PATIENT CLASSIFICATION SYSTEMS INTERNATIONAL

23rd PCSI WORKING CONFERENCE

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3M HIS – Health Information Systems

This Conference

In 2007 the 23rd Patient Classification Systems International (PCSI) Conference is held in Venice, Italy. This Conference is the largest international conference on Casemix and on Health Service Evaluation, both from an economic /managerial and from a clinical point of view.

All over the world, PATIENT CLASSIFICATION SYSTEMS are used for financing, clinical management, planning, budgeting, evaluation and control purposes in hospitals and in other health care services. In a growing number of countries reforms based on PATIENT CLASSIFICATION SYSTEMS have been implemented. In others, governments and health research institutions are still evaluating and experimenting with their possible use.

The Conference provides an ideal, international forum for discussion and dialogue among managers, doctors, academics, researchers, practitioners, policy-makers and so on.

About 350 people are attending, coming from 36 countries belonging to seven continents, and this is a record for a PCSI Conference.

Welcome to the 23rd PCSI International Working Conference.

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Plenary 1

Continuity of Care: How to Measure it?

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In recent years we have seen a great change in Epidemiology, from the prevalence of acute diseases to the prevalence of chronic diseases (diabetes, ischemic heart diseases, cancer, etc…), which need care for long periods of time, by different specialists and structures. This transformation has important impacts on planning, quality of care and costs. One study[1] showed that during one year Medicare beneficiaries with five or more chronic conditions took an average of 48 prescriptions, saw 15 different doctors and received almost 16 in-home health visits. Professionals usually think that continuity of care may have positive effects on this kind of problem.

In this paper I will try to clarify any concept about what is continuity of care and how we can measure it. Continuity is frequently related to different principles such as: the adequate accessibility to care for patients, good interpersonal skills of health professionals, good information flow between providers and organizations, good care coordination between providers and organizations, good care coordination between providers to maintain consistency, etc…

A recent revision of scientific literature on this topic[2] provides many definitions of continuity, enough to fill up seventeen pages. At the end of this revision the authors were able to summarize continuity into three definitions:

- Informational Continuity: Information on prior events is used to give care, which is appropriate to the patient's current circumstance.
- Relational Continuity: Recognizes the importance of the patient's knowledge as a person; an on-going relationship between patients and providers. This is the under girding that connects care over time and bridges discontinuous events.
- Management Continuity: Ensures that care received from different providers is connected in a coherent way. Management Continuity is usually focused on specific, and often times chronic health problems.

Measures of Informational Continuity are related to the availability of documentation. It is also related to the completeness of information transfer between providers, and to the extent in which existing information is acknowledged or used by providers and patients. This kind of

continuity has had increasing development in recent years, but is usually focused on specific conditions (specific problems and episodes of care), using tools like electronic medical records, telemedicine and links between different databases, for information transfer.

Relational Continuity is usually measured by using either the affiliation between patient and provider, or how long their relationship has lasted as a proxy for continuity. This is the kind of continuity which has more impact on the patient's satisfaction, and is typically used in Primary Care Systems and Mental Health Care Systems. The usual method of measurement is the degree in which a patient's care is handled with certain providers. The assumption is that if the enduring contact with a single provider is linked with stronger relationships, that there will be better information transfer, reception of information, and consistent management. However there is little evidence supporting these assumptions, and new research is needed before chronological measures can be used as indicators of continuity care.

The measures of Management Continuity are focused on the delivery of care in the continuum of the management plan. It is most common when follow-up visits are made when care crosses organizational boundaries. Adherence to key parts of disease-specific protocols appear to be an appropriate way to measure this type of continuity, but it needs to develop measurements which are able to monitor pathways during transition of care from one setting or service to another. In this approach 'Disease Management' is the most common tool. Process indicators are usually used in assessing the efficiency of programs. An intrinsic advantage of process indicators is that they are simpler than outcome indicators when assessing quality of care and are easier to evaluate. Process indicators are frequently considered a direct measure of quality of care, but this assumption may be of value only if a robust link to patient outcome has been demonstrated, and this does not frequently occur.

Different causes may impact all kinds of continuity such as:

- The fragmentation of knowledge and skills
- The prevalence of chronic or long-term diseases
- A low-level of communication between professionals, settings, structures, etc…
- Systems which are more focused on professionals and procedures rather than on patients and pathways.
- Inadequate information systems

Most Professionals and patients consider continuity of care to be an important value, but there is not enough evidence to support if and when continuity has a positive impact on outcomes. In a recent paper, Cabana et al. [3] tried to verify the impact of sustained continuity of care on the outcome, and they were able to conclude that "increased sustained continuity of care has not had any negative effects on quality of care."

Despite the importance of "how to measure continuity", there have only been a few number of experiences[2] on this topic (4% of studies on continuity which are focused on measures.), and these experiences have presented many problems. Some of the problems include:

- Most of the measures were developed to examine a single aspect of continuity in a single context
- Many measures are indirect and use indicators of process
- Lack of tools to examine continuity across different care settings or professional groups
- Measures are commonly focused on chronological aspects (the frequency and duration of contacts, the concentration of care, and the sequencing of care)

From the system's point of view, we need tools which are able to monitor not only single kinds of patients, but that are useful for general and frequent problems. This approach usually requires the use if administrative databases, but for continuity we have to consider some condition:

- The presence of accepted and used clinical pathways
- Pathway has identifiable and significant phases
- Informational systems have data related to chosen phases
- The possibility to recognize phase and times

Of course analysis of data is limited by their quality, completeness, accessibility, so we also have to consider that continuity is frequently being measured between different structures and settings. As a result the feasibility of links between different databases becomes and important aspect.

In conclusion, when we consider Continuity of Care, we need to consider two things:

- To agree on what continuity is in our analysis (Informational, Relational and Management)
- If we have enough useful databases or reliable links to support our analysis

Another problem which is related to the proper use of these analyses of data, as Iezzoni stated[4] "Administrative data are useful as a screening tool in identifying quality problems and targeting areas that might require in-depth investigation." Thus we have to remember that an indicator is only a piece of information, not a judgement.

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Case Mix, Primary Care, and 'Specialty Care'

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Co-and Multimorbidity—properly designated as 'morbidity burden'-- are increasing challenges for health services systems. Neither morbidity nor co-morbidity is randomly distributed in the population—a result of the multitude of interacting influences on health. It is critical that both those interested in the health of populations and those involved in managing or delivering clinical care understand how to characterize morbidity burden for the purposes of planning appropriate services. This paper reviews the evidence on the impact of multimorbidity and on its impact on health services use, with special focus on patterns of primary care and other specialist services, using a 'case-mix system (ACGs) designed specifically to characterize morbidity burden. The findings have implications for the balance between primary care and specialist resources, quality of care considerations, monitoring of adverse events, and reductions of inequity in health care and in health.

Session 1

Financing and pay for performance

Hospital payment systems redesign based on pay for performance – CMS and general policy initiatives

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3M Health Information Systems

Pay for performance is often spoken about but unfortunately little is implemented in practice that leads to increased value (outcomes quality/ payment). This situation is beginning to change in the USA. Many of the CMS efforts are predicated on the recent development of the MS-DRGs, a new inpatient classification system focused on the Medicare (over 65) population.

Under virtually all existing hospital payment systems, a failure in the quality of care results in higher payments to hospitals. This is a fundamental flaw in our hospital payment structure that, in effect, financially rewards poor quality of care. In the Deficit Reduction Act (DEFRA) of 2005, Congress took a first step toward addressing this flaw. DEFRA requires Medicare to select at least two types of post admission infections and to no longer allow the presence of those infections to increase hospital payment. CMS has responded by proposing a limited set of initiatives largely revolving around process of care measures but also including a small number of hospital complications and possible future initiatives.

These above initiatives are a positive first step towards pay for performance, but extremely limited in scope. A much more comprehensive reform of the payment system is critically needed.

Two of the most costly consequences of poor quality of care are inpatient complications and hospital readmissions. For example, a major inpatient complication on average doubles the cost of hospitalization and triples the risk of patient mortality. New technology has been developed for identifying potentially preventable inpatient complications (PPCs) and potentially preventable hospital readmissions (PPRs). The availability of these technologies can provide the basis for a more comprehensive pay for performance reform of the hospital payment system.

A pay for performance reform of the hospital payment system will provide hospitals with the financial incentive to reduce inpatient complications and hospital readmissions, costing annually tens of billions of dollars in USA alone.

The financial incentive in such a payment system reform will require hospitals to develop processes and information technology infrastructure to facilitate the prevention of inpatient complications and hospital readmissions. The Clinical Research

group at 3M HIS has a contract with CMS for work on many of these activities pertaining to the development and simulation of inpatient classification system. A redesigned payment system and the provision of comparative performance data to hospitals can provide the basis for simultaneously improving the quality of care and reducing health care cost and expenditures.

P4P in Australia – Queensland's New Clinical Practice Improvement

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Following a high profile scandal relating to quality and safety of care, the health authority in the Australian state of Queensland is introducing a pay for payment (P4P) component into its new hospital prospective payment system. P4P will include both pay for reporting to collect additional clinical data and payment for adherence to key clinical process makers. This paper describes the model used to choose conditions amenable to use in a P4P system, together with detail of the indicators used for payment.

The Dutch shift from Budgeting to Contracting based on DBCs

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Introduction: The reform of the Dutch Health Care system started formally in the year 2000 as the Ministry of health gave the CTG (now NZA) the commission to prepare the introduction of the DBC funding of Dutch hospitals. After the successful DBC2003 project DBC's were nationally used for hospital funding as of 2005, while 10% of the hospital production was already contracted between hospitals and health insurers. In the meantime steps have been prepared by the Ministry of Health to further introduce the DBC system as a tool for liberalization of the health market. All of the stakeholders which have supported the introduction of a replacement of the "old" budgeting system were still in favor of the next step in the process of DBC introduction, although they were aware of the immense consequences of the steps to the existing health care system. The current budgeting system with its assurance of getting historical based budgets both for the hospital and the clinicians was to be replaced by a contracting system, in which for nearly 90% of all care which can be planned???. The introduction of the new system is prepared by the so called "Health Maintenance parties", the organizations responsible for three dimensions of the health care system :

1. the NZA is responsible for a properly working health "market",
2. The Health Care Insurance Board manages the basket of insured health care interventions,
3. DBC Onderhoud, the Dutch Case Mix office responsible for the tools to measure health care services by the development and maintenance of the DBC classification systems.

To achieve this shift two major projects have been initiated:

1. The liberalization of the health care market by shifting the funding of hospitals by budgeting to DBC contracting.
2. The further development of the DBC system towards a DBC classification based on International Standards.

In the paper these developments which have been initiated last year and will take until 2012 to be finalized will be further introduced. The first results of these major processes of change will be presented during the conference, as the process is already set in motion and can be of interest for other countries. The focus of the new system to contract health care on both price and quality is a major incentive for an interesting and worthwhile process of change of the system and the professional behaviour of all stakeholders.

Session 2

Coding and Case Mix Adjustment

Planning coding audits: sample size determination

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In most countries where hospitals are financed by Diagnosis Related Groups (DRGs) coding audits are conducted in order to verify that the casemix reported to the insurers and health care authorities reflect the true severity of the cases treated in acute care facilities.

The basic principle of these audits is to select patient records and compare the diagnosis and procedure codes assigned by the coders of a given hospital with the codes assigned by the auditors working for an independent organization.

Since coding audits are generally performed on a sample of patient records, statistical methods must be used in order to determine the precision (e.g., confidence intervals) of the sample estimates. Moreover, the sample size depends on the desired precision.

This paper describes the statistical method used in a coding audit of about four thousand medical records from hospitals in the western part of Switzerland.

The first step was to define how coding errors would be measured. There are three possibilities:

- to observe the differences between the codes registered by the coders of each hospital and the codes assigned by the auditors;
- to oberve the differences in the DRGs in which cases are classified before and after the audit;
- to observe the differences in the cost-weights of the DRGs in which cases are classified before and after the audit.

It was decided that coding errors would be measured in the three ways mentioned above. The sample size was determined in order to satisfy the following condition: if the difference in the casemix index of a hospital (i.e. total casemix divided by number of cases) calculated before and after the audit is larger than 0.05, there is a 95% chance to detect such a difference. Upcoding was thus operationally defined as a 5% probability that the difference between the true and the reported casemix index of a hospital is larger than 0.05.

For each hospital, the condition is approximately satisfied when the sample size equals $\{[1536.64*v / (1 + 1536.64*v/N)] + 0.5\}$, where: N = number of cases eligible for the audit (population size); v = variance of the cost-weights differences before and after the audit (v must be estimated from the results of previous audits or set to 0.5 when no information is available).

The reliability of this computation has been tested with the help of a simulation study.

Examples of the use of this formula will be presented, including calculation of confidence intervals and assessment of potential upcoding or downcoding.

Estimating the hospital costs of diseases and the impact of under reporting of diagnoses in hospital data from Australia and Chile

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Current episode based funding models using DRGs are based upon assigning a principle diagnosis to each patient episode. The principle diagnosis, along with the most significant procedure, is then used as the basis for classifying the patient into a family of DRGs (adjacent DRGs). Secondary diagnoses are then used to allocate a patient to a complication level within the DRG family. DRG costing approaches are based upon the allocation of costs to each DRG, patient or patient day. Costs represent the costs of treating a patient with a given principle diagnosis, not the costs of treating an individual disease per sec.

An alternative approach to DRGs, as used in the Dutch casemix system, is to classify the various diagnoses reported by a patient and to sum the overall effect. This approach does not rely on the allocation of a principal diagnosis. However costing individual diseases is a difficult and not routinely supported by current costing methodologies. The approach is further confounded in many systems by an inadequate reporting of diagnoses within the electronically captured data. Many countries only report one or two diagnoses, making cost allocation and reimbursement based upon multiple diagnoses problematic.

In the 1970s DRGs were initially designed to describe acute care, for which a principle diagnosis was relatively easy to define and determine. At that time it was recognized the concept of a principle diagnosis did not readily apply for longer term care. Consequently, DRGs have not been routinely applied to describe extended care or for developing capitation funding models. Over recent times the appropriateness of DRG based funding models for funding chronic care has become increasingly questioned. Alternative products, such as 3Ms Clinical Risk Groups (CRGs) and DxCGs Diagnosis Cost Groups (DCGs) and their associated Hierarchical Condition Categories (HCCs), have been developed to better describe the costs associated with specific conditions, especially over time.

This paper assesses the possibility of using HCCS to describe the costs of individual episodes of hospital care. Cost data from the State of Victoria in Australia and charge data from Chile are used to develop estimates of costs/charges for each HCC using standard linear regression techniques. The estimated costs/charges for each HCC are then aggregated back to the patient level and compared against actual costs/charges. The ability of this approach to identify the highest cost patients is examined.

In Chile only one or two diagnoses per episode are typically reported, while in Victoria over 40 diagnoses can be reported for each episode. The effects of restricting the numbers of diagnoses on the usefulness of HCC in describing costs/charges is explored by comparing the results for Chile, Victoria and Victorian data modified to exclude more than one or two diagnoses.

The risk of upcoding in casemix systems: a comparitive study

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With the introduction of a diagnosis related group (DRG) classification system, in the Netherlands in 2005 it has become relevant to investigate the risk of upcoding. The problem of upcoding in the US casemix system is substantial. In 2004, the US Centres for Medicare and Medicaid estimated that the total number of improper Medicare payments for the Prospective Payment system for acute inpatient care (both short term and long term) amounted to $ 4.8 billion (5.2%).

By comparing the casemix systems in the US, Australian and Dutch healthcare systems, this article illustrates why certain casemix systems are more open to the risk of upcoding than other systems. This study identifies various market, control and casemix characteristics determining the weaknesses of a casemix reimbursement system to upcoding.

It can be concluded that fewer opportunities for upcoding occur in casemix systems that do not allow for-profit ownership and in which the coders salary does not depend on the outcome of the classification process. In addition, casemix systems in which the first point in time of registration is at the beginning of the care process and in which there are a limited number of occasions to alter the registration are less vulnerable to the risk of upcoding. Finally, the risk of upcoding is smaller in casemix systems that use classification criteria that are medically meaningful and aligned with clinical practice.

Comparing the US, Australian and Dutch systems the following conclusions can be drawn. Given the combined occurrences of for-profit hospitals and the use of the secondary diagnosis criterion to classify DRGs, the US casemix system tends to be more open to upcoding than the Australian system. The strength of the Dutch system is related to the detailed classification scheme, using medically meaningful classification criteria. Nevertheless, the detailed classification scheme also causes a weakness, because of its increased complexity compared with the US and Australian system. It is recommended that researchers and policy makers carefully consider all relevant market, control and casemix characteristics when developing and restructuring casemix reimbursement systems.

Quality Data Through International Training and Certification - A Status Report of the WHO-FIC - IFHRO Program

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Aims: Good quality, comparable data are needed to underpin management of health services and programs. High-quality data can also help best allocate scarce resources and get value for money from the health system. Two years ago at the PCSI conference, the ICD-10 international training and certification program for coders was described. This program is a joint effort of the WHO Family of International Classifications (WHO-FIC) Network Education Committee (EC) and the International Federation of Health Records Organizations (IFHRO). Since 2005, this program has become more fully developed. Parts are now operational. This paper will focus on one segment of the program, i.e., the application and testing process for both practicing underlying cause of death coders.

Methods: The international training and certification program consists of a number of parts. One is the testing of practicing underlying cause of death coders. This piece requires a self-assessment and a coding exam along with coders interested and willing to complete the assessment and take the exam. A testing process is also necessary to ensure appropriate measures are taken before, during, and after the exam day.

Data: A self-assessment for practicing underlying cause of death coders was developed. An underlying cause of death coding exam was also developed by the WHO-FIC Networks Mortality Reference Group (MRG).

Outreach to practicing coders for the pilot was done via the WHO-FIC EC. Individuals from Canada and Korea agreed to organize and manage the testing process in their respective countries. A testing process was created to ensure appropriate measures are taken before, during, and after the exam day.

Results: Two individuals from Canada and 23 from Korea completed the self-assessments and took the exam. Twelve were successful in satisfying the requirements and were therefore recognized as being qualified as an ICD-10 Underlying Cause-of-Death Coder.

Conclusions: Creating a process to recognize and award an international ICD coding certificate has many challenges. But with the proper processes in place, success can be achieved.

Only one part of the international training and certification program has been described. The JC has also developed a methodology by which educators and trainers are approved as meeting an international standard. Additional items on their work plan include:

- An application and testing process for new underlying cause of death coders;
- A process for awarding an international ICD coding certificate for morbidity coders.

Session 3
Refining Case Mix Classification Systems I

New Approach to Grouping Newborn/Neonatal Patients CMG+: A Step Forward

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In the spring of 2007, the Canadian Institute for Health Information (CIHI) introduced CMG+ (Case Mix Groups+), Canada's acute care inpatient hospital grouping methodology. CMG+ uses administrative and clinical data to group patients into clinically relevant and resource-homogeneous groups. CMG+ identifies 21 major clinical categories (MCC), similar to Major Diagnostic Categories (MDC), and 558 CMG (analogous to DRG). CMG+ is an ICD-10-CA/CCI native grouping methodology that replaces the ICD-9/CCP based CMG/Plx methodology.

Some of the most significant differences, and improvements, between the old methodology and CMG+ are found within the Newborns and Neonates with Conditions Originating in Perinatal Period MCC. In the neonatal section of the old CMG methodology, cases were assigned to Case Mix Groups based on a set of weight ranges and the presence of particular, but unspecified, diagnoses. No information, other than admission weight and diagnosis, was used to group neonates in this methodology.

In developing the new CMG+ grouping methodology, considerable thought was given to exploring additional grouping data elements. The elements were evaluated based upon their ability to assist in creating more meaningful groups from a clinical perspective while being able to account for more cost and length of stay variation. Two additional data elements, as well as one other existing element, were found that demonstrated marked improvements in both cost and clinical considerations. The two new elements, not taken into account by the old methodology, are gestational age and the presence of specific interventions. In addition, the use of diagnoses, which simply supported general categories in the old methodology (minor, moderate, major), was greatly expanded. In CMG+, specific diagnosis categories have been implemented that not only explain costs well but also create much more clinically identifiable and meaningful groups.

These three elements have been combined with the series of admission weight ranges to form improved groups in CMG+. The paper will highlight some of the CMG resulting from the new approach and will present an R-square analysis that demonstrates clear advances in the explanation of cost variance. It will show that the use of gestational age, interventions, and specific diagnosis groups have helped to create a much more cost-homogeneous and clinically meaningful

grouping methodology for newborns and neonates.

Honey, I regrouped the kids

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The introduction of HRG4 (Healthcare Resource Groups 4) was a revolutionary change to HRGs in England and represented significant changes from the previous version HRG v3.5. One of the areas with significant changes was paediatric and neonatal healthcare, including critical care. Based on NICE (National Institute for Health and Clinical Excellence) guidance paediatrics is regarded as all patients 18 years and under.

Compared with the previous version of HRG (v3.5), the handling of paediatric patients in HRG4 includes a greater range of ICD-10 codes, has increased the number of Paediatric Medicine HRGs, reducing variability and improving the representation of resource usage.

A significant distinction is the differentiation between procedure driven HRGs and those driven by diagnosis. Clinical relevance or resource usage requires age splits for many of the procedure driven HRGs within their respective chapters. For diagnosis driven HRGs, all those aged 18 years or less receive one of ninety paediatric medicine HRGs.

The concept of unbundling areas of high resource usage has been utilised to address issues associated with national costing and to ensure equity in funding. Typically, this means that a patient may receive a core HRG for the inpatient occasion of stay, a number of unbundled HRGs for areas such as high cost radiology or drugs, as well as receiving a series of HRGs associated with time in intensive care. For Neonates, the assumption is made that a baby with a major diagnosis is likely to have additional resource needs, therefore receiving both an HRG from the chapter as well as Neonatal Critical Care HRGs.

