA 06492
- **Maria Angeles Gogorcena, MD**
  - Technical consultant, Institute for Health Information, Spanish Ministry of Health

Episode, go with workflow

Presenters Jacob Hofdijk (Public Health, Ministry of Health, The Hague, Netherlands), Caroline Hyden (Ortopedkliniken Karlshamn/Karlskrona, Blekingesjukhuset, Karlshamn, Sweden), François Mennerat (European Institute for Health Records , Paris, France)

Introduction: The development of the next version of the CEN standard for Episode of Care has reached new dimensions, and will be discussed in a special workshop, Go with the Flow Part 2.

Methods: The importance of integrated care delivery is growing, the CEN CONTSYS standard for the continuity of care has developed new concepts which we want to discuss at the level of the PCSI community.

Results: Assessment of the Episode and Workflow concepts important for the further development of the standard.

Duration: 2 hours 30 minutes

LIST OF AUTHORS