In addition there were a number of changes to Paediatric and Neonatal Critical Care (PCC/NCC) HRGs based on the definition of new datasets.

These datasets collect procedures and treatment on the patient for each day of their stay in Critical Care, so PCC/NCC HRGs are generated daily allowing a more accurate representation of changing resource requirements for variation in care.

Refining ancient DRGs by adding 228 Subgroups: principles, process and results

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Aims: APDRG's are used in Switzerland for hospital financing since 2002. Every second year, a new version of cost-weights is produced, with the aim of integrating cost variations and refining the groups used. Since the APDRG Grouper cannot be adapted for that purpose (legal issue), a number of subgroups are specially developed, called SPG (Swiss Payment Groups) along with a second grouper used in a post-processing mode.

Method: APDRG Suisse being a Users Group, data on possible improvements was collected during the past two years from the members of the group, mainly hospitals. Proposals were listed and analysed. The analysis provided a number of solutions, in particular for developing subgroups. Each proposed subgroup was processed with the new costs database, made available by the Federal Office for Statistics. For each proposed subgroup a simulation was made to document the effects of introducing it: number of cases, costs spread, implications for implementation. This process followed a list of criteria set by the group. Each subgroup had to fit these criteria to qualify.

Each qualifying subgroup was then discussed by the group and the accepted subgroups were introduced in the list of future cost-weights. At the end, a final adjustment was made to guarantee cost neutrality to the payors.

Results: Of the 228 new subgroups created, most resulted from a splitting process: for each of the former APDRG's concerned corresponded two or more groups, the original APDRG and one or two subgroups. Other subgroups took care of APDRG's which didn't comply with Swiss specific financing practice and/or administrative constraints.

In terms of performance, the results were encouraging: R2 improved over the last version from 0.671 (version 5.1) to 0.693 (version 6.0).

Conclusions: Adding a number of subgroups to APDRG's helps improve their applicability to a wider group of hospitals, in particular teaching hospitals. It compensates the well-known lack of flexibility of the grouper to take into account sufficient levels of severity.

However, it should not be considered for regular upgrading of the system, but rather as a temporary solution when planning transfer to another system.

The paper will describe the objectives, the process of identifying "to-be-split" APDRG's, the conditions required for selecting the relevant

subgroups and will present the results of the new version 6.0 of the cost-weights.

Update on the German DRG System – seeking for excellence

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The German DRG System is getting more and more mature. Since the early adoption of Australia's AR DRG System Version 4.1 Germany made a lot of changes to the system. Especially by establishing the InEK Institute and standardizing data delivery as well as cost calculation, Germany resulted in a very accurate hence rather sophisticated DRG System which is already interesting also for other countries. Switzerland decided to adapt it in 2006.

The presentation will deal with the following:

- Evolution of the G-DRGs
- Main components of the system
- Differences to other DRG Systems
- Mechanism of actualization

Evolution of the G-DRGs: By November 2007 we will have the G-DRG System 2008 ready, thus it will be possible to reflect on 6 versions of the system. Especially the capability of explaining variances in costs (R2) and the mechanisms how the results are achieved will be part of this section

Main Components of the G-DRGs: The basic structure will be displayed (originating from the AR-DRGs) but differences will be shown. These lie especially in the use of procedures for CC-Classification, the role of procedures itself and the usage of the original AR-DRG CC-Matrix.

Differences to other DRG systems: The main differences will be shown. Special focus will be drawn on the German reimbursement system which is the single most important driver for the structure of the German DRGs. As in Germany unlike most other countries in the world the compulsory insurance system knows several hundred insurers who are also concurring with each other, the G-DRGs have to be necessarily much more accurate than other systems, in the end for each patient an individual bill has to be written.

Mechanisms of actualization: One of the most remarkable features of the G-DRGs is its way of yearly actualization. The InEK Institute introduced the structured dialogue, a system in which a broad variety of healthcare professionals can contribute to optimization of the DRG-System. The structured dialogue will be explained as well as examples will be shown. The InEK provides a specialized Softwaretool to formalize the contributions and suggestions and thus each suggestion can be easily administered in a database and moreover it is possible to test the suggestions on the whole dataset of all participating hospitals (>200, >2 Million datasets each year) while calculating the new cost-weights and to determine mainly result-driven whether a change makes sense or not.

The relationship between three kinds of disease name and DPC-code in Japanese system

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Aims: In Japanese patient classification system of DPC (Diagnosis Procedure Combination), the DPC coding is performed by the disease name in which the most resources is charged. In the report data, the other names of the main disease and the reason disease for inpatient are included. The selection of disease name could leads to upcoding. The relation among three kinds of disease name and DPC code was investigated by using the DPC data collected in DPC Associations.

Methods: In-hospital disease name, resource disease name and main disease name stand for thr three kinds of disease names described above, respectively. The relationships among three disease names and DPC-code were investigated in the groups of patients with/without complicating disease, operation and some affective factors. The significance among the groups was evaluated using by SPSS.

Results: In-hospital disease name is out of accord with resource disease in cases with some complicating disease in the hospital.

Conclusions: A patient has many disease names during its medical practices. The fee for the treatment relates to the disease name. Many kinds of disease name for a patient shows us the quality of medical practice in the hospital.

Plenary 2
Mental Health Care:
Views from two continents

Case Mix Adjusting Short Stay Inpatient Mental Health Episodes

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Introduction: Inpatient mental health represents a significant component of hospital activity, with costs exceeding C$194 million ($180 million US$). The Province of Ontario has recently implemented a minimum data set reporting for hospital activity occurring in adult inpatient mental health beds. The mental health dataset is based on clinical conditions and mental health (mental function, ability to develop and maintain relationships and adapt to change). A case mix classification system for inpatient mental health activity is currently being evaluated. Evaluation of the case mix classification system has revealed that a significant portion of inpatient mental health hospital admissions are short stay (0-3 days length of stay, or LOS), whereby insufficient clinical data is collected regarding clinical conditions and mental health to case mix adjust patient stays. We propose a methodology to case mix adjust inpatient mental health short stay admissions and validate using available information.

Data: The Ontario Ministry of Health and Long-Term Care (MOHLTC) mandated the collection of the Resident Assessment Instrument Mental Health (RAI-MH) for all activity occurring in inpatient mental health beds in the Province of Ontario (12 million residents) in 2005. Since implementation, there have been 105,001 patient assessments. Of these, 14,976 assessments (14.3%) are short stay admissions, representing 25% of episodes. For those mental health patients admitted from the Emergency Department (ED), 66.6% of patients have an electronic discharge summary containing summary diagnostic information, triage level and ED case mix classification (and cost weights). In addition, for a subsample of ED records, daily cost records from the Ontario Case Cost Initiative (OOCI) are available to validate ambulatory-based cost weights.

Methods: Using data from the ED discharge summary and ambulatory case mix classification results, per diem costs (and cost weights) are estimated for inpatient mental health short stay admissions. The results are validated by comparing estimated costs to daily ED costs from the OCCI. Performance of cost weights is evaluated by computing the mean square errors of estimated costs.

Results and Conclusions: Inpatient mental health is an important component of hospital activity and existing DRG-based classification systems have proven to be inadequate descriptors of patient cost. The current inpatient mental health case

mix classification system cannot classify, and weight, short stay episodes. The methods proposed in this abstract estimate, and validate, per diem cost weights for short stay mental health patients. The results of this analysis are intended to complement the classification system being considered for widespread implementation for case mix adjusting mental health activity in the Province of Ontario.

Mental Health Service Activity Classification and Cost Analysis – The Blind Leading the Sighted?

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Aims: The paper examines the existing Mental Health Patient classification systems and the potential for systems to deliver robust and comparable patient episode cost and performance indicators for mental health services in Australia and the UK.

Methods: Interviews with service managers, information system developers, clinical unit managers and where available patient representatives.

Literature review of previous research and development in existing mental health casemix system development. Documentation review of existing MIS development in mental health patient and service management systems.

Data (if any):

Data will be presented on the

- Examples of operational patient management systems that are used in Australia and the UK
- The availability of data that can be used in a standardized way across different provider services and settings in mental health
- The development to date of episodes of care that can be grouped reliably and consistently from obtainable data
- The potential to identify the costs of the episodes of care delivered by episode types

Results:

The examples of mental health patient classification systems examined will be assessed against criteria:

- Resource homogeneity
- Clinical meaningfulness
- Useful number of categories for examination of performance and comparison of practice across services
- Value of performance indicator reports available form the system
- Ability to track costs to the identified episode type classification categories from readily available financial and activity data.

Conclusions: Mental health has been a problematic area in the development of casemix management approaches and performance assessment. The reasons for this are varied. However, mental health is a very information rich health discipline and one that is typically managed in clearly identifiable management responsibility areas.

It has many features in common with other health service provider areas that manage various physical sub-acute and chronic health conditions. Current developments in common across these areas will be considered and the potential to develop common systems for analyzing performance and costs across these areas will be proposed.

Session 4
Administrative Health Data Applied to Studying Disease Processes

Using administrative data to assess patterns and quality of cancer care

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Objectives: The goal of this project is to assess patterns and quality of cancer care in the Emilia-Romagna region of Italy. The project is a part of an ongoing collaboration among the regional cancer care commission, the Agenzia Sanitaria Regionale, and the Center for Research in Medical Education and Health Care of Jefferson Medical College.

Data and Methods: The Emilia-Romagna Region of Italy has developed a Longitudinal Population Health Database which includes data for the years 2000 through 2005 for 4.5 million people who were residents of the region at any time during that period. 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. Indicators of quality of cancer care developed through a collaborative process among the American Society of Clinical Oncology, National Comprehensive Cancer Network, the Commission on Cancer, and the National Quality Forum were applied to the regional database. Analyses included stage at index admission, and variation in patterns and quality of care, by age, geography and local health unit for breast and colorectal cancer.

Results: Using a combination of diagnostic and procedure information, an index encounter was identified. 16,235 women were identified with an index admission for breast cancer in 2002 through 2005. 76.4% of women under age 70 who had breast conserving surgery had radiation therapy within one year (quality indicator 1) and 76.8% of eligible women had chemotherapy within 4 months of index admission (quality indicator 2). 13,761 colorectal cancer patients were identified. 64.6% of eligible colorectal cancer patients had chemotherapy within 4 months of index admission (quality indicator 3). Variation in these indicators was observed by local health unit of residence, geography, patient age, and stage at diagnosis.

Conclusions: The increasing interest in the use of administrative databases in cancer care assessment appears to be justified. They are potentially available for large populations, over a long time period, and can be used at relatively low cost. Administrative data can be used for initial assessment of patterns and quality of cancer care

and provide a focus for additional data collection and analysis.

Resource usage over time for patients with chronic illness

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The ability of DRG based casemix funding models to appropriately fund patients with chronic conditions is becoming increasing questioned. By definition, episode based funding models fund periods of hospital care. However, increasingly the focus of chronic care management is to provide ongoing support for patients in an effort to prevent their health from deteriorating to the extent that hospital care is required. Such models of care do not fit well within the traditional DRG model.

In an effort to develop more appropriate funding models for patients with chronic conditions the Victorian (Australia) Department of Human Services has been studying the hospital utilization by individual patients . Data have been linked probabilistically for all patients admitted to any Victorian hospital (public and private) and each patients disease profile and corresponding hospital use calculated.

The approaches that can be used to fund chronic care depends, in part, on our ability to predict health care requirements for patients with chronic conditions. If we can accurately predict health care requirements then capitation based funding models are possible, if not, then funding must rely on either in part or completely on episode based or fee for service models. The Victorian Department of Human Services has used DCGs and HCCs to evaluate the potential for such funding models. During this evaluation it was noticed that hospital use routinely reduced in the year following admission, even for patients with chronic conditions require multiple admissions during the year.

The reduction in hospital care requirements in the year following hospital admission was unexpected for patients with chronic conditions. The current conventional wisdom states that as time proceeds, the health status of patients with chronic conditions deteriorates, and consequently health care requirements increase. This was not supported by the initial analysis of the Victorian time series data.

This paper will describe these results and explore various options for these counter intuitive results. It will examine issues associated with disease staging and sampling bias on our ability to predict health care requirements and their likely effects on the initial findings. The role of financial risk sharing strategies in addressing these issues will be considered.

What can hospital morbidity data tell us about Sentinel Events?

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Aims: Since 2005, State health authorities across Australia have required hospitals to report on any instance of the eight nationally-agreed 'Sentinel Events' that is events in which death or serious harm to a patient has occurred. This paper reports on a comparison of two sources of data about sentinel events in hospital care: the nationally-mandated Sentinel Events collection for Victoria (VDHS, 2005) and coded equivalents extracted from the Victorian Admitted Episodes Database. Methods: Code lists were developed by two health information managers to identify ICD-10-AM codes which can be used to define each of the 8 national indicators, and an additional 14 subcategories of 'Other Catastrophic Events' reported in Victoria in 2005. These were translated into computerised algorithms to select cases in the VAED that matched the code sets for each of the 22 indicators. We use the 'C-prefix'(diagnosis onset flag) recorded in Victorian data to identify hospital-acquired diagnoses, and combine these diagnoses with information on separation mode (specifically, death in hospital), and on DRG-type (surgical cases) to define some indicators.

Data: Victorian Admitted Episodes Database, 2004-2005; VDHS Sentinel Events Report.

Results: Five indicators (1 'core' and 4 of the 'other') could not be replicated using data available in the VAED, and several others can be only partially replicated. Case counts for each indicator will be reported, and compared with those submitted through the Sentinel Events reporting system for 2004/05.

Conclusions: Review of the literature on adverse events suggests that, while Victorian coding standards are among the best in the world, routine data may not be reliable for patient safety research. On the other hand, the literature also shows that systems which rely on voluntary reporting of adverse events are vulnerable to a host of human and organisational factors that may impede full reporting of such events. The code sets reported here identify some 'events' that may be much less serious than the ones hospital staff are encouraged to report, and in some cases will

identify outcomes (eg, death) which are only related to, but not directly caused by the identified adverse event. Nonetheless, we think the comparison is a useful way to improve both data sources, and potentially to identify data-triggers that could be used to stimulate hospitals to undertake further investigation.

Register studies of cancer in Southern healthcare region in Sweden

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Aims/hypothesis: Southern regional Health Care Committee has initiated a project, in order to study the care process within the cancer healthcare, in the southern healthcare region in Sweden, based on a episode-of-care and health economy approach. We want to examine care contacts and costs for specific cancer diseases within different care areas and at various care units. The aim is to give methods and bases for continuous follow-up of care initiatives and results.

Methods: In a first study, information was used for the period 1999-2005 from patient registers in Skaring;ne and from registers of cancer in the southern region for six cancer shapes (colon, lung, breasts, female sexual organs, prostate and bladder). These shapes cover approximately 2/3 of incidence of cancer. Totally, the processing covered 32 673 reported tumours for 31 998 persons.

Results: In a patient perspective we describe how a population has got care over time and in a producer perspective we describe all care in a calendar year for everyone as got ill before and during this year. Most persons had contact with primary care as well before as after getting ill. Compared with the population in corresponding age, costs and care contacts (in- and outpatient) was 3 - 8 times higher for persons that got ill in presented cancer shapes. These persons care for others diseases are included in the cancer-case. During 2005, the total costs in Skaring;ne was approximately 1 200 million SEK for persons that earlier got ill in presented cancer shapes. Approximately half the sum was related to care for stated cancer diagnosis. The total care cost per person during a period of seven year in 2005 years'cost situation was per person from approximately 440 000 SEK (colon cancer) to 250 000 SEK (prostate cancer). Per 100 000 inhabitants, the care costs during a year (prevalence) can be calculated from 27 million SEK (colon cancer) to 9 million SEK (bladder cancer).

Conclusions/interpretation: For specific cancer shapes, we will in future studies make subdivision after stages and other cursors for disease amount and aggressiveness. We will do more studies of survival and also study medicine consumption, especially for outpatients.

Patient based patterns of morbidity – a 18 year follow-up on patient records in primary health care in Sweden

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Background: Longitudinal studies on clinical categories of patients in primary health care are rare, as are studies of the individual co-morbidity, as well as public health oriented studies on groups of patients. In some areas in Sweden diagnoses have been recorded and stored in electronic patient records for a long time but so far have not been used for follow-up on categories of patients.

Aim: The aim of this paper was to test the feasibility of retrieving diagnosis data from a long period of time and to elucidate the patterns of clinical categories of patients over time by applying the Adjusted Clinical Groups® case-mix system to encounter data from primary health care units in one limited geographic area in Sweden.

Methods: Data were retrieved from the primary health care centre in Gagnef in Dalarna county council in Sweden. Longitudinal data from 18 years were used. The Swedish primary health care version of the diagnosis codes were mapped to the full version of the ICD-10 classification. The 7.1 version of the Adjusted Clinical Groups software was utilised.

Results: Diagnoses from all 18 years could be used and it was feasible to elucidate the longitudinal pattern of morbidity. The categories of patients according to the case-mix system showed great stability over time. On the diagnosis level some distinct shifts over time could be found. The differences in coding and registering diagnoses in the patients records over time and between physicians have to be observed.

Conclusions: Eighteen years old data in electronic patient records in primary health care could be used to elucidate the morbidity pattern among people in a defined geographic area. The patient based case-mix system used showed great stability over time in terms of categories of patients with similar morbidity pattern. More detailed analyses indicated a shift of slowly accepted new diagnoses, and the need for rules of coding and registering

diagnoses in primary health care has to be emphasised.

Access to Health Information in Ireland

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The concept of data mining has become crucially important when dealing with the large datasets collated nationally on health. These data become most valuable when they are visible, useable, understood and accessible. There are competing pressures between the need to make the data accessible, the need to maintain confidentiality, the difficulties of very large databases and the requirement for user training. The important aim of increasing the value of data by making it more accessible must be offset against the twin needs of confidentiality and data education.

In Ireland the HIPE (hospital in-patient enquiry) national data collection project collects more than 1M records on in-patient and day case activity annually. As over 100 different pieces of information can be collected for each patient, the patient database can potentially contain over 100,000,000 bits of data. Usability of this database is a serious concern due to the three issues of its sheer size, the need to maintain confidentiality and the specialist nature of the information. It is infeasible to simply make the database public for these reasons. Recently, however, a number of initiatives have been introduced in Ireland building on the local HIPE reporting systems in hospital. These are designed to enhance accessibility of this valuable health data using reporting tools and websites.

Building on the success of the reporting systems at the hospital level, new reporting tools have been developed to interrogate the data over the past number of years. With the help of these tools and with targeted training courses, users have been facilitated in compiling sophisticated reports. The value of the health data was further enhanced when the reporting tools, accompanied by relevant datasets, were rolled out to appropriate stakeholders at a regional and national level.

Further steps towards improved accessibility were achieved with the launch of the HIPE data reporter on the ESRI website (www.esri.ie), allowing public users to create reports on national health data. A second website, called Casemix Ireland will be launched shortly with the aim of adding to the knowledge of Casemix within Ireland using features such as forums, publications and an on-line reporting tool. This website is designed to be a single one-stop source for all questions relating to Casemix in Ireland.

The use of websites and reporting tools accompanied by the preparation of annual reports of data clearly facilitates the exploration of the enormous amount of health data collected in Ireland. These initiatives maintain the confidential nature of the data and the anonymity of each patient and provide education on a number of levels. The introduction of these initiatives have enhanced the use of the data and improved its accessibility in Ireland thus ensuring the data collected are put to the optimum use for the benefit of all.

Session 5

Benchmarking

Performance indicators in Swedish Health Care

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Summary: Sweden has developed national performance indicators to measure quality and efficiency in Health Care. The indicators will be published on a yearly basis on a County Council level.

The aim is to:

1. Report on the achievement of the counties for the purpose of transparency and accountability
2. To encourage management in health care to start activities to improve performance

The first indicator set was published in 2006. There was a great interest in the work and a waste majority of the Swedish county councils have now started a local work in connection to the national work. Next report on performance indicators will be published in October 2007.BackgroundSweden has a decentralized health care system with 20 County Councils/Regions and one municipality with a high degree of autonomy. The counties both finance and manage the health care activities in each county. In this context there has been hard to get a national picture of quality and efficiency in Swedish health care in all. The aim is to find methods to measure if Swedish health care is: i) Evidenced based; ii) Efficient; iii) Responsive; iv) Accessible; v) Equal; vi) Safe.

A work started in 2006 to develop national performance indicators for open comparisons in health care. The project is a joint project between The National Board of Health and Welfare, The Swedish Association of Local Authorities and Regions and the County Councils.

Methods: The counties are compared from four different perspectives: 1) Quality of Care; 2) Patient Satisfaction; 3) Access; 4) Costs and Productivity.

Data have been collected from a number of databases, for example The National Health data Registers, Quality Registers, The National Waiting Time database and The Patient Satisfaction database. A working group has developed the indicators and the final indicator set is then decided by a steering group. All indicators have also been discussed with the counties before being published.

Results: In year 2006 a first indicator set was published embracing 57 performance indicators from four different perspectives of quality and efficiency in health care. The comparisons where open and presented on county level. The majority of the indicators reflected quality from a clinical

perspective, for example disease based mortality rates or measures for patient safety. The indicator set also reflects measures for access, patient satisfaction and for health care costs and productivity. The work received a great interest from the county councils but also from the public and the press. A new report will be published in October 2007.

Areas of discussion: For the year of 2007 we expect to have about 70 national performance indicators in the national indicator set. Examples from the comparisons will be presented and discussed in the full paper. The results from last year suggested that there is no obvious connection between costs and quality therefore all counties have an opportunity to improve efficiency in health care. There are also quite big differences between the counties in the results for some indicators. We will discuss these issues in the light of the findings in new results for year 2007. There will also be a discussion about quality in data and a report on the efforts that have been made to obtain better data quality in health care.

Hospital Benchmarking in Cardiac Surgery – Clinical management, Portuguese Best Hospitals and Disease Staging

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To monitor and compare Health Care in different hospitals through a benchmarking strategy has become a reality as to promote quality and as a management tool.

Objectives: This study aims to compare the six Portuguese cardiac surgery centres by constructing an Index of Hospital Quality (IQH), with structure, process and outcome indicators selected from the American Evaluation System American Best Hospitals (ABH) and adapted to the Portuguese reality. A population submitted to major cardiac surgery vas selected, considering the high incidence of cardiac diseases and its high costs. Methodology: The American Best Hospitals methodology was used for equally reflecting the three fundamental dimensions of healthcare structure, process and outcome (The Donabedian Paradigm)

Results: It was possible to calculate an IQH for the six Portuguese public cardiac surgery centres selected which enabled a benchmarking and final ranking of each hospital. Hospitals that provide the best care in each disease and in different stages were identified and performance was correlated with severity. Only structure and outcome indexes were correlated to IQH. There was no correlation between reputation and IQH.

Discussion: Each index was evaluated in terms of potential and national adequacy. Strategies for improvement and the role of clinical governance are suggested in a perspective of accountability as the key word in performance evaluation.

Conclusion: It was possible to calculate an IQH, which enabled a benchmarking and final ranking of each public cardiac hospital. The process indicator needs further adjustment to Portuguese reality by outcomes release. As for the outcome indicator, it would be interesting to compare it with other generic and specific measures in future studies.

The development of a cost-weights scale for benchmarking. The experience of five Belgian hospitals in 2004

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Introduction and aim of the study: The comparison of hospital costs to evaluate management is done since many years. However, this benchmarking is imperfect because it does not take into account the severity of illness of patients treated. The standardization of costs on the basis of case-mix needs an important precondition: the existence of a cost-weights (CW) scale resulting from a representative sample of hospitals. If this situation is not yet completely met in Belgium, it is nevertheless possible to suggest a way of reflexion. This study will try to evaluate the possibility of creating a CW scale on the basis of data from five hospitals and will try to develop a costs analysis methodology between these institutions and a reference hospital.

Methodology: The five hospitals used in this study are general hospitals situated in the south part of Belgium. They are public hospitals, have a comparable structure and homogenous case-mix. Data used for the CW scale are costs from patients hospitalized in 2001, 2003 and 2004 in these five hospitals. Costs for years 2001 and 2003 were indexed, according to the health index. These five hospitals were consolidated in an average hospital which will be used as reference for the benchmarking.

We use in Belgium the APR-DRGs hierarchy and we have made the methodological choice to gather minor (1) and moderate (2) severities of illness, as well as major (3) or extreme severities (4) of illness (not enough cases in each severity of illness) to create this CW scale.

The suppression of extreme values (outliers) was carried out with a technique based on percentiles. The CW corresponding to each APR-DRG was obtained by dividing the average cost of each APR-DRG by the average cost of all inliers. The case-mix of hospitals was calculated by summing all CW associated with APR-DRGs treated in 2004 in the five hospitals. This case-mix is expressed by a number of points. The cost of the point is obtained by dividing costs of the year 2004 by the number of points generated by the case-mix 2004 of each institution.

Results: The sample for the CW scale is composed by 126 277 stays. However, 5 382 stays (4,26% of the sample) for which hospitals could not communicate APR-DRGs (or severity of illness) have being eliminated. The suppression of those stays reduced our data base to 120 895 stays. We have in our data base 652 groups of APR-DRGs (and severities of illness) including 427 groups with more than 25 patients. The determination of outliers highlighted 5,7% of high cost outliers and 0,2% of low cost outliers. The suppression of these extreme values reduced the data base to 113 748 stays which were used for the determination of CW. CW vary between 0,08 and 20,44. The number of points (case-mix) varies between 6 512 points for H1 and 15 376 points for H4. The cost of the point for all hospital costs (inpatients and outpatients) vary between €5 862 for H2 and €7 045 for H1 (€6 224 for the reference hospital). The cost of the point for inpatients costs varies between €3 809 for H5 and €4 975 for H1 (€4 033 for the reference hospital). Hospitals having a cost of the point higher than the cost of the point of the reference hospital were analyzed by category of costs to refine the comprehension of the overcost.

Discussion: Many countries have incorporated the case-mix in benchmarking reflexions. In this type of approach, the benchmarking is done on the basis of an indicator of productivity which is the cost of the point, often calculated in a reference hospital. The benchmarking based on the cost by point can then be refined by category of expenditure (salaries, costs of structure…) in order to take measurements of management if necessary. Results of such studies have to be nevertheless taken with prudence because methodological choices of such approaches, the quality of coding, differences of hospital structures and differences of accountancy rules between institutions can influence notably results.

Individual-based activity – and costs assessment in Swedish elderly-care and in care for disabled persons

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Aim: The aim of the project was to develop a national model based on Individual-level Costing. A fist step, tested in the municipality of Borlänge, was done in order to study if the method was a useful way to calculate costs and describe the service. It was done for every individual contact in Elderly-care and in care for disabled persons. As a second step the method was implemented in additional twelve municipalities in order to validate its value. In addition to the previously mentioned municipalities another fifth teen have started implementation projects. This paper has focus on the modelling, the benefits and the experiences from implementation of the national model. Practical examples and usage of data is presented.

Methods: The developed Cost Management method is based on a time-driven Activity-Based Costing approach. The costs for different departments and units are allocated to the different services. The cost per service is then allocated to the consumption for the individual client, thus calculating the costs of each individual service, care contact and client. Analyses of other dimensions like age, age groups or service groups can be retrieved from the model.

Results: A common analysis-model which analyses individual care consumption in the dimensions of case-mix, productivity, inhabitant consumption and results has been developed. Usage in the thirteen municipalities has shown that the method is useful for describing the services for elderly and disabled clients in the municipality as well for benchmarking costs of care between different municipalities This model has been used in e.g. Borlänge municipality for managing costs and consumption of individual clients between support in regular housing and care performed by special housing. Substantial productivity gains where accomplished by transferring costs which was consumed by client groups in regular housings to other services in special housings. The most costly client in regular housing was three times the cost of a client in a special housing.

Conclusions: The method is applicable to other municipalities. The thirteen municipalities that implemented the method where supplied with useful information about individual care consumption. The information was also relevant for decision-making, both at unit level and at local authority level. In municipalities like Borlänge the productivity and efficiency has been improved.

Measuring Hospital outcomes: Statistical model to determine variables of influence for adjustment in Spanish public hospitals

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Aims: To obtain the most appropriate model to explain observed variability between hospitals, for a relevant set of indicators related to hospital performance and quality of care.

Methods: A retrospective study based on the 3.496.238 records (discharges) of one year (2004) was carried out. Indicators analysed were LOS, preop LOS, mortality, readmissions, hospital acquired infection, and caesarean rates. Clinical data were coded with ICD-9-CM and DRG groupers (AP and APR). Independent variables were divided into two different groups: one group was related to the case (disease): complexity (DRG-weights), Severity Index (APR-DRG), Major Diagnostic Category (MDC) and type of case (surgical/medical -just for preop LOS). The second group of variables was related to the patient or the hospital: age, sex, type of admission (planned/unplanned), type of discharge and type of hospital (4 groups). A probabilistic graphical model - Bayesian network - has been shown as the most efficient mathematical model defining the joint probability of the total possible dependencies of variables for each indicator. Not relevant dependencies were eliminated in order to simplify the function and obtain the most efficient model through an appropriate factorization.

Results: Severity index and complexity have the maximum predictive value (MPV) for LOS (mean: 7,58 days); severity, gestational age and type of admission have the MPV for caesarean rate (rate 21,48%); severity and type of admission for readmissions (rate 6,59%); severity, complexity and age (over 74) for mortality (rate 3,9%); severity, complexity and surgical case for hospital acquired infection (rate 1,16%); and finally severity, complexity and type of discharge for preoperatory LOS (mean 2,07 days).

Conclusions: The hospital outcomes analysis requires adjustment studies to make the conditions under which providers are acting homogeneous.

Given the multiple factors intervening in the clinical management results, multifactor lines of adjustment are necessary.

The present probabilistic model was shown as the most efficient to asses the most influential variables in each indicator. Case-related variables (severity, complexity) have been proved to be main factors of influence whereas, from the other group, only age was suitable as an adjust variable.

DRGs in Slovenia - tool for strategic purchasing

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The health insurance system in Slovenia is based on Bismarck social insurance model. The 1992 Health Care and Health Insurance Act formed the legal basis for the current system and laid the foundations for the establishment of a centralised compulsory health insurance system, administered by the Health Insurance Institute of Slovenia (HIIS). By the act, the HIIS is the exclusive provider of compulsory insurance. HIIS is also a purchaser of health services provided within public health care network. The role of the Ministry of Health in Slovenia (MOH) in social insurance model is above all the management and supervision of the system. MOH doesn't perform purchasing function, however MOH can cooperate at establishing the vision of purcasion function on national level and creating the conditions for strategic purchasing of HIIS. Till 2003 the reimbursement model of inpatient health care in Slovenia was based on prospective programme planning while at the same time taking into account the limited budget and the number of inpatient cases. In 2003 the reimbursement model changed. Slovenia has implemented the application of DRGs to the funding of acute inpatient care. After 2003 the reimbursement model was upgraded in a way which gives HIIS a chance and also obligation to act as a active and strategic purchaser. Creating of conditions for HIIS's strategic purchasing was based on next variables: planned and realised programme of acute inpatient care providers, citizens'needs, capacities of providers and available financial resources. The strategic purchasing resulted in better access of citizens to health services and higher cost effectiveness of providers. The article presents the process of creating of conditions, the analysis of all included input variables and the results.

Session 6

Resources Allocation and Case Mix Systems

Beyond needs-based funding: resource allocation and equity at the population level in the Australian State of New South Wales – Resource allocation and equity at the population level

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Background: The reduction of inequities in health is an important aspect of the present global effort to reduce poverty. Although some progress has been made in relation to re-distribution of resources towards disadvantaged populations, the growing health inequities worldwide raises concerns about how, in reality, resource distribution in the health sector benefits the most disadvantaged.

Health equity, particularly equity in access to services remains a major challenge to health systems around the world. In many settings, often the better-off receive more and better quality services while the poor and the most disadvantaged who need health care the most face severe access restrictions. As in many other countries, there are marked health inequities in Australia. For example, despite the high life expectancy of nearly 80 years for the general population, Indigenous Australians live about 20 years less. Access to health care is also limited for minority populations and people living in remote areas.

The state of New South Wales (NSW) has sought to address inequities in health through the application of a population and needs-based resource distribution formula (RDF) modelled on the Resource Allocation Working Party (RAWP) approach. The eight Area Health Services (AHSs) in NSW receive equitable funding based on the RDF. While the RDF has been hailed as a model that attempts a fair distribution of resources by directing funds to AHSs where health needs are greatest, it is largely unknown what impact the distribution mechanism (RDF) has had on addressing inequities within population groups. Indeed, very little is known about how resources are distributed to further equity at the population level in NSW. The persistent health inequities at the population level raises concerns about whether the RDF has any impact at all on equity. To what extent has resource allocation been streamlined at the population level in NSW to reflect the importunate health inequities? This study examines how resources are distributed at the AHS level in NSW and seeks to develop an equity-oriented model which could be applied to enhance equity in distribution of resources

towards the most disadvantaged population groups in many countries.

Results: Data analysis is ongoing and results will be reported at the conference.

Casemix Adjustment for Outpatient Service: a Tool for Resource Allocation of Social Security Population in Thailand

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Introduction: Social Security Scheme (SSS) is a compulsory health insurance scheme and covering formal workers in Thailand. The scheme decided to pay health care providers on a flat rate capitation basis to cover both ambulatory and inpatient care. Capitation payment has caused the strong incentive for cost-containment, but may cause under-treatment. In order to prevent adverse effects, the Social Security Office (SSO) decided to explore the illness of outpatient care by using the casemix.

Objectives: The aim of this paper was to examine a burden of illness for outpatient care in a SSS population and the application for the resources allocation to the providers of health services.

Data and Method: A retrospective study of individual electronic database with the application of risk-adjusted method based on Adjusted Clinical Groups (ACGs). Individual data for outpatient services in the year 2006 were available from the SSO. Information was composed of demographic data with registered hospital, all diagnosis, and annual charge. The end results yielded 65 categories of patients and the resources utilisation as annual charge was analysed comparing between public and private registered hospital.

Results: About half of the populations had acute minor condition. The differences across two type of health care provider sector were number of the utilisation and annual charge. Only acute and chronic conditions ere selected to examine the pattern of disease, service utilisation, and average annual charge. The results shown the same pattern of disease distribution, while difference in outpatient visit and annual charge which is also influenced by age and gender.

Conclusion: The burden of illness in a social security population can be described in terms of ACG casemix by using the individual data for outpatient care. Patterns of morbidity and severity of illness focused in detail on public and private sector. The differential between the health service utilisation and annual charge between health care sectors might be providing the balance of input and output in the defined populations according to their morbidity. Future policy reorientation should aim towards the financing development of ambulatory services according to health needs, which can be identified using morbidity pattern.

Casemix in Smaller Jurisdictions: the use of Casemix in planning and funding an update

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A problem with output funding is ensuring that a "fair" price is established to ensure that the financial risks are not unmanageable and that perverse incentives are not introduced.

Efforts are focussed on ensuring that the costing of hospital services is reliable and that the classification system has sufficient classes to ensure homogeneity. Smaller jurisdictions have a difficulty in casemix funding efforts in that there are problems in ensuring competition, and there tends to be a concentration of highly complex services within a small number of establishments. This presentation describes the development of a means of identifying the highly specialised high cost "Tertiary" services by considering the procedures undertaken and providing a means of establishing additional target funding to mitigate the risks. This process was initially considered in Slovenia and later incorporated into costing efforts in Tasmania. Samples from Slovenia and Tasmanian are explored to demonstrate the reliability of the process. The presentation will provide details of the selected tertiary classes and the clinical services required to support the activity. The impact of these procedures on the cost of care across and within DRG classes will be presented. The relationship between highly complex care and the occurrence of cost "Compression" will be discussed and examples provided from both Slovenia and Tasmania. An additional benefit of this process has been the development of an ability to examine where procedures are undertaken. This is in the context of ensuring that support services appropriate to the patient's care are available, or that activity is referred to the facility that is most suitable. The presentation will provide examples from the recently completed Clinical Services Plan for Tasmania where the information gained from an analysis of the "Tertiary Activity" has proven useful in defining the most appropriate service mix.

Thai Diagnosis Related Group Version 4 for more equitable and efficient resource allocation

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Introduction: The Thai health financing reforms quickly achieved universal coverage policy with the support of 8-year-research on diagnosis related group. In 2007, the fourth version of Thai DRG was submitted to the National Health Security Office for more equitable and efficient payments to hospitals.

Objective: To evaluate financial impact of using Thai DRG version 4 to pay for hospital care as compared to the earlier versions.

Method: Simulation analysis using inpatient records of 2005-2006,

Result: From 7.1 million inpatient records, Thai DRG version 4 relative weights have been calibrated. The new features of version 4 include recognition of multiple procedures for bilateral organs and repeated procedures on the same organ site leading to different DRGs. The relative weights range from 0.1653 to 53.2562. Significant determinants of hospital care cost include types of hospitals and types of health benefit schemes. Simulation of payment to hospitals by a fixed base rate show better allocation to different types of hospitals by using version 4 than the earlier versions. The use of Thai DRG version 4 may encourage providers to give higher intensity of care for one admission because they will be paid higher than cases with single procedure

Conclusion: Thai DRG version 4 should be used for payment to hospitals in 2008 for all schemes with minor adjustment. Monitoring of provider behaviours is needed.

The association of incentives and performance with hospital closure: a study of distress, recovery and failure

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The purpose of this study is to examine the association of payment system-based economic incentives, and both financial and nonfinancial performance measures, with hospital closure in the US. Continuing cost containment pressures have increased the number of financially distressed hospitals over time. Some have recovered, while others have failed and closed. This process has important implications for the distribution of cost, quality and access to healthcare in the US.

We perform a multinomial logistic analysis on data taken from Medicare Hospital Cost Reports for the years 1997/1999. We study a sample of financially distressed hospitals that closed compared with hospitals that remained open. We find that a hospitals form of ownership control, debt burden, asset investment and occupancy rate are all strongly associated with the hospitals financial distress, recovery or closure.

Session 7
Activity Based Funding With Case Mix

CASEMIX FUNDING IN IRISH ACUTE PUBLIC HOSPITALS: A REVIEW

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Aims: The importance of casemix in the allocation of funding to acute hospitals in Ireland has grown substantially since it was first introduced in 1993. There are current proposals to increase the share of casemix funding to 50 per cent and extend the model to incorporate all acute hospitals. We review the operation and outcomes of the casemix programme for the period 2000 to 2007, during which a number of refinements have been implemented in the casemix model comprising of distinctions for same day and outlying discharges, the inclusion of maternity and paediatric hospitals, and a change in the grouping scheme for discharges. Examining trends in key casemix parameters over this period permits analysis of how hospitals may change their behaviour in response to their casemix performance.

Methods: Univariate statistical analyses are conducted to determine the extent to which each hospitals previous casemix payments predict more recent payments over the eight years under consideration. Such analyses will identify those hospitals that have been consistent in their performance. The performance of new entrants in the casemix programme is also assessed. The changes in the outcomes from the casemix model, such as relative values and base prices, are also examined over time. To maintain confidentiality, individual hospitals are not identified in this analysis. The analysis concentrates on the in-patient casemix model.

Data: This analysis draws on data from two main sources. In-patient discharge data from acute public hospitals in Ireland were drawn from the Hospital In-Patient Enquiry (HIPE) Scheme. Since 1995, the coverage of HIPE has consistently exceeded 95 per cent of all discharges from acute public hospitals. Data on the casemix budgetary adjustments for the participating hospitals were obtained from relevant publications from the Department of Health and Children.

Results: Preliminary results indicate that performance throughout the eight-year period under consideration was broadly consistent for almost half of all participating hospitals, with the number of hospitals being penalised exceeding the number with positive budget adjustments. A hospitals previous budget allocations under casemix were generally positively correlated, with the strongest association being between the adjustments in consecutive years.

Conclusions: The Irish casemix model has evolved since its introduction in 1993, particularly during the period 2000 and 2007 which has been

characterised by a number of changes. An understanding of how participating in casemix affects hospitals performance is important given the expanding role of this funding mechanism in Ireland.

The Dutch experience: reciprocal influences between (socio-)political processes and casemix systems

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Introduction: The Dutch DBC-system was developed and implemented between 2000 and 2005. When compared to other members of the 'classification family tree' it can be concluded that the system is not a logical step in the general line of development of classification systems. On a number of characteristics the Dutch system stands out from the other systems. One major differing characteristic being the fact that the system is not based on an internationally recognised classification system, but on 24 different systems of diagnosis classification, developed by different specialist medical associations. This results in 24 product structures that cannot be compared amongst each other. Another main difference with 'classical DRG-systems' is the episode of care rather than the encounter as a basis of the DBC-product. In the presentation we will investigate into the underlying political process that led to the creation of a deviant system. We will highlight some benefits of the system, but will also point out the fundamental changes that are needed to combine the benefits of the DBC with the benefits of DRG-systems. We will conclude with some assumptions on how the fundamental changes will reciprocally influence the socio-political relations in the Dutch health landscape.

The development of the DBC-system: socio-political influences

The Dutch 'healthcare landscape' consists, apart from governmental organisations, of a number of strongly organised national associations representing amongst others insurers, public and private health providers and medical associations. These parties are embedded in a 'process-design' that is based on consensus decision making as opposed to 'enlightened despotism'. Due to the influences and counter-influences of the national associations and the culture of consensus decision making, the resulting DBC-system can be qualified as a 'negotiated product' rather than an 'expertise product'. On the basis of an analysis of stakeholders and their different interests some design-characteristics of the DBC-system can be explained. Interests of a majority of self-employed medical specialists had a strong influence on the creation of 24 diagnosis classification systems. The strong position of public providers as opposed to the marginal position of private providers seems to account for the emphasis on classification rather than funding in the use of the DBC-systems. A map will be drawn representing positions, relations, influence-weights and outcomes of the process.

Benefits of the DBFC-system and changes to be made

The DBC-system induced major culprits necessitating fundamental changes, but the system also provides advantages to the classical DRG-system. Detailed products give a high level transparency of diagnoses, processes and costs, providing feedback to hospitals to redesign their processes and develop efficiency and quality interventions. Strong involvement of the medical profession in the design of the system increased insight into effects of medical decisions on costs of the system. Information on the whole episode of care provides an incentive to increase efficiency by substitution of inpatient care by day- and outpatient care. Despite the benefits, the pitfalls posed by the system will lead to fundamental changes in the system, combining strong points of actual DRG-systems, with benefits of the DBC system.

Influence of system changes on the Dutch healthcare system

Fundamental changes to the DDB-changes have been proposed but not yet implemented. Still we will attempt to draw out some tentative assumptions about how a changed system may influence positions and relations within the Dutch healthcare landscape.

Activity-based financing - decreasing the length of stay and increasing the readmission rate? Experiences from Norway 2001-2006

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Introduction: Activity-based financing of acute somatic hospitals was introduced in Norway in 1997, succeeding hospital financing by frame budgets. The system now used is based on DRG, national calculated cost weights and reimbursement per DRG-point.

Activity-based financing in Norway is regarded as a success, even though there has been some criticism of the system. During the last 5-10 years, the length of stay for hospital inpatients is reduced, while the readmission rate has increased. Critics of the system claim that the hospitals are discharging patients too early, in order to maximize the patient volume and the number of DRG-points. As a consequence the number of

readmissions is increasing. The tendency is said to be most visible the last 2-3 years.

Aims: The aim of the paper is to study readmission rates and length of stay. We will take a closer look at two statements:

1. Reduced length of stay is correlated with an increased readmission rate.
2. If a hospital stay is followed by a later readmission, the length of stay is more reduced than for hospital stays not followed by a readmission.

Data: The data used are individual patient records, registered at the hospitals and collected and provided by the Norwegian Patient Register. The data include all hospital admissions at 55 acute somatic hospitals during the period 2001-2006. The total number of admissions was 685 277 in 2001 and 753 067 in 2006. The number of readmissions was 57 041 and 72 027 respectively.

Results: In 2001 the percentage of readmissions at Norwegian acute hospitals was 8.3, and had increased to 9.3 in 2006. The number of readmissions increased by a percentage of 26.3, compared to 9.9 for all hospital admissions. During this period (2001-2006) the overall LOS was reduced from 6.1 to 5.4 days. The LOS for hospital stays followed by a readmission was reduced from 7.3 to 6.6 days (a reduction of 0.7 days) and for hospital stays not followed by a readmission from 5.8 to 5.1 days, also a reduction of 0.7 days.

Conclusions: Based on data from 55 acute hospitals, there is a significant correlation between reduced length of stay and increased readmission rate. However, the length of stay has the same level of reduction independent of later readmission or not. This indicates that the increase in readmission rates may have other explanations than a too early admission from the hospital.

The Role of Case Mix in Funding Long-term Care in Ontario

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Purpose: The purpose of this work was to evaluate the impact of various case mix groupers in the funding model for long term care (LTC) in Ontario.

Background: In Ontario, LTC is provided by a mix of charitable, municipal and for-profit organizations. There are 77,000 beds in over 600 homes with annual provincial funding of approximately $2.8B. The current funding model is an envelope system which separates care funding from accommodation funding. Under this system, 100% of the care component of funding is case mix adjusted using the Alberta Resident Classification system (ARCS). ARCS is a relatively simple case mix system with 7 terminal groups and associated weights. Since implementation of the system in 1998, Ontario homes have experienced a significant increase in acuity, so that today the majority of LTC home residents now fall into only two groups. As a result, both the Ministry of Health and Long Term Care (MOHLTC) and LTC providers recognize the need for a more sensitive case mix grouper that is less susceptible to case mix creep. In response, the RAI 2.0 tool has been introduced to 89 homes in the sector. This tool supports the MOHLTC's move towards a performance management framework that includes resident assessment, quality indicators, care planning and case mix. Currently in Ontario, the RAI 2.0 implementation is voluntary, however it is expected that 2010 all homes in Ontario will be using this tool.

Method:

Using the RAI 2.0 data from 89 LTC homes, we examined the following:

- The impact of various grouping methodologies
- The cost and measurement impacts of the frequency of assessment and adjustment
- The impact of various fixed versus case mix adjusted funding scenarios.

These decision points were evaluated against the population characteristics of Ontario's LTC residents and the operating principles of LTC homes to provide the basis for policy decisions.

Results: We will present the results of our evaluation of various versions of the RUG III grouper and our assessment of their impact on funding at an individual home level. In addition, we will show the comparison of these results to current home-level funding results using the ARCS. As the framework for the current case mix policy changes, the discussion uncovers the inevitable mix of evidence based information required to influence funding policy with the political challenges of funding policy implementation.

Session 8

Nursing Care and casemix

Accounting for Nursing Complexity

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Background: Approximately 30% of inpatient costs relate to nursing care. Many hospitals are relinquishing their use of patient dependency systems following the introduction of ratio based nursing awards and the omission of this functionality from replacement computer systems architecture. Ratcliffe has proposed a Patient Clinical Complexity Level [PCCL] adjusted bedday and activity model (the Nursing Complexity model) for the allocation of nursing costs.

Aims: To evaluate and compare alternative nursing cost allocation methodologies against nurse dependency derived costs, with particular emphasis upon the proposed Ratcliffe model.

Method: Patient dependency, length of stay, transfer, and nursing cost data were extracted from the Royal Women's Hospital patient costing system and 4 different cost allocation methodologies (Fractional Beddays, DRG nursing weights, PCCL adjusted BASIS hours (underlying nursing care required for an acute admitted episode), and Nursing Complexity Model) implemented within a cost modelling environment. Costs relating to 6 Patient Care Areas [PCAs] (3 general wards, ICU, surgical, & oncology wards) wholly costed by the existing patient dependency data were spread to individual cases according to each allocation method. Investigation into the relative performance of each cost allocation methodology was undertaken by calculating the correlation against the true patient dependency cost. Further analysis of the contribution effect of various components of the Nursing Complexity model was undertaken by aggregating their costs by occupancy, admission, discharge, ward and theatre transfer activity.

Data: In 2005/6, the Royal Women's Hospital treated 32,673 patients. 18,169 cases were subsequently identified as being wholly treated within the 6 patient care areas under investigation (representing 21,015 case/PCA splits). Nursing Costs for these areas totalled $29.1M. Cost models generated over 500,000 service codes (allocation items) representing 5.2 million allocation units collectively.

Results: Comparison of correlations between each alternative cost allocation methodology and the patient dependency derived costs revealed significant variations within each Patient Care Area, with the worst result relating to the use of DRG nursing weights in ICU ($r2 = 0.4085$) compared to a base LOS result of $r2 = 0.9194$. Overall performance (r2) for Bedday, DRG nursing weight, PCCL, and Nursing Complexity

methodologies were .925, .548, .9225, .9224 respectively.

To eliminate the potential confounding influence of relatively fixed high nurse/patient ratios within the ICU area (and its exclusion from PCCL adjustment within the Ratcliffe model), these cases together with unqualified newborns were excluded to produce a new population comprising 12,689 cases; revised performance (r2) was calculated at .783, .8158, .7775, .7732 respectively.

When allocating costs by the Nursing Complexity Model, the proportion of costs attributed to each component differed considerably between Patient Care Areas; occupancy effect ranged from 57% (Surgical ward) to 83% (ICU), admission effect ranged from

From Belgian Nursing minimum dataset to nursing cost-weight per DRG

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Introduction: The Belgian hospital financing system is regarded as one of the systems that is adjusting for nursing care. Two nursing care indicators that are based on the Belgian Nursing minimum Dataset (B-NMDS) are used in the Belgian financing system: an average cost-weight for surgical, internal medicine and paediatrics departments and a weighted intensive care ratio (ZIP/ZAP) for intensive care departments. A main critique is that these cost-weights are based on actual staffing ratios, which may be biased and favours nursing wards with high nurse staffing levels.

One goal of this study is to investigate if cost-weights could be developed for the Belgian Nursing Minimum dataset that are based on nursing care needs of patients and would provide the resources that are needed to give safe care.

Methods: 112 real clinical patient cases have been written from the patient record. These cases were collected from 35 hospitals. Each case was written in a clinical sense to that they could be judged on staffing needs by clinical nurses and charge nurses. A few questions were asked such as if you had to care for these patients, how much time would it take? The different questions allow to evaluate internal consistency of the rating procedure. These cases were randomly distributed among nurses so that every nurse had to rate on average about 10 cases and every case was evaluated on average by 8 nurses. 202 nurses from 69 hospitals, participated in the study to rate these cases.. At the same moment of writing the case, the nursing minimum dataset (I and II) and some relevant patient classification systems were scored. The comparison of the scores with these other classification systems allows to evaluate the external consistency of the rating procedure. Independent of the rating of the cases, each of the 79 nursing interventions of the nursing minimum dataset II was rated by 20 randomly selected raters, evaluating the time needed to perform each of these interventions. A sum_intervention score per case was calculated and compared with the time rating per case as a measure of criterion validity. For both ratings (case and intervention ratings), a Huber robust estimator has been used as measure for central tendency when the data were highly skewed.

Results: A main result of the study is that valid, reliable and usable nursing weights per NMDS-intervention have been developed. The nursing weights have been validated for the 112 clinical cases. There is a high correlation (r=0,90) between the sum of nursing weights per intervention and the direct rating of nursing time. The correlation between the new developed nursing weights for NMDS-II and the Closon and Ghent weights for NMDS-I is more than 0,93. The time rating for the cases shows a high correlation with validated patient classification systems such as TISS, San Joaquin and AGGIR.

Conclusions: The main conclusion of the study is that it is possible to weight nursing care based on an appropriate staffing level instead of actual staffing levels. The study provides valid, reliable and usable nursing cost-weights for DRGs.

Identifying Nursing Care Patterns In Hospital Care

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The classification and measurement of patients and patient care are the cornerstones of care management, clinical pathways, quality monitoring, resource allocation, financing, etc. Patients, medical care and pharmaceutical care receive most attention. Nursing, a main hospital resource estimated between 20% to 40%, and nursing care are somewhat less popular. The most popular unit of measurement of nursing is still the length of stay or count of average in-patient days. Some refinement is introduced by differentiating between normal inpatient days and intensive care inpatient days, whatever that may mean in different countries and health care settings.

While most countries regard nursing care as a fixed average cost per inpatient day in the same manner as heating or meals, different efforts were started to remedy this simplistic point of view. Werley introduced the concept of a nursing minimum data set in 1986 and Tilquin the instrument of PRN - level of Nursing Care Required in 1989. Some countries use nursing

workload adjusted costing weights per category of patient. The Australian National Hospital Cost Data Collection calculates service weights per Australian Revised DRG, the Canadian Institute for Health Information calculates resource intensity weights per Canadian Case Mix Group. Two driving forces influence further developments. On the one hand many suspect that a system that only look at average, standard or robot nursing care per inpatient day favors providers that, intentionally or not, focus on low-severity, more profitable patients, called skimming. On the other hand the cost and effort to collect nursing data on an ongoing basis is huge while the returns are risky: improved patient focussed care, less adverse outcomes or cost savings.

Belgium introduced a measurement system of a sample of nursing activities Belgian Nursing Minimum Data Set I (BNMDS-I) - for a sample of inpatient days in 1986 and applies it, alongside a DRG based case-mix system, towards hospital financing since 1994. A refined system extends the list of nursing activities from 27 to 79 (BNMDS-II) and integrates seamlessly with the DRGs as of January 1 2008. This document develops a method to identify leverage patterns of nursing care during hospitalization and by the same token to rank patient categories and individual patients according to their outlier or extreme pattern of nursing care. We use data mining, pattern recognition and information visualization techniques. To exclude system, registration, cultural contamination, we focus on one large Belgian hospital and its DRG and NMDS data to evaluate the results with respect to their hospital nurse staffing impact, the 4 Severity-of-Illness levels of the APR-DRG12 and the 6 nursing acuity levels identified by Thompson & Diers. At issue is the question if we need more expensive data or rather an improved data utilization approach that is indeed more complex than just averaging nursing care.

Does the Patient Clinical Complexity Level (PCCL) reflect nursing acuity?

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Background: Approximately 30% of inpatient costs relate to nursing care. Many hospitals are relinquishing their use of patient dependency systems following the introduction of ratio based nursing awards and the omission of this functionality from replacement computer systems architecture. Ratcliffe has proposed a PCCL adjusted bedday and activity model for the allocation of nursing costs.

Aims: To examine the relationship between Patient Clinical Complexity Level (PCCL) and nursing activity/cost as measured by patient dependency scores, and therefore ascertain the suitability of the PCCL as a patient dependency surrogate.

Method: Patient dependency, length of stay, transfer, and nursing cost data were extracted from the Royal Women's Hospital patient costing system, and nursing costs allocated to patients according to their individual patient dependency scores. Costs relating to 6 Patient Care Areas [PCAs] (3 general wards, ICU, surgical, & oncology wards) wholly costed by the existing patient dependency data were examined. Investigation into the relationship between PCCL scores, length of stay, and acuity was undertaken by plotting case frequency by LOS and PCCL, and by depicting total and daily cost variability by PCCL using box plot techniques. Variability of average daily cost by PCCL across DRGs was illustrated in graphical form.

Data: In 2005/6, the Royal Women's Hospital treated 32,673 patients. 18,169 cases were subsequently identified as being wholly treated within the 6 patient care areas under investigation (representing 21,015 case/PCA splits) and were further trimmed to 18,127 cases (total cost < $100,000, daily cost < $2,500). Nursing costs for these areas totalled $29.1M and were allocated across 757 service codes (allocation items) representing approximately 406,400 allocation units.

Results: Analysis of total cost by PCCL across the targeted costed population base revealed a correlation of r2 = .1167 and the PCCL/Length of Stay relationship showed a similar correlation of r2 = 0.138. The daily cost/PCCL relationship was insignificant at r2 = 0.0223, though correlation of the median daily cost was significant at r2 = 0.9117. Results of further analysis of daily costs by PCCL within each Patient Care Area were inconsistent.

To eliminate the potential confounding influence of relatively fixed high nurse/patient ratios within the ICU area and the uncertain clinical relevance of unqualified newborns, these cases were excluded to produce a new population comprising 12,689 acute cases. The revised total cost/PCCL correlation improved slightly to r2 = .1525 and the PCCL/Length of Stay relationship increased further to r2 = .1989. However, the daily cost/PCCL correlation remained insignificant at r2 = .0079 while the median cost relationship deteriorated to r2 = .3856 in a negative direction.

Conclusion: These results suggest that length of stay rather than nursing intensity increases with PCCL. Furthermore, the inconsistency of the PCCL cost relationship across DRGs does not

support the use of the PCCL as a measure of nursing acuity.

Refinement of the APPRO method for the organizational appropriateness evaluation using administrative data

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Background: In November 2001, the Italian Ministry of Health defined by decree the minimum levels of assistance (core benefits) guarantee by the National Health System to all citizens. In this context, 43 Medicare DRGs were identified as being at high risk of inappropriately delivered care when cases assigned to these DRGs are treated as inpatient. The APPRO method was conceived to evaluate organizational appropriateness of acute hospitalizations using administrative data. The method is based on the use of refined patient classification systems to define criteria for the selection of appropriate discharges and on the definition of DRG-specific thresholds of acceptability of cases as inpatient.

Objective: The aim of the study is to refine the APPRO method through a revision of the criteria used for identifying acute hospitalizations at high risk of inappropriateness. The refined criteria include the use of APR-DRG version 20 clinical categories and their relative weights.

Methods: The original APPRO method and its refined version (APPRO 3) were used to evaluate the 2.842.686 discharges from all Italian hospitals in 2003 assigned to one of the 43 DRGs defined at high risk of inappropriateness. APR-DRG classification system was used to analyse within-DRG clinical variability and to exclude / include specific combination of DRG-APR-DRG categories from the analysis. Further exclusion criteria were defined on the basis of resource consumption relative weights assigned to each case.

Results and discussion: The refinement of the selection criteria resulted in a significant reduction of cases excluded from the analysis when compared with the original method (from 11 % to 6 %). Major differences using refined criteria relate to DRG 134 and DRG 467 - showing increasing amount of discharges flagged as inappropriate - and DRG 429 and 160 - with more cases excluded from the analysis as compared to the method previously used. The results of the refined method are consistent with an increased clinical discrimination capability based on the use of APR-DRG classification logic and with the use of the relative weights, a measure of complexity useful to compare cases assigned to different APR-DRG categories.

Session 9
High-Cost Care Within Case Mix Systems

Supply-demand balance and diffusion of high-cost medical devices in Japan: region-level analysis by use of casemix classification

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Aims: Any hospital in Japan may introduce high-cost medical devices into their repertoire without regulation. Such a situation may induce an imbalance between the supply and demand of such devices. The purpose of this study was to demonstrate the supply-demand balance of high-cost medical devices, such as MRIs (Magnetic Resonance Imaging) and hyperthermia applicators. Furthermore, the relationship between the supply-demand balance and the change in supply was analyzed.

Data: Data for this study was obtained from three sources: (a) the data of patient data discharged between Apr 1, 2001 and Dec 31, 2005 from 16 hospitals, (b) medical device units and the number of procedures in each prefecture from a Survey of Medical Care Institutions by the government (2002, 2005), and finally, (c) estimated patient volume from a Patient Survey by the government (2002).

Methods: We developed two indicators: the supply-demand ratio and the supply-demand gap. The supply-demand ratio was derived from the observed numbers of the device divided by the expected numbers of the device. The supply-demand gap was obtained by subtracting the expected numbers of the device from the observed numbers of the device. For the two indicators, the expected demands were calculated by the distribution of patients and the number of procedures, both based on casemix classification. Data was analyzed at the level of prefectures in Japan.

Results: Variations in the supply-demand balance of MRIs and hyperthermia applicators between prefectures were identified across prefectures. The supply-demand gap and the change in supply were negatively correlated, indicating that over-supply would suppress introduction of new devices.

Conclusions: We developed the practical and valid methodology for the evaluation of supply-demand balance in high-cost technology, based on indicators by utilizing casemix classification. This methodology can help policymakers review regional health and medical care plan about resource allocation, such as technology and manpower.

How can expensive drugs, high cost medical devices or procedures and innovations be financed in a casemix-based hospital financing system?

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Objective: A frequently discussed problem within casemix-based hospital financing systems is the adequate financing of expensive drugs or blood products, high cost medical devices or procedures like e.g. dialyses. Most commonly the cost weight of a DRG is calculated by the arithmetical cost average of the case groups. Since typically not every case within that DRG receives one or more of the mentioned high cost services, options to solve that problem are needed. Notoriously difficult is the adequate financing of innovations in a casemix-based hospital financing system, especially when data of the past years is used for the purpose of developing a future system. As the true costs of an innovation for hospitals are hard to determine, it is extremely difficult to define adequate financing within DRGs. An additional problem is the time span between identifying a new procedure, introducing a respective coding and inclusion in the calculation, the so called calculation gap. The following annotations describe the options applied in the German DRG system.

Methods: In order to identify the cases which received expensive services and their additional costs which cannot be recognised as service based in the modular cost presentation a further augmentative data provision by hospitals that participate voluntarily in a partial census was implemented. This additional requested data consists of procedural information including the calculation procedure applied, service data, e.g. the number of services provided or the dosage administered in medications and cost data of drugs, blood products and specific medical devices. In order to finance innovations adequately in a casemix-based hospital financing system, a standardized and transparent method to identify new and not yet adequately compensated innovations was established. In the German DRG-system hospitals can ask to have specified services acknowledged as “new diagnostic or therapeutic methods”. For the acknowledged services a solution within the casemix-based hospital financing system will be established during the following years.

Results: With the help of the further augmentative data provision it is possible to decide, if a service fulfils the criteria to be financed by a supplementary remuneration. As a result for 105

highly complex services G-DRG version 2007 provides additional remunerations that apply nationwide. There are 47 supplementary remunerations for high cost procedures, e.g. dialyses, 2 surgical or interventional procedures, 54 for expensive drugs and blood products like chemotherapeutics and 4 for special treatments. In addition 20 services which had been acknowledged as "new diagnostic or therapeutic methods" were integrated in the G-DRG version 2007, mostly as supplementary remunerations. An indispensable precondition for the integration is that specific codes for these procedures had been established.

Conclusions: A fair, appropriate and resource oriented financing of expensive drugs, high cost medical devices or procedures and innovations in a casemix-based hospital financing system is possible by using supplementary remunerations and establishing a standardized and transparent method to identify new and not yet adequately compensated innovations. The basic instrument for this is the further augmentative data provision which proved to be an effective instrument for considerably shortening the time span between identifying a new procedure, introducing a respective coding and inclusion in the calculation, the so called calculation gap.

Assessing the quality of care from medical basic datasets: The case of low-molecular-weight heparin after major orthopedic surgery

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Aims: 'Real world data' analyses are needed to assess the quality of care in daily clinical practice. The aim of this study was to determine whether medical basic datasets associated with information on pharmacological treatments can be used to assess the quality of care and to compare hospitals' clinical practices. The case studied was prophylaxis with low-molecular-weight heparin after major orthopaedic surgery.

Methods: The study was performed in 20 Belgian hospitals. Patients who underwent total hip replacement (THR), total knee replacement (TKR), or hip fracture surgery (HFS) were selected retrospectively from the hospitals' 2002 and 2003 administrative databases (n=14,991). Readmissions during the same year as the procedure were also analyzed. Two quality indicators were assessed: Incidence of adverse events like venous thromboembolism (VTE), major bleeding and death; and cost of care.

Data: Two administrative databases were investigated: the Medical Minimum Basic Data Set (MBDS) database and the health bill summary database. The MBDS database contains medical information, such as principal diagnosis, secondary diagnoses, and procedures. Administrative data are also included. The health bill summary database contains information on resource use, such as the types and prices of performed procedures, of blood and implant products used, and of all pharmacological products given to the patient.

Results: VTE and major bleeding events were rare (1.9% and 1.1% respectively). Patients who underwent HFS were at greater risk of having a pulmonary embolism (OR=2.010;CI=1.384-2.921; p=0.0002), a major bleeding (OR=3.997;CI=2.929-5.455).

Refinement of DRGs reimbursement for chemotherapies bases on medical protocol in Hungary

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Background and objectives: In Hungary, the special documentation rules used to for chemotherapies from 2000 which ensure to control the medical protocol. After several discussion and refinement process from December of 2005, new reimbursement scheme were introduced for chemotherapies of carcinoma, except haematology cases. Hungary spends 18% of the public expenditures of the in-patient care on the treatments of cancer diseases for around 100 thousand cases/year. In the previous system, average expected resource's consumption of one hospitalization, irrespective off the relation to the cycle of the medical protocol due to chemotherapy was covered by DRGs.

Methods: In 2006, a new reimbursement scheme were introduced for chemotherapies based on DRGs according to cost-demand considering professional protocols (for 300 protocols 12 groups were set up). In consequence of the new, very expensive drugs, the cost-effective application, the reduction of practice variation and the need for the development of the quality of treatment induced a new type of reimbursement system. The charges cover the costs of one cycle without reference to the type of provision (in-patient, out-patient, courses) or the number of attendance to the Cancer Unit. Cost-weight of the DRGs varies between 0,53362-15,10534, moreover by defining of groups the minimization of variation was a very important aspect (0,04-0,12). The indications and the adaptability of protocols are well-defined. Chemotherapies are reimbursed only for providers that have competences to carry out the protocols. The process to accept of the new

drugs is connected to the process of definition medical protocols and reimbursement parameters by DRGs. The chemotherapy no listed are paid with very low amount.

Results: The new system was success to provide better care, but the professional and financial assessment has been continuous. The quality, appropriateness and effectiveness of care are well-controllable on patient level considering type of protocols in the totally 52 oncology centres.

Conclusions: The new method of reimbursement of chemotherapies is feasible for new, highly developed health technologies also. The flexible combination of principles of DRGs and protocol-based reimbursement was attained but a continuous follow-up and update of the programme is indispensable.

Assessment of Intensive Care Unit (ICU) functionality by patient acuity in Japan: A pilot study

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Aims: Interest in the appropriate assessment of ICU services in Japan has increased together with the introduction of a system of reimbursement based on Diagnosis Procedure Combinations (DPC - Japanese Casemix). There is a general impression of a lack of consistency within Japanese ICUs, with some providing post-operative care for severe patients and others used for treating moderate patients. Their expected functions, and levels of equipment and staff appear to be different across hospitals. However, a standardized classification methodology for ICU functionality has yet to be developed. Therefore, the aim of this study was to examine a methodology that could potentially be used to appropriately and broadly assess ICU functionality in Japan.

Methods: We developed methodology and used it to implement a survey to assess ICU functionality, checked the quality of obtained data, and described the variation of functionality across participating hospitals.

Results: We obtained 8,928 records from 141 hospitals, gathered from the patients who utilized ICU service during October 2006. Patient data was used to calculate APACHE (Acute physiology and chronic health assessment) score within 24 hours after entering ICU. Due to some missing variables, there were not a few records where the APACHE 'score was unable to be calculated. However, with the available data, variations were observed in the percentage categorized by APACHE' scores across participating hospitals. The results implied that there was a variation in the functionality of ICU services in Japanese hospitals.

Conclusions: Using this methodology, we were able to progress in the assessment of ICU functionality and to show variation in this aspect of Japanese hospitals. This suggested that an assessment based on patient acuity had the potential to be used in the classification of ICU functionality. After this, it is necessary to improve methodologies through more consideration towards appropriate assessment of ICU functionality in Japan.

Plenary 3
Case Mix for Rehabilitation

Implementing a Provincial Case Mix Adjusted Funding Model for Inpatient Rehabilitation Activity: The Impact on Bed Designations

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This paper will describe the implementation of a case mix system for inpatient rehabilitation activity in Ontario and review the impact of the implementation on hospital bed designation in the province.

Background: In the fall of 2002, the Ontario Ministry of Health and Long Term Care (MOHLTC) mandated the collection of National Rehabilitation Reporting System (NRS) data in all designated adult inpatient rehabilitation beds. From these data we developed a case mix grouping methodology with associated weights. Together these are being used to incorporate adult inpatient rehabilitation activity into the Integrated Population Based Allocation (IPBA) hospital funding formula. In Ontario, designated inpatient rehabilitation is typically provided in two sectors. Within the acute care sector, hospitals may or may not have designated rehabilitation beds. Even in hospitals that do not have designated rehabilitation beds, a patient may receive some rehabilitation while an inpatient, or on an outpatient basis. For example, a patient who has just had surgery may be visited by a physiotherapist to increase range-of-motion and strength while recovering from surgery. Within the rehabilitation hospital sector, facilities typically have designated rehabilitation beds and are usually referred to as rehabilitation hospitals. The care in these facilities is often organized on a programmatic basis, time limited and goal oriented. For example, a facility may have a stroke rehabilitation program that is 6 to 8 weeks long for individuals following stroke. These programs are provided on an inpatient basis and may or may not have an outpatient component at the end. Rehabilitation is also provided in other sectors of the health care system, but not on an designated inpatient basis.

Provincial Implementation: The province followed a three year implementation plan. During the first year data quality and completeness issued were identified. During the second year these issues were addressed, and regional education sessions were held to educate providers on the new case mix system. In response to the provincial implementation, certain facilities embarked on case mix reviews. These reviews included grouping their inpatient rehabilitation data for the first time in order to understand their case mix distribution and to investigate the issue of 'specialty populations'. One specific issue uncovered was the appropriateness of care being

provided in designated rehabilitation beds. For example, Tuberculosis care was being provided in designated rehabilitation beds, however, the care was not typical rehabilitative care. We will discuss the implications of issues such as this and the potential for re-organization of bed designations in this sector.

Developing casemix classification systems for rehabilitation in the UK

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The introduction of an episode-based reimbursement system within the UK NHS has led to the development of a new case-mix classification - Healthcare Resource Groups (HRGs), based on diagnostic and procedure codes. Diagnosis is a poor cost-determinator in rehabilitation. In the US and Australia, casemix classifications for rehabilitation have centred on function-related groups using physical dependency for on help for basic self-care as a surrogate for rehabilitation needs. These classifications may work reasonably well for many areas of general post-acute rehabilitation, but do not assess the need for inputs such as specialist nursing, therapy and medical care, which are important components of specialist rehabilitation programmes in the context of brain injury or progressive neurological conditions.

In the UK rehabilitation services are arranged in networks which include local general (LGRS), district-based specialist rehabilitation (DSRS) and complex specialised services (CSRS) providing tertiary rehabilitation for the low-volume high-cost group of patients with particularly complex needs. A 'one-size-fits-all' fixed rate episode tariff set at the level for average service costs would lead to financial destabilisation of CSRS, and also those DSRS which manage a greater proportion of complex cases. We have developed a set of validated tools to measure the complexity of rehabilitation need, offering direct assessment of rehabilitation inputs which may be used to provide patient level costing of rehabilitation service provision in a standardised format. The Rehabilitation Complexity Scale is a simple tool, which provides a valid and reliable, if somewhat crude, estimation of needs for rehabilitation input (see separate abstract). Feedback from service users suggests that it is practical to apply in time-pressed lower level services, but that it lacks sensitivity to distinguish higher levels of input at the more complex end of the scale.The Northwick Park nursing Dependency Scale (NPDS) and Therapy Dependency Assessment tool (NPTDA) have been developed to provide a more detailed breakdown of needs for nursing, therapy and medical interventions. From these, an algorithm is applied to provide a generic estimate the requirements for staff time in the relevant disciplines.

The tools provide a standardised assessment of need for rehabilitation input, may also be used to estimate staffing requirements in relation to a given caseload. This presentation will describe the tools and their application to provide patient-level costing of rehabilitation inputs which may be used to inform the development of appropriate tariffs and commissioning currencies across the range of rehabilitation service provision.

Validating the Nordic Assessment System /NASS- to the grouping of the rehabilitation patients

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Introduction: Case-mix of the rehabilitation patients has been actual in many countries. Rehabilitation is delivered in multidisciplinary teams. Cost-effectiveness of rehabilitation work is of general interest. The definition rehabilitation and structure of the services varies between countries. Case-mix work on rehabilitation has been done previously at least in Australia, Canada and United States. The Nordic countries have a common interest. Therefore the Nordic Centre for Healthcare Classifications has published the first version of grouping logic and continues to work with the issue.

Results: The new Nordic system to evaluate rehabilitation patients, called NASS (Nordic Assessment System), is been introduced. The usability of the grouping for the expenses, evaluation of the patients and education of the personnel will be presented.

Discussion: The Nordic co-operation in rehabilitation case-mix will continue. A wider perspective, like quality of life and there relation to case-mix applications needs to be examined. This is essential for the case-mix of out-patient care. We have found international collaboration useful in our work.

The effect of medical need to the disability based patient classification system - A critical review of disability based patient classification

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Background: Disability based patient classification systems have been studied/developed in several countries. The limitations of these systems are its complexity and low explanatory power, not representing medical need of patients.

Objective: To critically review limitations of disability based patient classification systems in the light of disability components and medical need of the patients..

Method: Disability based classification systems including RUGs, FIM, SMAF, TAI and the classification system for the long term care insurance (LTCI) law in Japan were reviewed with regard to explanatory and outcome variables including disability and medical need. The author is especially interested in the use of medical and rehabilitation need used as explanatory variables. In addition, attention was paid to complexity and the power of estimation of each system.

For this purpose, a secondary analysis of a large scale one-minute time study was performed to understand the correlation between medical and disability variables.

Result: RUGs had more medically related explanatory variable, followed by the Japanese LTCI classification system. A secondary analysis of TAI data suggested that medical need of the patients have an effect on the explanatory power according to the disability level. The detail will be discussed at the conference.

Discussion: The scope of each disability based classification system depends on the framework of each model. For example, RUGs and Japanese classification system for the LTCI law contained more medical explanatory variables compared to the others. These two were developed in relation to fee schedule of long-term nursing care facilities. Therefore these two systems included medical service use in long-term care facilities. In contrast, FIM, SMAF and TAI were developed as patient management tools. Although medical components had a positive effect to explanatory power, use of medical need related variables increased the complexity of classification system, consequently restricting their use as patient management tools.

Session 10

Primary care

Evaluating case-mix and predictive modelling measures within the British primary care sector

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Aim: The goal of this project was to promote the ability of the NHS to apply diagnostic and other clinical information to develop state of the art case-mix measures relevant to medical and fiscal management activities. In addition, it demonstrated the validity of the ACG case-mix system using Read codes.

Data and methods: Data was obtained from three Primary Care Trusts (PCTs) within the British NHS. Four years of data were collected at two of the sites, while two years were collected at the third site. The population of the sites varied from 6,000 to 20,000 in 2005. The independent variables included age, gender and diagnostic information, in the form of Read codes. A range of variables were used to measure resource utilization.

Results: The project looked at three specific applications:

Population Risk Profiling to assess the disease burden of populations for resource allocation: There was found to be a very strong relationship between the simple risk score distribution and relative resource use in all three sites. The distribution of Read codes demonstrated that the number of codes per patient differ significantly across practices. The distribution of ACG-PM risk scores by postal code revealed the differences across geographical areas. Eleven conditions have been identified as key conditions in the ACG program. There is significant variation in the distribution of key conditions.

Provider Performance Profiling to assess efficiency across PCTs or providers: For budgetary allocation and performance profiling, concurrent regression models were used to estimate the expected resource use adjusted for demographic and diagnostic information of the patient. The actual and expected resource use were then compared to profile providers performance and measure efficiency.

Predictive Modelling to identify people at risk for assessment and care planning: Comparisons of the explanatory power of alternative models, show significant improvement when ACG measures are added. Highest explanatory power is achieved with total secondary care costs as the dependent variable. For primary care variables, the explanatory powers are much higher for pharmacy use and lab tests. It is possible to identify 4.2% to 21.5% of all true high risk patients from the models. A list of anticipated high-risk patients for 2006 was generated.

Conclusions: Accounting for differences in the health status of populations and their anticipated need for health care services is necessary when considering policies at the individual level, be it the provider or patient level. Our results show that UK populations do vary in their need for health care resources and can be successfully compared across PCTs, as well as on the individual practice level, to assess the disease burden and the health care resource needs of the population. The ACG model proved to work well with the available British data. These results can be directly used for population risk profiling, performance management, or case management.

ACG potential for capitation policies

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Aim: To verify the explanatory power of ACG casemix system for primary healthcare services (PHC) use and pharmacy cost in Spain to develop integrated care strategies and capitation policies.

The research is ongoing on explanatory power of ACG of variability in total cost for population healthcare, including primary and specialized care.

Data and methods:

Data from two geographical areas of Catalonia, Spain, have been used (2005):

- Area 1 with a population of 151.543
- Area 2 with a population of 417.517

Data used: age, sex, active diagnosis during the period, visits, pharmacy cost and referrals to specialties. Pharmacy cost does include bills paid for drugs delivered to each patient and total pharmacy cost (including hospital pharmacy cost)

ACG version used: 6.1.

The variance of PHC use (visits) and Pharmacy cost explained by age and sex and ACG have been tested using R2. All analysis has been done for all patient and inliers and with actual values and log transformed ones.

Results: Age and sex explains between 3 to 6,7% of visits variability while ACG explains from 35 to 45%. PHC drugs cost variation is explained in a 16-25% by age and sex achieving a 41-43,6% with ACG. All these results are using the log transformed values which shows higher explanation powers than the non transformed analysis in most cases.

The results in Area 2 show higher explanation power for all analysis with the exception of explaining PHC utilization by age and sex.

Conclusions: The previous experiences for capitation in Spain had used age and sex as the unique adjustment. ACG show an improvement in variance explanation in respect to the age and sex groups for visits and pharmacy costs. The results obtained for PHC use (visits) are similar in other studies in Spain.

Area 2 has better data quality measured by the percentage of cases without diagnosis and the average number of diagnosis per patient and the better data quality could be the explanation for higher ACG power on this population as co-morbidity should be better captured.

Analysis on total costs, including hospital and other services cost, is ongoing and studies in larger populations will be carried out soon as the PHC database grows and data quality improves. Nevertheless ACG carries an important improvement to the explanation achieved by age and sex offering an important opportunity for improving capitation adjustment.

Physician practice profiling in Primary Care Groups in Parma Local Health Unit, Italy

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Background: Primary care in Emilia-Romagna is delivered by general practitioners (GPs) organized in teams called Primary Care Groups (PCGs). Each team brings together GPs, paediatricians, specialized physicians, nurses, obstetrics and social workers. Members of the teams act in full autonomy but are structured as clinical networks. The aim is to take charge of patients and provide them with an integrated delivery of health care.

Aims: The objective of this project is to compare physician practice patterns among the 21 PCGs in Parma Local Health Unit (LHU) across various dimensions of care with the goal of assisting the PCGs in assessing and improving the quality of care provided to their patients.

Methods: Data from the 2005 Emilia-Romagna Health Care Regional database were used to profile the 21 PCGs in Parma LHU. The database includes demographic, hospital, outpatient pharmacy, and outpatient specialty data on all residents, as well as information about each primary care physician in the region. We restricted our study to GPs, excluding paediatricians. From this database, we retrieved information on approximately 400,000 Parma LHU residents, as well as on 311 Parma LHU GPs and their PCG of practice. We included GPs who practiced for the whole year in only one PCG. The sample patient population comprised individuals who were residents in Parma LHU for the whole year and did not change their GP during the year. The unit of analysis was the PCG. Analyses of all variables of interest, including characteristics of GPs, as well as demographics and utilization of health services of their patients, were defined jointly by the project team and leaders of the 21 PCGs.

Results: Three hundred six GPs (98.4%) met the inclusion criteria. These GPs had a total number of 325,683 continuously enrolled patients for 2005. The number of GPs per PCG ranged from 6 to 27 and the mean number of patients per GP in each PCG varied from 910 to 1,176. Among the 21 PCGs, on average 52% of patients were female (range 49-54%) and the mean age was 51 (range 49-55). The proportion of elderly patients varied greatly across PCGs, from 25 to 40% of the population. Cardiovascular diseases, gastric disorders, rheumatologic conditions, and psychiatric illnesses were the most prevalent diseases, although standardized rates varied substantially among the PCGs. Standardized rates of hospital medical admissions varied across the PCGs (range 58-84 admissions per 1,000 individuals). Pharmacy and specialty services utilization also exhibited significant variation among the PCGs.

Conclusions: The study demonstrates that there is a considerable variation in physician workload and medical patterns among PCGs. These results provide PCGs with relevant information to understand and to improve their practice and clinical outcomes.

Monitoring ACSC, a hospital MBDS-based indicator of Primary Health Care effectiveness.

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Introduction: Ambulatory Care Sensitive Conditions (ACSC) are hospital admissions considered preventable with a timely and effective primary health care (PHC). ACSC rate is a population-based indicator, easily obtainable from hospital MBDS. A Spanish modified version of ACSC have been used in last years in Catalonia (Spain), being included in 2005 in the contracts between Health Authority and PHC providers. SAGESSA is a group of publicly-owned providers managing all levels of care in a geographical area (350,000 inhabitants) of southern counties of

Catalonia (Spain), with 5 Basic Health Care Units (BHCU) and a university hospital (UH) located in the Camp de Tarragona Health Region (CT Region).

Aim:

1. Monitoring and comparing PHC overall effectiveness by means of ACSC, in CT Region and the 5 BHCU managed by Sagessa Group.
2. Implementing a feed-back Information System in Sagessa Group (from hospitals to BHCU)

Data & Methods:

1. Yearly 1998-2006 (9 years) hospital MBDS of CT Region inhabitants (around 500,000), discharged at any hospital. Yearly censed/assigned populations. Assigning ACSC through principal diagnosis. Yearly frequencies and rates of the 35 ASCS, for CT Region and each Sagessa Group BCHU. Evolution and comparison of among BHCU and CT Region.
2. MBDS of the UH managed by Sagessa Group in CT Region, with patient ID and BCHU. From 2005, ACSC reports are quarterly produced to each BCHU in order to review patients involved and their clinical management.

Results: ACSC represent a mean of 7,5% (5,5% - 11,5%) of hospital discharges. ACSC rates have been stable in the CT Region during the period 1998-2006 (96/10000 hab). Overall Sagessa BCHU rates also, but with values always lower (75/10000) than CT Region.

Measuring the quality of care in a primary care setting on the basis of a efficiency-effectiveness study (in Catalonia-Spain)

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Purpose: To investigate the relationship between efficiency (calculated on the basis of ACG) and effectiveness (measured as a Qualitative Synthetic Index [QSI] obtained from clinical practice indicators) in five Primary Care Teams (PCT).

Design and Methods: Retrospective descriptive study. All the patients visited by the five PCT during year 2005 were included. The collected variables were: age, sex, episodes/consulting causes, total cost, PCT, physician and QSI. A unique clinical case-mix category (morbidity class) was assigned to each patient using the Johns Hopkins ACG system (ACG grouper 7.0; n=106). An Adjusted Efficiency Index (EI), which means the relative efficiency in relation with an expected standard (observed/expected), and the QSI were obtained for each PCT and physician. A Spearman correlation analysis was used to analyze the relationship between EI and QSI, with a significant level for p0.05.

Results: 83873 patients were included in the study (75.6% of the total population), with a mean of 4.8 3.5 diagnosis and 8.0 8.1 visits/patient/year. EI for each PCT were: 0.92; 0.94; 0.95; 1.06 and 1.06 (p=0.000). QSI were respectively: 68.9%; 66.1%; 45,8%; 43.4% and 31.6% (p=0.000). An inverse correlation between EI and QSI (p0.001; R2=37%) was observed.

Conclusions: Relationship between efficiency and effectiveness dimensions could be a good proxy of quality of care measurement for PCT and for individual physicians. A direct association of more efficiency with better effectiveness of interventions is present in our study. However, data must interpreted with caution due weakness in their external validity.

Session 11

Using Cost Data Within Case Mix Systems

Cost outlier - why?

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Background: If a patient is not correctly coded, 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. Stockholm county in Sweden implemented DRGs as a base for reimbursement in early 90s. Until a few years ago outliers have been defined via length of stay. From 2004 a transformation to cost outliers began.

Aim: In order to evaluate the use of cost data for defining outliers a project started in 2006. The main questions for the project to answer were:

a) Are there - and if so to which extent - among cost outliers, cases that are incorrectly coded and therefore are defined as outliers although they shouldn't have been?

b) Why have those who are correctly coded become cost outliers? Is it due to incorrect costing data, malpractice or severity of illness?

Methods and data: In phase 1 a coding audit was performed of 277 records (defined as cost outliers) from Karolinska University Hospital in Stockholm. In phase 2 a medical audit was performed of a sample of these 277 records.

Results: Phase 1 results 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.33 cases were not defined as cost outliers with correct coding. In phase 2 a medical audit will be performed on a sample of the cases that after the coding audit still were outliers.

The inpatient service costs of two Thai psychiatric hospitals

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Introduction: To introduce a better alternative of allocating appropriate resources for psychiatric inpatient services, actual cost and cost behaviour are needed in the Thai health care system.

Aims: This study aimed to compute the inpatient service care costs and to explore variables influencing inpatient service costs by a generalized linear model (GLM).

Methods: This research was a cross-sectional and prospective study in view of service providers. We described methods by identifying cost centres,

activities, and drivers, collecting data, and calculating cost by both traditional cost accounting and activity based costing (ABC) methods. Data on clinical and cost were collected from two pilot psychiatric hospitals under the Thai mental health department. Our data came from three major sources: cost accounts from accounting reports, clinicians' records of inpatient clinical characteristics, and inpatient discharge abstract file, during January to April 2004.

Results: There were 23 major activities of inpatient services such as admission, psychotherapy, electroconvulsive therapy, discharge, etc. The psychiatric service care costs were predominantly determined by personal cost. By traditional cost accounting, the total inpatient care cost was 696 Thai Baht (19.9 USD) per diem or 17,388 Thai Baht (496.8 USD) per case, while the costs was 438 Thai Baht (12.5 USD) per diem or 9,645 Thai Baht (275.6 USD) per case by ABC. Therefore, the ABC approach was only 44.53% of the traditional approach. The GLM model was also used to illustrate the impact of changes in resource costs and in practice patterns. The patients' severity of symptom and functional level, age, and diagnosis significance reflected service care costs (The gamma model of service cost with r2 equals to 1.73. (The gamma model of service cost with r2 equals to 1.73).

Conclusions: The presented costing model illustrated inpatient service care costs and cost behaviors in Thai's psychiatric hospitals. The results of this study support a planning and allocating mental health system and policy.

Adjusting DRG weights for Outliers

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DRGs typically describe around 40% of the variation in the costs of treating patients. However, introducing a length of stay outlier policy can increase the explanatory power of DRGs to around 80%. Consequently casemix funding models often use an outlier policy to better describe the costs of treating patients. This potentially introduces a bias within the funding model. Different DRGs and different outlier policies will result in different numbers of outliers in individual DRGs and consequently different levels of bias. Bias occurs because high outliers can be effectively double funded, once within the DRG weight and once through the outlier payment. DRGs with relatively high numbers of outliers are advantaged under this arrangement.

To overcome this problem some systems calculate weights using only the costs of inliers. However, the extent to which the average inlier costs reflects the real DRG average cost after adjusting for outlier payments is problematic. This is especially the case where outlier policy is used extensively to better fit the payment to the costs for individual patients. This was illustrated in the State of Victoria, Australia, where, for selected DRGs the high boundary was lowered from three times the average length of stay for the DRG to 1.5 times the average length of stay. This improved the R-squares associated with the funding model, but reduced overall funding to some DRGs. Importantly, approximately AU$1,000 per case was removed from the Tracheotomy DRG, the most important DRG associated with intensive care. This change reduced the overall viability of ICUs within the state and consequently in subsequent years various adjustments were required in the weights setting process.

A second important problem associated with only using inlier costs when calculating DRG weights is that this process requires patient level costing. DRG cost modelling software does not provide this level of detail. Consequently, DRG cost modelled data cannot be routinely used for calculating inlier weights, representing a problem for countries that rely on cost modelled data. This is typically the case in countries when they first start to undertake costing studies.

This study derives a process for adjusting DRG weights for outliers without requiring inlier average costs and compares the impact of applying the approach using data from Turkey and Australia. It provides a simple and effective way of removing potential distortions introduce by outlier policy and allows the application of an outlier policy in countries relying largely on cost modelled data.

Challenges to defining resource indicators for CMG+, Canadas acute care inpatient grouping methodology

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In the spring of 2007, the Canadian Institute for Health Information (CIHI) introduced CMG+ (Case Mix Groups+), Canadas acute care inpatient hospital grouping methodology. CMG+ uses administrative and clinical data to group patients into clinically relevant and resource-homogeneous groups. CMG+ identifies 21 major clinical categories (MCC), similar to Major Diagnostic Categories (MDC), and 558 CMG (analogous to DRG). CMG+ is an ICD-10-CA/CCI-native

grouping methodology that replaces the ICD-9/CCP based CMG/Plx methodology. The complexity (Plx) overlay in CMG/Plx was replaced in CMG+ with a comorbidity-based factor and three intervention-based factors: fourteen flagged interventions (such as chemotherapy, mechanical ventilation, and tracheostomy), a count of intervention events (OR/intervention suite visits for significant interventions) and three out-of-hospital interventions. In addition, the number of age groups within CMG+ has been expanded. The prevalence of these factors explains considerable variation in resource consumption.

This presentation will review the process for defining the CMG+ health resource indicators and detail the challenges encountered. The two resource indicators are Expected Length of Stay (ELOS) and Resource Intensity Weights (RIW). ELOS is a measure of the acute-care days of stay expected for each type of patient while RIW is a measure of cost, relative to the average typical acute-care inpatient. There are over 2 million acute-care cases annually, about a fifth of which include associated case-cost information. The introduction of the CMG+ methodology, particularly the low-volume intervention factors, has created challenges to producing accurate and stable estimates.

Case-cost data are received primarily from larger/teaching facilities, necessitating adjustments to make RIW estimates nationally representative. Regression models were developed and cases adjusted for significant factor effects. Low volumes of factor cases necessitated rolling up to MCC and higher levels to produce factor adjustments, reducing the number of CMG-specific estimates. The log of length of stay and of cost were used to produce ELOS and RIW estimates, resulting in multiplicative factor effects. Cases with many factors create unique challenges to producing stable year-to-year estimates. Atypical cases (deaths, sign outs and transfers) and long-stay cases also present unique challenges to resource estimation as the volume of these cases is even lower; typical cases are used to enhance atypical estimates.

Session 12

Refining Case Mix Classification Systems II

Challenges in Developing a National Grouping Methodology Using an International Classification System

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In the spring of 2007, the Canadian Institute for Health Information (CIHI) introduced CMG+ (Case Mix Groups+), Canadas acute inpatient grouping methodology. CMG+ uses administrative and clinical data to group patients into clinically relevant and resource-homogeneous groups. CMG+ identifies 21 major clinical categories (MCC), similar to Major Diagnostic Categories (MDC), and 558 CMG (analogous to DRG). CMG+ is an ICD-10-CA/CCI native grouping methodology that replaces the ICD-9/CCP based CMG/Plx methodology.

ICD-10-CA is an enhanced version of ICD-10, created to reflect current Canadian practice. Although this Canadian version of ICD-10 was used in the analysis and creation of CMG+, CIHI has remained true to the WHO classification standards. This was done to ensure continued international comparability. Maintaining the commitment to WHO standards, however, presented a challenge in appropriately grouping dagger/asterisk conditions. The dagger/asterisk convention captures disease etiology and manifestation. According to the WHO coding standard the etiology should be captured as the primary condition while the manifestation may be captured as a secondary condition. In Canada the primary condition is known as the Most Responsible Diagnosis (MRDx).

This conflict in standards has been noted internationally in DRG systems. In the CMG+ high-level logic, the MRDx is used to determine the assignment of a case to the MCC and the diagnosis-driven CMG. Unfortunately, in some cases, the etiology (MRDx code) would group the case to one MCC while the manifestation would involve another body system, and MCC, entirely. This would occur even though the manifestation was often be the focus of treatment. Even more problematic are the cases where this focus of treatment included surgical interventions which determine the assignment of the case to an intervention-driven CMG within the above-determined MCC. Because the intervention would be directed towards the manifestation and not the MRDx, the case would be grouped to an Unrelated Intervention CMG within the MCC. This would result in the loss of important clinical information. Therefore, one of the challenges in building CMG+ was to allow the methodology to group using the manifestation, where appropriate, even though the WHO rule prohibited it from being the MRDx.

This paper will outline how this was accomplished in CMG+, discussing the issues, options, and solutions. It will then go on to demonstrate how the new CMG+ methodology groups this type of record and will show examples of how the groups have improved clinically, particularly with respect to the grouping of diabetic patients.

Developing a South African Episode Grouper

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Episode groupers aim to “tell an individual’s health care story” through the systematic categorization and grouping of one or more health care encounters, in order to construct one or more episodes of care for that individual.

Discovery Diagnosis Groups (DDG) is being developed, within the South African private health care context, with the aim to make sense of an individual’s acute and chronic health status. Episodes of care permit risk adjustment by segmentation of populations and which supports health care analysis, including the examination of issues of appropriateness, access and continuity of care.

Discussion: In contrast to some other clinical groupers which focus on health care as a function of the (supply side) of services provided, DDG attempts to analyse and incorporate the complex and interrelated signs, symptoms for which individuals seek health care in South Africa and associate these with the eventual diagnosis of the underlying illness (demand side).

This paper will discuss the methodology used to analyse the clinical condition for which an individual had an encounter with members of a health care team. Data used includes ICD-10 (WHO unmodified) a code gleaned from an individual’s billing data, which forms the primary episode of care indicator for the vast majority of episodes. A small minority where no ICD-10 code is available is inferred from the use of specific medications or procedures definitively related to a diagnosis. Given that ICD-10 codes are now mandated on all claim lines in the SA private sector, it is anticipated that this need will soon be redundant.

A “clustering” methodology further allows conditions that are clinically similar to be “rolled up” or grouped into a hierarchically structured algorithm.

An episode of care is defined as the period of time between the first and last encounter for the same health problem which is followed by a specific ‘encounter free’ period of time.

Results: The DDG algorithm has been tested on a data set from the funds administrated by

Discovery Health covering approximately two million lives with four years of data, totaling 350 million claims lines.

The explanatory value of the DDG was tested on a complete set of data for 2006, with total amount claimed as the dependant variable. This includes differential prices for the same services between providers and networks. A R2 of 20.8 percent is achieved with the DDG code as the only independent variable. Further refinements in terms of layering the Medstat Disease Staging software onto the DDG as well as age and gender will form part of the next set of iterations and will be presented in the final paper in November.

Conclusions: The Discovery diagnosis groups already demonstrate a good predictive value, whilst limitations do exist, a range of iterations are planned for further refinement. Nonetheless it is already currently in use for the routine management of the health fund.

The further development of the DBC system towards a DBC classification based on International Standards; First results.

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DBC onderhoud

Introduction: In January 2005 the Dutch Health Care system (DBC-system) was successfully introduced in the Netherlands as a replacement of the "old" budgeting system and as a tool to liberate the health market.

The DBC-system was developed between 2000 and 2005. Compared to other DRG-systems it has two main differences. First an important requirement was to develop a system that describes the total episode of care delivered in hospitals: so not only the inpatient care but also outpatient and day care. Second the system was developed as a local diagnosis classification for each specialty and not based on International Standards.

Although we consider the first difference as a benefit of the DBC-system, the second difference has led to a reorientation of a recent situation and a further development of the DBC system towards a DBC classification based on International Standards. It is of great importance to increase the uniform use of diagnosis within the DBC-system and to realise the international comparability. In this paper these developments which have been initiated last year and will take until 2012 to be finalized will be further introduced. The first results of these major processes of change will be presented during the conference. The focus in this paper will be on the process of development and the describing of the first care-products of the new DBC-Classification based on International Standards.

Conducting a National Pilot of the new CMG+ Grouping Methodology

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Background: In the spring of 2007, the Canadian Institute for Health Information (CIHI) introduced CMG+ (Case Mix Groups+), Canada's acute care inpatient hospital grouping methodology. CMG+ uses administrative and clinical data to group patients into clinically relevant and resource-homogeneous groups. CMG+ identifies 21 major clinical categories (MCC), similar to Major Diagnostic Categories (MDC), and 558 CMG (analogous to DRG). In addition, CMG+ makes use of five factors to further account for clinical and resource differences within CMG groups. CMG+ is an ICD-10-CA/CCI native grouping methodology that replaces the ICD-9/CCP based CMG/Plx methodology.

Aims: Prior to launching CMG+, CIHI conducted a national pilot of the Beta version in August 2006. Pilot participants represented a cross provincial mix of community, teaching and paediatric facilities in rural and urban areas. The goals of the pilot were to:

- Identify material modifications to CMG+ for fiscal 2007/2008;
- Determine potential updates to the methodology for fiscal 2008/2009; and
- Test the CMG+ Directory (HTML format).

By participating in the pilot, organizations were the first in the country to be introduced to CMG+, which provided them with the opportunity to:

- Learn about the inputs and components of the new methodology;
- Find out how to utilize and interpret the new methodology; and
- Gain a head start on planning for the incorporation of CMG+ and associated factors into their utilization management and decision support reporting activities beginning in fiscal 2007-08.

Methods and Data: In order to review and assess CMG+, participating sites were provided with a number of tools and materials, including the following:

1. Two sets of summary reports that grouped their fiscal 2005/2006 data: 1) Grouped

with the 2005 CMG/Plx; 2) Grouped using the new CMG+.

2. Record level data with the new CMG+ values included.
3. Results of a national system-wide analysis, which allowed all sites to easily identify expected shifts in MCC, CMG and Factor assignment.

Results and Conclusions: The paper will discuss in detail the process and organization of conducting a comprehensive national pilot and demonstrate the effectiveness of a pilot project that can be applicable to any health care system. Included in this paper will be the methods for soliciting participation, developing education materials and creating data files for pilot participants. In addition, the following key issues will be discussed:

1. Importance of client buy in to a new grouping methodology
2. Planning a national comprehensive pilot
3. Lessons learned from the pilot
4. Improvements made to CMG+ prior to implementation.

What is a fair DRG system? – Experience of five DRG-years in Germany

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Background: Starting in 2003, the previous per diem financing for hospital patients in Germany was replaced by DRGs (G-DRG). Since 2004 (after a single "optional year"), nearly all inpatients of acute hospitals are subject to DRG remuneration. The primary goal of the DRG implementation was appropriation according to actual expenses, so payment should be based on the rendered services. To define a "fair price" for hospital services, a correct allocation of cases to homogeneous cost classes as well as precise determination of actual case costs are required. Accordingly, DRG classification and cost calculation are two pillars of fair DRG prices.

Methods: Based on hospital data of the previous year, the G-DRG classification is developed and cost weights of each DRG are calculated every year. All German hospitals (about 1,800) are obliged to provide hospital specific structure data and case related service data (including all information that is needed to assign the case to a specific DRG) annually. In addition, detailed cost data are provided by about 290 hospitals that participate voluntarily in a partial census. These so-called "calculation hospitals" use a standardised cost calculation methodology that is published and updated annually by the German DRG Institute (InEK). The data submitted to InEK in 2006 consisted of 18 million in-patient discharges, 4.5 million of which contained detailed cost data. All data undergoes extensive plausibility checks and the results of the cost calculation are discussed in detail with every participating hospital in an elaborate auditing process. More than 2,000 possible modifications of the DRG classification are tested every year and their potential to improve the DRG system is evaluated using the data from the calculation hospitals.

Results: With the objective to achieve fair prices, four issues have proven to be of crucial importance in the annual DRG development process: i) Establishing a sound methodology to determine factual case costs; ii) Reducing "compression"; iii) Preventing underpayment of unavoidable risks; iv) Integrating medical progress in a timely manner.

To quantify the actual expenses of hospital patients is a complex task. In order to calculate expenses approximately accurate, in our experience at least the calculated cost of a) utilization of physicians and nursing staff, b) high cost materials and c) infrastructure should be close to reality.

The term Compression denotes a tendency to underpay high cost cases while overcompensating simple services. This may be due to unsuitable cost calculation methods that lead to underestimate the cost of highly complex services (calculational compression) and can thus be avoided by improving calculation. Mixing complex and simple services in the same DRG can bear similar results, either because the DRG classification is not properly designed or complex cases are not yet discernible due to the lack of specific coding (documentary compression).

Unavoidable risks are high-cost patients that do not reach an adequately compensated DRG, although neither inefficiency nor poor coding can be blamed. Examples are outliers or highly variable services such as chemotherapy in malignant disease. Here, underpayment can be prevented by supplementary remunerations or refinement of the DRG classification which may turn outliers into inliers, provided that these cases can be accurately described and assigned to a specific DRG.

Due to an uneven distribution of these high cost cases between hospitals, for DRGs containing high-cost patients as well as less complex cases, average prices often are not fair prices. The timely representation of medical progress requires an

intensive dialogue with providers of specialised medical services as well as a quick input of performance and cost data of new treatment methods into the process of DRG development and cost calculation.

Conclusion: DRG systems are no obstacle in achieving fair prices for hospital services. To the contrary, it could be stated that a refined DRG classification based on reliable representative cost data and a standardized sound calculation method provides an adequate solution to this task. To integrate medical progress and provide adequate financing for new methods of diagnostics and therapy is a constant challenge for any hospital reimbursement system.

Plenary 4
Measuring performance in hospitals

Composite indicators of performance: statistical properties and incentive effects

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The objectives of health care organizations and practitioners are multidimensional, and numerous measures of their performance have therefore been developed. However, there has been a recent trend towards aggregating such individual measures into a single 'composite' measure of attainment, intended to signal the overall performance of the entity under scrutiny. Examples include the scores given to entire health systems in the World Health Report 2000, and the four grades of 'star ratings' attached to hospitals and other health care organizations in England. Such initiatives offer intuitively attractive summaries of performance, and attract widespread media and popular attention. However, the reported composite scores are often viewed with considerable suspicion, and are quite sensitive to the methodology used to aggregate the performance indicators.

This paper first examines the statistical properties of composite performance measures by disaggregating the reported scores on individual indicators into a permanent and a random element. This permits the construction of confidence intervals around the report composite scores. Furthermore, where a small number of categories of aggregate performance are used (as in the English star ratings), it allows us to examine the sensitivity of the composite rankings to the decision rules used for assigning organizations to performance categories.

Composite measures of performance are often used in association with either implicit or explicit incentives for the organizations under scrutiny. The presentation ends with an examination of how organizations or practitioners might react to the publication of such composite measures, and the risk inherent in their construction. It includes an examination of the 'Quality and Outcomes Framework' for UK General Practitioners (GPs), which seeks to attach high-powered financial incentives to a scoring mechanism based on 150 measures of GP performance.

Session 13

Classification Systems

Towards an International Platform for Diagnosis and Procedures Coding Systems for Case mix. How to Use Ontology and Standards. The Categorial Structure of Human Anatomy: Catanat

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There is since the extension of case mix projects all around the world a need for updated and harmonised health care classifications and coding systems to allow international comparisons and cooperation. It is not feasible to propose a standardisation of the linguistic expressiveness of different health care professionals but since 2 centuries the WHO ICDs have been a reference but to day the different case mix projects are not using the same version (9 or 10). For procedures coding systems it is a mix of jungle and desert. One solution could be to agree on a reference clinical terminology as Snomed-CT which is supported by a new international organisation named IHTSDO (International Health Terminology Standard Development Organisation) but it is until now restricted to fully or partially English speaking countries T he European Standard Body CEN has developed since 1990 an approach named categorical structure as a step standardising only the terminologies model structure or the ontology. The categorical structure for terminologies of human anatomy currently in the phase of final approval is presented here and explained as an example of the use of ontology and standards methodology for harmonising between classifications and coding systems based on biomedical ontology. This methodology already used for the French CCAM procedures coding system will be applied to the 11 revision of WHO ICD and the maintenance of SNOMED CT. It is a way towards an International platform for healthcare terminologies coding systems.

The importance of age in classification systems

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Age is one of the few hard facts in the minimum basic data set (MBDS) and the analysis of the influence of the age or the age class on costs or the length of stay (LOS) has shown that it is a very important predictor. Since the beginning of the Austrian DRG-system, which was introduced for the reimbursement of all inpatients in 1997 age was a very important classifier. Similar importance can be found in other DRG-systems worldwide. Austria is now evaluating its DRG-system and in this process an extensive analysis of the role of age on LOS and on costs is performed. Based on the MBDS of the last years and on cost data statistical procedures are used to identify and model the influence of age. First descriptive statistical methods are used to demonstrate the influence of age on LOS. It can e.g. be shown that in many DRG's there is a strong linear increase of the LOS with increasing age which can be modelled by a regression equation. In other examples there is an increase up to a certain age, than the relation between age and LOS is constant up to a certain age and afterwards it is again increasing or one can model it by a step function. Classification tree methods are used to identify the best cut off points for age or age classes in the Austrian DRG's. Furthermore the interaction between age and other classification variables like intensive care unit yes/no, main and additional diagnoses, procedures etc. will be discussed. Examples of the importance of age on the LOS and costs in the Austrian DRG-system will be given. The role of age in other DRG-systems worldwide will be discussed.

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Do You Speak DRG ? Measuring the Complexity of DRG Labels by Counting Conjunctions

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Introduction: Patient Classification Systems are constructed by collapsing similar diagnoses and/or treatments within not too many discrete groups, typically some 500 until 1000. These patient categories are usable if their labels are comprehensible.

In this study, the complexity of the DRG labels of several DRG systems is explored over time. As data, only the DRG labels were necessary to look at.

Data: The following DRG systems were inspected: Medicare DRG 1993/94 to 2006/07, AN-DRG 3.1 to AR-DRG 5.2, G-DRG 2003 to 2007.

Methods: For each DRG label the following conjunctions were counted: 'and', 'or', 'with', 'without', periods, slashes, parentheses and the word 'age'. Sequenced conjunctions are counted as 1.

Results: Whereas the number of conjunctions used in labels of Medicare DRGs stays relatively

unchanged over time (the quota of labels with four conjunctions or more increases from 6% to 8%), there is some increase with the labels from AN-DRG 3.1 until AR-DRG 5.2 (10% to 16%). In contrast, there is much increase in the use of conjunctions in the G-DRG labels (15% to 41%).

Discussion: The use of conjunctions not only worsens the comprehensibility of DRG labels, it sometimes makes expressions illogical and even unintelligible. To get better DRG labels, it could be of help to use parentheses, to split up complex DRGs for clinical homogeneity, to construct DRG systems with 'smoother' boundaries between categorised patients.

Conclusion: A DRG system should not only be useful for statisticians, but it should also serve as a basis for discussions between clinicians and managers. Thus, it is necessary to make sure that DRG labels are comprehensible. This is especially important when DRG systems are strongly optimised with regard to statistical performance (as it was done with the G-DRG system).

How to spread the knowledge about classification!

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Background: After education in Patient Classification at the University of Gothenburg, we wrote a couple of crib sheet, both for doctors and for secretaries at the surgical clinic in our hospital. We have also educated our colleagues, we have pointed out what they need to think of, when they are classifying diagnoses. We have checked some medical journals and discovered a lot of errors wrong first diagnose, the measure/measures were connected to the wrong diagnose, and sometimes the doctor had forgotten some diagnoses.

After this course the secretaries have become more aware of how important it is to have the right diagnoses, both for the patient and for the hospital economy.

At the Queen Silvia Children Hospital the secretaries, who have university education in classification, meet every fortnight in purpose to discuss and solve problems around the coding.

Question: How do you spread the knowledge and experience of classification to other hospitals and to other countries? We would like to take part in the experiences of other secretaries and their way to reach out.

Method: With our education, knowledge and experience as teachers at our internal education, we want to give our colleagues an idea of what they shall be aware of, and we also want to start a discussion at their clinics how to classify. Both educations, our education and the internal one, have been very successful. Several other hospitals have sent their secretaries to us.

The internal education is based on the system ICD-10. We discuss the most important chapter and point out how to think in order to get as right diagnose codes as possible. The students also get home work, with real cases to solve. We show them how to find the new regulations in ICD-10, which is new every year.

Results and meaning: The Queen Silvia Children Hospital is a university hospital. Our statistics are used for research, and if the diagnoses are not optimal we cannot be sure that the basic material corresponds to reality. In the beginning of every year we send our diagnoses to Socialstyrelsen, which is the controlling authority for Sweden. They use the statistics for further revisions, more statistics and comparison between all hospitals in Sweden. To be able to compare, it is very important that the diagnoses are right, both for the hospital economy and also for the national economy.

Adapting & Adopting ICD-10-AM in Ireland. The development of the Irish Coding Standards

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HIPE: Hospital In-Patient Enquiry; HPID: Health Policy & Information Division; ESRI: Economic & Social Research Institute; ICD-10-AM: International Classification of Diseases, 10th Edition, Australian Modification; ACS: Australian Coding Standards; ICS: Irish Coding Standards

Background: In January 2005 ICD-10-AM 4th Edition was implemented for the collection of hospital activity information in Ireland by the Hospital In-Patient Enquiry (HIPE) scheme.

Prior to the decision to implement ICD-10-AM an evaluation of internationally available classifications was conducted that led to the Australian classification being the preferred option for Ireland. ICD-10-AM was chosen as it is an internationally used, regularly updated, well-supported and integrated clinical coding classification. It met all the criteria identified by HPID for an ICD-10 based hospital activity classification. The next task was to make the classification fit the Irish system while maintaining international comparability. ICD-10-AM is a five-volume set incorporating the Australian Coding Standards (ACS) developed and published by the National Centre for Classification in Health (NCCH), Australia.

The Health Policy and Information Division in the ESRI is responsible for the development and delivery of all training for the Irish clinical coding community. This training has been adapted to incorporate ICD-10-AM. A key element of the training is to ensure high quality coded data and the introduction of the Australian Coding Standards, the fifth volume of ICD-10-AM, proved to be an important data quality tool. The HPID is also responsible for the quality of HIPE data and coding standards are important to ensure data quality.

Development of Irish Coding Standards

There are differences between Australia and Ireland in terms of data collection and in some guidelines. To address these differences the Irish Coding Standards (ICS) are published as a comprehensive set of national guidelines. The clinical codes of ICD-10-AM are never altered and international consistency and comparability is maintained. The Irish standards complement the classification and the Australian standards. The ICS are submitted to the National Coding Advisory Committee (NCAC) in Ireland for discussion, review and ratification. The National Centre for Classification in Health (NCCH) are also informed of all published ICS.

The first version of ICS (V1.1) was published in June 2006 and contained thirteen standards. Subsequently ICS version 1.2 was published in November 2006. In this second edition the ICS were developed and expanded and there are guidelines relating to administrative variables and eighteen standards for clinical codes. The HPID are currently compiling Version 1.3 of the ICS for publication later in 2007.

Structure & content of Irish Coding Standards

The Irish Coding Standards are structured and numbered similarly to the ACS. The ACS are categorised by site and/or system according to the specialty to which the diagnosis or procedure relates. Guidelines are intended to provide clarity and standardization as necessary. The Irish standards are organized into four sections:

- HIPE guidelines for administrative data
- General standards for diseases
- General standards for procedures
- Specialty chapters

Future development of Irish Coding Standards

The ICS are an important part of the evolution of ICD-10-AM in Ireland and the Irish system of hospital activity data collection. Ireland is a member of the Australian Coding Standards Advisory Committee (CSAC) that collaborates with the NCCH on ICD-10-AM. Ongoing feedback to the NCCH and the ability to make submissions on the classification ensure that there is a relevant and workable classification in place for use in Ireland. This ongoing collaboration with the NCCH is a key element in the ongoing success of ICD-10-AM in Ireland.

Ireland has taken ownership of ICD-10-AM by adapting the Australian standards to meet the needs of the Irish hospital system without losing the international comparability of ICD-10-AM thus providing a robust and valuable hospital activity database.

Correlating ICD-10 Coding with DPC system in Japan. Attaching Additional information code to original ICD10 code

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Background: In 2003, Japanese healthcare system DPC (Diagnosis Procedure Combination) was introduced.

DPC system requires the Classification of Diseases (ICD10) coding. However, ICD10 is not necessarily suitable for DPC coding. In 2007, we proposed Additional information code. It is attached to conventional ICD10 codes, in order to compensate insufficient information (ex. more detailed anatomy or pathology).

Method: Reviewing the submitted data at 2007, we attempted to evaluate.

Result: Some ICD10 classifications obviously have two or more characters in one classification.

Conclusion: By attaching Additional information code to original ICD10, DPC database will include more clinical information useful for profiling clinical practice without changing any concept of ICD10 code.

Session 14
Building from Case Mix Systems

Berlin Charité Hospital Risk of Mortality Evaluation

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This report explains the context, objectives, methods and results of our review of 2006 inpatient mortality at Charité Hospital in Berlin, the largest academic health care center in Europe.

High risk of mortality (ROM) is characterized by multiple serious diseases and the interaction of those disorders. 3M APR DRGs clinical logic comprises an 18-Steps assignment process of risk of mortality assignment. APR DRG ROM is considered the Gold Standard of risk adjusters , internationally used (ie Fraser Institute- Ontario Mortality Report) and also included in the AHRQ- CMS /USA widely adopted Inpatient Quality Indicators.

The hypothesis to validate is that 3M APR DRG and its ROM assignment can be successfully performed using ICD-10 German diagnostic codes and German procedures codes (OPS); and that focused review of ROM 1 and 2 enables further identification of quality and documentation potential problems.

All 122,579 cases (2209 deaths) from Charité in 2006 are compared. We used also the 3M German Benchmark which has 2,023,377 discharges and 43, 034 deaths. The number of error DRGs is less than 0,5%, both in Charité and in the benchmark. The 3M Rule checker was used to assess the quality of documentation and coding and demonstrated a better coding quality at Charité than in benchmark.

Overall, the mortality rate is lower in Charité (1,8% vs 2,2%). This is true also in each ROM subclass (pulling all DRG similar subclasses together), and in all pulled together medical cases. Only subtotal of surgical cases, without adjusting/stratification by ROM, has a relative higher mortality ratio, which does not prove to be true for each and all surgical cases ROM subclasses. ROM adjusted SMRs are much lower at Charité. Specificanalytical comparisons will be presented at the DRG level.

Out of the 2,207 cases who died at Charité Hospital in 2006, 231 out of 1307 medical cases who died are in ROM 1 or 2; 57 cases in surgical DRGs out of 900 who died were in ROM 1 or 2. Chart review was done on close to 100 cases from APR DRGs groups with 2 or more deaths and low risk of mortality (ROM 1 and 2). Medical DRG cancer groups, immune-suppressed cases, trauma DRG groups and terminal care patients were

excluded. Documentation problems are identified after recoding by a coder and independent review by physicians.

Charité Hospital compares favourably on mortality, even after risk adjusting with APRDRG ROM. This implementation effort proves valuable to identify coding /quality problems and helped quality assessment activities. Following these positive results, an expanded project is starting with a large sample of German academics hospitals.

Medical episode grouper: a categorical approach for risk adjusting episodes of care to assess provider performance

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Aim: To improve and provider performance assessment by taking into account estimates of patients' overall illness burden in risk adjusting episodes grouping.

Until recently, risk adjusting episodes for comparing provider performance was based on an expected payments derived from the average payments for episode groups obtained from a large medical and drug claim database. However, this method of risk adjustment ignores important patient risk factors, i.e., age, gender and unrelated medical comorbidities. A risk adjustment methodology addressing these additional risk factors was developed and tested.

Methodology: Episodes of care are grouped according to Disease Staging disease categories and DCG Relative Risk Score (RRS) ranges. The model uses the average payments of these groups to predict episode costs. For each episode-stage the range of relative risk scores are divided among percentile categories. Indicator variables were assigned to each percentile, and linear regression was used to select the combination of those indicators with the highest R-square value.

Two approaches to episode risk adjustment predictions were tested.

1. Episode Group (Group) - the average allowed payments derived from the development database are used as the basis of the predictions.
2. Episode Group, Severity and Complexity (Group/Severity/Complexity) - Average allowed payments were calculated for ranges of RRSs within each stage of all episode groups.

Data: To test explanatory value of the Medical Episode Grouper (MEG) categorical risk adjustment model, medical and drug claims incurred during the period July 1, 2002 to June 30, 2004 from the Thomson Healthcare MarketScan data repository were analyzed. Once incomplete episodes and payment outliers were removed, the remaining episodes were divided randomly into two groups; development and validation data sets, totalling 12,872,027 and 12,869,020 episodes respectively.

Results: The risk adjustment model using only average episode payments explained the least amount of variation - .257 or 25.7 percent. By contrast, the Group/Severity/Complexity model explained 38.4 percent of the variation representing a 49 percent increase in the variation explained compared with the Group method.

Conclusion: Taking into account a measure of a patient's overall illness profile - RRS - along with information related to the episode group and level of severity within the episode, substantially improves the quality of the prediction. In addition, the result is a far more equitable approach to profiling physicians.

The critical role of Clinical Groupers that enable Risk Adjustment in managing a major health fund in South Africa

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Discovery Health is a private health fund in South Africa, with over two million members. Care is funded as a 3rd party, and risk management and managed care interventions are an increasingly important part of the funds management.

Since the late 1990s, Discovery has invested significantly in the creation, capture and analysis of clinically coded data for each individual member of the fund, complimenting the demographic and financial data already routinely available. This data has steadily grown quantitatively and qualitatively, over the years, including by the application of both classification systems and groupers. These were either home grown or by modification of existing schemas.

Grouping clinical data has created a competitive advantage for the funds management team, as these grouping tools are increasingly used to effect accurate risk adjustment within predictive modelling exercises. The predictive modelling approach has numerous management applications.

The paper describes the process of creating and using these tools, under the following sections:

- The process of integrating individual member / patient information i.e. relating codes and their classifications to categories and to groupers

- The production of an Individual View, as a step towards an Electronic Health Record
- The process of Risk Adjusting sub-populations within the funds membership; and its application in a number of situations, including profiling, cost efficiency, cost effectiveness and quality outcomes measurement.
- Finally, future developments are discussed, deriving from the initial and anticipated new sources of clinical data; as well as likely new applications.

Implementation of clinical pathways based on DRG in a large central hospital in Norway. Effects on costs, length of stay and quality.

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Ostfold Hospital has since 2002 been a pioneer in Norway using clinical pathways, detailed clinical information and cost per patient in DRG-based clinical improvement.

The development and implementation of clinical pathways are based on a step by step method where leadership commitment, coaching by process managers and multidisciplinary teamwork goes hand in hand.

Until now we have introduced and implemented 24 clinical pathways with convincing results.

Both the method and how we use the cost per patient system as a basis for planning, reporting and measuring outcome will be described. One of the success factors, and goals, has been to merge clinical pathways, cost per patient and DRG-based clinical improvement.

In "bronchiolitis" (DRG098A/098B) between the years of 2002 to 2005 the average cost for each patient went down from 20800,- Ncr (Norwegian crowns) to 17235,- Ncr, and the length of stay (LOS) from 3,25 days to 2,35 days (26%).

In breast cancer (DRG257/258/259/269) the average costs went down from 25550,- Ncr per patient in January 2006 to 19453,- in December 2006 (24%) .

Statistical Process Control (SPC) and improvement flow charting shows that ALOS before and after implementation of the clinical pathway were reduced from 2,36 days to 1,23 days.

In the same period the quality indicator preoperative waiting time went down from 22,3 hours to 5,3 hours by introducing same day admission.

These results indicate that continuous quality improvement based on introducing and implementing clinical pathways in health care may have a positive effect on costs, LOS and preoperative waiting time.

Using Case mix data base for public health: Is tobacco addiction recorded ?

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Introduction: Tobacco addiction has become in France since 15 years a public health high priority and this year 2007 the government has approved the total ban. To assess the outcome of this new policy there are few specific information systems namely cancer registries (less than 15 % of the population) or cardio-vascular registries (less than 5).

The goal of this work is to assess on the French national case mix data bases if the 17 ICD 10 codes for tobacco addiction are describing well enough the differences in addiction related to the important differences in tobacco consumptions by regions and the important differences in tobacco induced diseases

Method: There are 17 ICD 10 codes (F17.-; P04.2; T65.2; Z50.8; Z58.7; Z71.6; Z72.0; Z81.2) including the recently added (2006) Z58.7 « exposure to tobacco smoke » .

The tobacco induced diseases traced are lung cancer, ischemic heart disease and chronic bronchitis.

The consumption behaviour is estimated from the selling volume by region and the percentage of regular smokers between 15 and 75 years by sex.

The results are edited as maps

Results: There are important discrepancies in tobacco consumption across regions (25 % regular smokers in Limousin against 34 % in Corsica). There is an under recording of tobacco addiction on the case mix data bases and important variations across regions.

Conclusion: We discuss in the conclusion the ability of the Case mix data bases to describe the individual tobacco addiction and to measure the effectiveness of the public health policy .The 2004 public health act has given precise goals for regular and passive smokers to reach but has not envisaged how to measure these goals.

Session 15
Local and International Experiences with Case Mix I

Turkey driving system changes by case mix design and implementation

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Background: "Infrastructure Development for Strengthening and Restructuring of Healthcare Services' Financial Management in Turkey" (HUAP1) and "Infrastructure Development for Healthcare Services Payments by Universal Health Insurance System" (HUAP2) Projects are 2 major recent initiatives of the Turkish Government in the attempt to transform the fragmented social insurance system into an universal one, both in terms of social protection and health insurance coordination and in terms of centralizing the public health insurance system. Starting with 2005, the preparatory steps known as HUAP1 and HUAP 2 projects tried mainly to create the tools that the new system will operate with. HUAP1 main activities were restructuring of the fee-for-service payment system, development of a prospective payment and budgeting system based on DRGs and development of infrastructure for drugs and medical material management. As a continuation, the HUAP2 activities started in 2006 are much more linked with the operation and future functions of the proposed universal health insurance system (UHIS): development of necessary policies and instruments for healthcare services payments by the UHIS central agency, analysis of cost differences in inpatient healthcare services by hospital types and regions based on DRGs, building of a National Healthcare Providers and Physicians Database, development of an organizational model for the UHIS central agency and the infrastructure for institutional transformation of processes. The goals are rather ambitious, but results to date and the pressure from the international financial community made it possible to be on time with most of the activities planned.

From a case mix perspective, the basic technical activities had been piloted with 8 hospitals and had been expanded to another 40 starting with January 1st 2007. Training support had been intensive and customized initially at hospital level, moving to a training of trainers approach in the HUAP2 phase; clinical and costing data is being collected, grouped and analysed with locally developed or adapted tools; policy impact of using the case mix system has been extensively addressed with the decision makers and simulations for a PPS were produced to demonstrate potential impact when using the system as a reimbursement tool.

A phased in implementation plan has been designed, correlated with the other components of the HUAP2 project, considering also other major

changes that the UHIS will face in the same time: defining other payment mechanisms for the rest of services and designing contracts for all type of providers, defining a minimum benefits package, aligning types of care provided with categories of providers, creating appropriate incentives across the entire system.

Conclusion: the paper will present the technical steps taken along the 2 projects course, the main results that are supporting the decision to go to a staged implementation and some pitfalls faced in such a challenging and changing environment.

Using international disease classifications to characterise hospitalised patients and performance in the Central University Hospital in Kigali, Rwanda

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Aims: The objectives of this study are [1] to analyse major causes of hospitalisation in a 411-bed tertiary hospital in Central Africa and [2] to link this profile with quantitative and qualitative performance criteria.

Methods: This is a cross sectional study. All hospitalised patients were registered in dedicated software designed [1] to seize every single diagnosis as established by clinicians and reported on patients' individual medical files and [2] through the utilisation of a Thesaurus (Belgian Thesaurus 3rd version BT3) to generate ICD-10 and ICPC-2 codes. Other administrative data were also collected. We tested the software and ability of computer scientists who were in charge of capturing data in a 1 month pre-test. Software utilisation and coding aptitude were comparable to international standards. Then, all diagnoses were captured from individual patients' files between March 2006 and February 2007. Results were presented as distributions according to ICD and ICPC chapters. Average lengths of stay (LoS) for different codes (diagnoses) were used as a proxy for hospital's performance and care quality.

Data and results: In the preliminary study of these 10,212 diagnoses and about 220,000 hospitalisation days, general analysis revealed that more than 88 % of patients improved while 10 % of them died. In both classifications, the distribution of diagnoses showed that infectious, digestive, blood and respiratory diseases as well as musculoskeletal problems reckoned for 75 % of diagnoses and added up to 78 % of total number of hospitalisation days. The first 4 added up to 62 % of deaths. In ICPC chapter A (General - 22 % of hospitalisations, 29 % of deaths), infectious diseases were mainly malaria (50 %), tuberculosis/HIV (25 %), cancers were less important (5%). In ICPC chapter L (musculoskeletal - 10 % of hospitalisations), 81 % of diagnoses corresponded to limb fractures. Femur fractures had a very high average LoS of 38.4 days. This latter result allowed decision makers and hospital quality assurance team to review guidelines for taking care of those patients. Finally, missing diagnoses were discussed and added if necessary (>1/1000).

Conclusions: This study revealed [1] the relevance of classification systems in national hospitals in developing countries to picture the case mix profile, [2] the usefulness of the instrument to raise some critical problems (quality of care) that can be further explored in a view to improving services offered to the population, [3] to link health problems with management aspects.

This study brought up the potential [1] to connect epidemiological profile and costs (billings) as well as [2] to use the instrument in hospitals at lower level of the health system. More detailed analyses should be performed.

Designing and implementing a new DRG system in Romania by using AR-DRG

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The DRG system in Romania to reimburse the hospitals for the acute cases is currently using the Grouper HCFA v.18 with the associated relative values list, nationally administered by the SNSPMS.

The diagnostic list used by this grouper is ICD9, different than ICD10, which is used by hospitals for patient data collection and coding. While the medical procedures list used is ICD10 AM v3. Even ICD10 diagnostic list includes less diagnostics than other grouping systems, as ICD10 AM v3. In order to get a higher financing per case, hospitals tend to up-code (to use the most severe diagnostic, with the biggest relative value) if there are no other options between the simple and complicated diagnostic or the procedure is not correct coded.

Current problems:

- Incompatibilities between patient data collected by hospitals in this way and data processing with HCFA grouper;
- Phenomenon of up-coding in most of the hospitals for a better financing, well known by analysts and financers;
- Lack of national standards for patient data collection and reporting by hospitals.

- Low transparency of hospital financing by using the current system because of additional mappings and filters.

These issues are directly influencing the hospital financing system, both at hospital and thirty-part payer level.

Objectives:

- Improving the quality of patient data collected by all the hospitals;
- Increasing the transparency of hospital financing by using a grouping system that directly process the patient data, with no intermediaries in the reimbursement of hospital services (cases);
- Re-establishing the image of hospitalized morbidity at national level by encouraging the correct coding and reporting, reducing the upcoding phenomenon (NO FRAUDS).

Required activities

- Changing the current data collecting system by introducing new fields in the minimum patient data set (MPDS) and the diagnostic list ICD 10 AM;
- Updating the software application DRG National for MPDS collection in order to signal the difference between the cases grouped using HCFA 18 and those grouped with AR DRG v5 during 2007;
- Improving the patient data analysis process between sending to SNSPMS to be grouped;
- Set up a data reporting format compatible with both reporting systems required and in respect for regulations;
- Changing the SNSPMS MIS for data collecting and centralizing in 2007 in both variants: central database, analysis procedures and data import.
- Expand IT procedures for case validation according to the set of validation rules in use;
- Implementing the grouping procedures by using the new system after introducing the new DRG system;
- Implementing the procedures for reporting to National Insurance Fund and to hospitals;

The new classification system AR DRG v.5 will allow the Insurance Fund to pay hospitals according to the severity of cases treated and the hospitals to code their medical activity more accurate.

Ambulatory Substitution (AS) in an inpatient sample from Hospital UKM Case-Mix.

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We analyzed the Casemix of Kebangsaan Hospital (National University of Malaysia) to identify the cases that can be safely transferred to ambulatory care without compromising the outcome or quality of care to the patients. For the purpose of research, a three (3) year dataset was selected. This dataset contains patients registered from 1st January 2003 till 31st December 2005, and has a total of 47,646 patients in it. This study is a refinement from a previous study and incorporates new selection criteria proposed by audience during last PCSI 2006 presentation.

Only those patients with a procedure are considered for the ambulatory transfer. Only patients with a Length of Stay (LOS) less than 2 days were selected. It was realized that this transfer could not be done indiscriminately. So the patients selected for this ambulatory substitution excludes all the patients in Major Diagnostic Categories (MDC) 14, 15, 18, 19, 20, 21, and 22. The patients from MDC 14 and 15 were excluded because the MDC 15 has neonatal patients whereas the MDC 14 has pregnancy and delivery related cases. While MDC 18 to 22 contain patients because the conditions in those categories are not easy to define.

Other criteria that render them unable to be transferred to ambulatory care includes Severity of Illness (SOI) 3, and Length of Stay more than 2 days, and finally if the patient died during the hospital stay. A new criteria added from previous study was to exclude the patients who has undergone a Class A procedure, from a list of procedures that are identified in the IRDRG grouper as to group only if done in inpatient setting.

A total of 2,952 cases (6.1 % of the total case-mix) were identified in the case-mix of Hospital UKM that can be safely transferred to ambulatory care, and 2,575 cases (5.4 %) if only cases with Severity of Illness 1 are retained. More than 978 of the initial 2,952 cases (33.1 %) are prenatal conditions (like abortions) that could not be transferred as ambulatory patients because of social context. Using IR DRG Procedures Class A as an exclusion criteria, taking the example of cardiac surgery procedures cases, 7 cases were additionally excluded.

Analysis of these cases was done using the relative cost weights to ascertain the saving associated

with this proposed ambulatory transfer. This study validates the feasibility of transferring a large number of inpatient encounters into the ambulatory setting.

War Gaming: Computer Simulation for the Installation of Prospective Payment

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Table Top Exercise – Computer Simulation for the Installation of Prospective Payment in a geographic Region of 40 million to 80 million inhabitants.

The "Players" in Simulation: Your impact is measured by the level of Money, Workers and Voters you Can generate and call on.

Problems to Address: Which DRG Grouper do you use, and who does each impact?

What is an accurate count of ICD Coders for this work. Is it adequate? If not, How do you develop? What baseline statistics do you have for the institutions for which you propose PPS. Financial, Patient Usage, and Staffing.

Do you want to go sector by sector or all payer, and what are the consequences and reaction of each? What is the impact of running a PPS Payment System on the existing Institutions? What do they spend/budget now? What would they spend/budget under PPS? What kind if pilot phased installation time table you plan? What are the costs of installation over what time period? How will PPS affect the different ICD/Disease Categories and the use of increased technology. i. e. Cat Scans, MRI, etc etc etc What is an approach for handling hospital capital costs? How long to integrate Capital Into the PPS System?

Assumptions: Where data is not readily available, then sampling is available for workable estimates.

Givens: Health Outlays as a percentage of GDP. [From Economist Fact Book]. Population including demographic age pyramid, urban rural divisions. Standard metropolitan service areas or their equivalent. Population income pyramid with distribution. Standard epidemiological data. Where data is not available, then it is derived from sampling effort.

Session 16

Ambulatory casemix systems

Clinical Service Planning within Emergency Care: the use of a clinical classification system within an activity projection of Emergency Department activity.

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Clinical projection techniques have been used for a number of years to plan for projected changes to the utilisation of hospital services by inpatients. All the jurisdictions in Australia have used the same methodology and tool at some time (Acute Inpatient Modelling tool - AIM) to project their future activity and these projects are undertaken every few years. Essentially the process is a statistical projection based on the Australian Bureau of Statistics (ABS) population projections at the local government area by age and sex cohorts. The projections are at the level of Service Related Groupings (AR-DRG v4.2 SRG) for admitted data. The most recent Australian Census for which complete data are available at the Local Government Are a dates from 2001.This presentation will describe the use of these techniques to project activity in the Emergency Department setting in the recently completed Clinical Services Plan for Tasmania. The project involved a use of the Emergency Classification system developed in Tasmania (previously presented at the PCSI conference in Singapore) and a calculation of projections and relative utilisation within this classification schema. Data from the past 5 years were used to populate the projection model. Over 90% of the Jurisdiction's Emergency Department presentations were used in the projections to provide a reasonably complete analysis of Emergency Department activity for the entire state. The presentation will describe the groupings used and issues encountered during the analysis project. Additional refinements such as the definition of patients who could be managed within a GP service will also be discussed. The results will be presented and the statistical methods explained. The project will be repeated in Tasmania when the data from the latest (2006) Australian Census are available at the appropriate level of detail.

Integrated health services, integrated data sets, what comes first?

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Aims: The NSW Health Department (NSW Health) is undertaking the community health and outpatient care information project (CHOCIP) which aims to develop a patient level data collection across all community health and outpatient care settings in the State. 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 nature of services provided in the community health and outpatient care settings. The aim of the data dictionary development sub-project, which is the subject of this paper, was to develop a data dictionary that sets out definitions, data domains and guides for use for the minimum data set (MDS) to be collected within each unit record.

Methods: The methodology consisted of three major processes. First, the proposed minimum data set was reviewed to ensure that it would produce the information required to meet the project objectives. Second, a series of 11 data dictionaries were reviewed to extract data element definitions and data domains for data elements that were to be included in the CHOCIP MDS. Third, a draft data dictionary was developed that encompassed a series of options for the definitions and data domains of data elements that appeared in multiple data dictionaries as well as developing from first principles a range of data elements that were not included in any of the reviewed data dictionaries. This document was then used as the basis for stakeholder consultation so as to understand data needs, the suitability of the proposed data element definitions and data domains, and implementation issues prior to finalising the CHOCIP Data Dictionary.

Results: Through review of the data dictionaries it became clear that notwithstanding various attempts at integrating data sets the data elements and associated definitions and domains were often program specific. For example data elements that appeared in the NSW Health Data Dictionary (which is intended to be the state-wide standard) were found in different forms in other data dictionaries for other data sets collected in NSW (eg Mental Health). Also we found that the attempted standardisation was mainly in the area of socio-demographic data elements about clients and there had been few attempts to standardise data elements that related to describing service events across programs. Thus, the process of data set definition was found to follow the process of program management in Australia. That is most programs are funded in 'silos', they have their own program eligibility criteria and often their own funding models. This phenomenon exists notwithstanding the stated aims of integrating the services for patients and clients of the health system to ensure continuity of care. Through extensive consultation and some iteration it was possible to produce a data dictionary that can be applied across the broad range of services covered by the scope of community health and outpatient care. To date, this dictionary defines 28 data elements and their associated data domains and

guides for use. It will be used to support the implementation of the CHOCIP MDS from 1st January 2008. It will also be reviewed as part of a subsequent stage of the project to include data elements that describe more complicated concepts such as reason for visit and intervention type.

Conclusions: The data dictionary exercise has demonstrated that developing integrated health services requires the development of integrated health data sets. Without consistent and comparable data across the range of services delivered in community health and outpatient care, it is impossible to identify gaps in service delivery and discontinuity in patient journeys. CHOCIP represents an important step in the process of integrating data sets in support of developing integrated health services. The real challenge will be the analysis of the resultant data to improve methods of service delivery and funding thereby resulting in improved continuity of care for patients and clients of the health system.

Nord DRG Full version. Ambulatory care in Stockholm, Sweden. Review of costing data and grouping logic after less than two year in use

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Aim: The aim is to make a situation analysis after using Nord DRG Fullversion to cover all ambulatory care during one fiscal year and to describe what we have achieved so far. Is there any pattern when analyzing coding results during the trial year? Is there any type of visits that has increased? What kind of adjustments to the system has to be made? Is costing data accurate? Are all new DRG groups relevant? Do we need make adjustments of DRG groups? Are there any differences when calculating relative weights for ambulatory care DRG's vs inpatient DRG's?

Methods: The Stockholm County Council gathers data from all suppliers of healthcare every month. Data consists of medical coding, grouping result and costing data for each individual case. Data has been gathered into a data warehouse since 1992. By analyzing grouping results, types of visits and costing data on a total level and for each hospital and comparing ambulatory care after and before the introduction of Nord DRG Fullversion, conclusions can be made.

For each fiscal year costing data for calculation of relative weights is collected separately from hospitals. Data is collected by the County Council on central level. Data has been analyzed to see if the new DRG groups are homogenous from a cost perspective view.

Data: Data will be delivered by us before 1st of June.

Results: The total number of ambulatory care visits has increased since the introduction of Nord DRG Fullversion.

Indirect visits (phone calls, conferences about the patient etc) have increased rapidly and are frequently monitored. When calculating relative weights for ambulatory DRG's a problem is that many groups are not homogeneous from a cost perspective view. When trimming data for cost outliers a similar methodology might be useful for the "cheapest cases" within a DRG.

Conclusions:

The following conclusions have been made

1. The total number of ambulatory care visits has increased since the introduction of Nord DRG Fullversion. There are several reasons for that. One is "old habits". The previous reimbursement system for ambulatory care was based on "fee for service" and as a consequence healthcare personnel still "want to show what they are doing" instead of performing medical correct coding. The question is if the current "standard of coding" is what we wanted to achieve or if adjustments has to be made.

2. There is a need to discuss the relevance and use of some DRG groups. Do some of the newly developed DRG groups include cases as we thought? Or do hospitals not code as we wished?

3. There is a need of more accurate costing data to perform calculation of relative weights. The newly added medical procedure system gives us an opportunity to calculate intermediate products. It's necessary to identify cost drivers. It's also necessary to perform better calculations on some costing data such as salaries for different types of personnel i.e. nurses, physicians etc. Cost data is currently not "good enough" for calculation of relative weights.

4. There is a need for all acute care hospitals in Stockholm to deliver data for calculations of relative weights, both public owned hospitals and private vendors. For the fiscal year 2006 3 out of 5 public owned hospitals delivered data.

5. There is a need to discuss the relevance for some newly added DRG groups and in some ways how the primary coding is performed. The transition from a "fee for service" based reimbursement system for ambulatory care, to a secondary classification system and reimbursement by DRG's has to be monitored and analyzed more.

Adjusted Clinical Groups use as a measure of the referrals efficiency from primary care to specialized in Spain

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Purpose: To determine the referral rate per center, its main causes and the adjusted efficiency indexes, through the retrospective implementation of the Adjusted Clinical Groups (ACG) in a Spanish primary care setting.

Design and Methods: Design descriptive-retrospective study. Attended patients by five primary care teams (PCT) during the year 2004 were included. Measures: general parameters, age, gender, dependent (visits and episodes), and comorbidity of each patient relative to each ACG. The referral rate (RR) was defined as the quotient between the number of referrals and the visits made. Efficiency Index (EI) was established dividing the observed by the expected referrals obtained by indirect standardization. Statistical-significance p0.05.

Results: Studied patients 81335 (use: 76.9%), 5.03.6 episodes and 7.97.8 visits/patient/year. Percentage of visits with a referral, adjusted for morbidity burden, was 7.5% (CI:7.3-7.7); age: 48.322.7 years (women:55.9%), p=0.000. The average of referrals was of 59.6 per 100 attended-patients/year (p=0.000). Visits and episodes explain 34.1%-68.1% respectively (p=0.000), the explanatory power of the classification's variability was of 23.6% (p=0.0001). EI per center were: 0.95 (CI:0.82-1.08); 0.78 (CI:0.63-0.93); 0.88 (CI:0.73-1.03); 1.15 (CI:1.03-1.27) and 1.08 (CI:0.95-1.21), p=0.034 (family practice) and 0.83 (CI:0.70-0.96); 0.83 (CI:0.68-0.98); 0.84 (CI:0.70-0.98); 1.24 (CI:1.12-1.36) and 1.16 (CI:1.03-1.29), p=0.041 (pediatrics); respectively.

Conclusions: Adjusted morbidity by ACG explains an important part of the referrals variability. The study results must be interpreted cautiously even after adjustment by age, gender and morbidity. Should the results be confirmed it would allow an improvement in the measurement of referrals for clinical management in the PCT.

Application of international refined DRG V.2. classification system to day service output

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Aims: The Outpatient Day Service (DSA) is an organization model of the outpatient structure, defined in simplification of access to services, combining Day Hospital and simple services into a complex clinical situation. By means of DSA, inappropriateness, contained previously in our hospital improper casemix, has been nearly completely eliminated. After many analyses of DSA cases, a Classification System, developed for outpatients, has become most important in complex clinical situations. From this point of view, IR-DRGs System identifies the possibility of testing a new classification, completely unknown in Italy and adjustable to our codification, because it is procedure-oriented. The International Refined DRGs, v.2 is designed for use with various coding systems for Inpatient and Outpatient, incorporating the concept of refinement thru use of multiple levels of CCs applied to all individual severity-of-illness subgroups. Our purpose is to achieve the best knowledge of a classification system, also suitable for Outpatients, that could be employed to measure the Day Service in accordance with uniformity criteria within the Hospital casemix, and to determine a weight depending on various typologies of IR-DRGs groups.

Methods: The project is based upon a pilot study on the application of IR-DRGs classification system to outpatient Day Service cases in 2004 2005 in the University Hospital, Ferrara. The sample included 5086 DSA cases taken from our Azienda Ospedaliera, between Jan-Dec 2004. Data were available in electronic format for each DSA and consist of personal data, admission and discharge date, ICD-9-CM diagnosis and output services codified by Nomenclatore Tariffario Regionale. Classification System IR-DRGs, in the attribution process, uses ICD-9-CM coding systems for diagnosis, operating rooms, and various outpatient services; therefore Regional Tariff codes were transferred to the equivalent ICD-9-CM codes by the project working group . Two populations were analysed: one as Inpatient and second as Outpatient. Thus it was possible to value the differences existing between two classifying logics.

Results:

- The first 5 IR-DRGs per volume of cases include the majority of inpatient and outpatient cases;
- Comparison between distribution of Inpatient and Outpatient results in many changes in classification of the 2 populations;
- Comparison between Medicare DRGs and IR-DRGs, has found many interesting differences in their combination;

Conclusions: A new Classification system, unknown in Italy, enables new analysis of DSA cases. There is still need for evaluation of use of

resources for individual IR-DRGs. Nowadays, we use different scales for Inpatient and Outpatient, as in the U.S.

Using TPC database for predicting utilisation of health services in Malaysia

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Aim: Teleprimarycare (TPC) is an electronic medical record developed specifically to facilitate seamless management of services from primary to secondary care in Malaysia. It is an enterprise wide system that was initiated in Jan 1, 2006 and has successfully linked primary with secondary care. It has collected substantial data from 45 primary health care clinics and 2 hospitals (specialists' clinics only). The goal of this project was to assess the usefulness of this data for:

- Predicting high-risk users for inclusion in care management
- Determining capitated payment amounts to the clinics
- Fairly allocating resources within programs
- Assessing the efficiency of the clinics and providers within them
- Monitoring outcomes

Data and Methods: ACG software was run on the TPC database. The data has been grouped by states, urban and rural. For comparison purposes, a non-TPC clinic and a private clinic was also subjected to the ACG software.

Results: Using ACG on the TPC database the following can be described;

1. Limitations of the TPC database facilitate policy improvements
2. Morbidity patterns across the sample populations
3. Resource utilization patterns across the sample population
4. Assessment of practice patterns of primary health care provider. Providers were delineated both geographically as well as whether they were private or public providers.

Conclusions: The ACG System was useful for helping the TPC team to understand a variety of underlying implementation issues and reforms are being implemented to correct the shortcomings of the TPC system. However, despite any data limitations, the ACG System was found useful for demonstrating differences in the health status of populations and their anticipated need for health care services, a requisite when considering policies be it the state, clinic, provider or patient level. Our results show that Malaysian populations do vary in their need for health care resources and can be successfully compared across various populations' sub-groupings to assess the disease burden and the health care resource needs of the population.

Session 17
Case Mix System Comparisons

Using acg for profiling primary health care teams performance

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Aims:

- To test the feasibility to use ACG with data collected in Primary Health Centers (PHC) through existing electronic record systems
- To describe disease burden and build PHC teams adjusted performance indicators by ACG
- To test the acceptance by doctors of this system as an evaluation tool

Data and methods: Data on 417.517 patients (2005) from Catalonia, Spain, attented by 23 PHC facilities managed by the same institution. Reference pattern: 779.000 patients also from Catalonia. Data used: age, sex, active diagnosis during the period, visits, pharmacy cost and referrals to specialties.

ACG version used: 6,1.

Morbidity has been analyzed by means of ACG and Expanded Diagnostic Clusters (EDC). Comparison of disease burden of populations have been made through the Relative Weight (RW) thus calculated from ACG weights. Performance indicators have been calculated relating actual resource use (visits/patient/year, pharmacy cost/patient/year) to the expected ones adjusting by ACG by means of indirect standardization methods.

Results: Quality of data was quite different among PHC units. The percentage of patients without any diagnosis ranged from 8 to 26% and the average number of recorded diagnosis from 2,5 to more than 5. The most frequent ACG was patients without diagnosis/non-visited (14%), followed by the ACG of adults with 2-3 conditions (ADG) (6%). The most common EDC was respiratory disease (19% of patients), followed by moderate hypertension (14% of patients). RW as a comparative measure of disease burden ranged from 0,8 to 2,1, with an average value of 1,4. After adjustment by ACG the average annual number of patient visits was 8,2 ranging from 5,9-11,9, and the average annual pharmacy cost per patient was 199,9€, ranging from 167,8 to 247,3€ .

Conclusions: It has been feasible to apply ACG with existing data in PHC from different type of providers and with different electronic records systems in Catalonia. ACG have been evaluated as the most suitable PCS in primary care in the

Spanish health care system. Disease burden appraisal by ACG and EDC introduce a new paradigm of evaluation in PHC, since ACG adjusted resource use indicators are more equitable in performance evaluation. This approach have been so well accepted by the management and the doctors that in 2006 they have introduced some of the ACG adjusted indicators to set performance objectives and adjust the variable component of the salary.

Comparison of APRDRG and IRDRGs for One Day Visits Drug and Emergency Visits Documentation and Payment in Belgium

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Budgets for medication for inpatients are now based on the case mix of the hospital, and measured with 3M ™ APR DRGs. The government has the intention to expand this system to the one-day-care (akin to one day surgery and other one-day ambulatory visits) patients also to be based on APR DRG. However APR DRGs have not been developed to classify outpatients. Our primary objective is to compare the value of APR DRGs versus the IR DRG classification for such a goal of one day clinic ambulatory drug costs.

We measured the coefficient of variation for IR DRGs and APR DRGs for the retained 2003-2005 one-day-visits drug charges in 1,245,574 records from Matrix Hospitals Network: an average drug charge 14 euros is paid directly by the patient and an average total charges of 150 euros is observed . The component that would be part of the prospective payment (PPS) is estimated at 34 euros.

For this planned prospective payment component, 71.29% of all encounters (in 172 out of 279 groups) have a coefficient of variation of charges less than 1,5 as measured for the IR DRGs in comparison with 58.08% of encounters (present in 509 out of 755 groups) for the APR DRGs. Hence, IR DRGs fare better on that criterion in relation to APR DRGs.

For the PPS component, the pooled sample GLM reduction of variance (R2) is 0,22 for IRDRG and 0,30 for the APR DRGs, hence APR DRGs have better total ambulatory drug charges homogeneity. However, a higher number of groups and lack of specificity for ambulatory conditions (eg chemotherapy) may be problematic for the APRDRG classification.

In summary, IR DRGs have better potential PPS ambulatory charges homogeneity: the authors consider that in comparison with APR DRGs, IR DRGs are a better fitting classification for ambulatory drug reimbursement. We recommend better coding of procedures and also that a larger portion of ambulatory drug charges be included in prospective payment.

A brief rendering of our coming results on emergency visits grouping with APR DRG and IR DRG is made. This will complement well our current ambulatory drug payment results and previously reported day surgery comparisons.

APR-DRG is better than Medicare-Diagnosis Related Groups (MC-DRG) in evaluating multidimensional impairment of hospitalized elderly patients: a multi centre, prospective study.

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Background: Health resource consumption in hospitalized elderly patients is related to a multidimensional impairment of the subject. Preliminary results have shown that All Patient Refined-Diagnostic Related Groups (APR-DRG) are good predictors of the multidimensional impairment in elderly hospitalized patients.

Aims: 1) to confirm in a large multi centre study whether APR-DRG system is significantly associated with multidimensional impairment of elderly inpatients; 2) to compare APR-DRG system as predictor of resource consumption with the actually world-wide running DRG system, i.e. Medicare Diagnosis Related Groups (MC-DRG).

Materials and Methods: The Discharge Abstract (DA) of elderly patients discharged from 20 Geriatric acute wards were grouped by the MC-DRG version 19 and by the APR- version 20 DRG grouper. A Comprehensive Geriatric Assessment (CGA) was performed by using the Activities of Daily Living (ADL), Instrumental Activities of Daily Living (IADL), Short Portable Mental Status Questionnaire (SPMSQ), Comorbidity Index Rating Scale (CIRS) and Mini Nutritional Assessment (MNA). Number of drugs prescribed at discharge to patients (DPD) as well as the length of stay (LOS) were also recorded. MC-DRG and APR-DRG relative weights (RW) were computed in order to compare patients with the

same clinical severity grouped at different APR-DRG.

All patients were divided into three subgroups according to the cut off suggested by APR-DRG RW quartiles distribution.

Results: 1197 (526 males, 671 females, mean age =81.2±7.3 years, range=65-101 years) patients were included in the study. APR-DRG distribution ranked by frequency was : Heart Failure (APR-DRG=194, n° patient=146, 12.2%), Chronic Obstructive Pulmonary Disease (APR-DRG n°140 n° patient= 103, 8.6%), Respiratory Failure, (APR-DRG n°133 n° patient=49 4.1%), Degenerative Central Nervous System Diseases (APR-DRG n°42 n° patient= 47, 3.9%), Transitory Ischemic Attack (APR-DRG n° 47 n° patient= 41, 3.4%), Pneumonia, (APR-DRG n°139 n° patient=41, 3.4%). A significant difference in functional impairment (ADL p).

Cost and effectiveness of ambulatory vs inpatient episodes of care with cardiac using CRGs and IRDRGs .

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Cost effectiveness will be measured and compared in order to assess the effectiveness and savings linked to performing cardiac angiographies between encounters in ambulatory and inpatient settings in Kuala Lumpur, this being essential to convince clinicians and patients to accept such behavior.

From a previous study, MDC 5 transferable cases have been identified over a three year period (2003-2005) in a major teaching hospital in Malaysia. The main transferable procedures that have been selected for this more detailed study are cardiac angiographies from the original sample (427 cases in SOI 1; 175 cases in SOI2; and 116 in SOI 3). Coronary Angiogram is considered as the procedure identified as 88.57 in the ICD 9 CM classification scheme.

After applying the ambulatory substitution criteria, the number of cases were reduced to 297 (253 in the SOI1, and 41 in SOI2). Additional exclusion criteria used here are retaining cases not with acute Ischemic heart disease (acute myocardial infarction) 121 in ICD 10 classification scheme.

Episodes of care are then built around these interventions for selected patients. All ambulatory diagnostics, interventions and other relevant information is being reviewed and abstracted anew by coders specifically trained for this purpose. All ambulatory and inpatient encounters and resource use are documented and grouped using IRDRG inpatient and ambulatory groups. Also, 3M Clinical Risk Groups (CRGs) are used to group the studied cases.

Estimates of resource consumption may also done using external weights and variation between ambulatory and inpatient encounters and more complete episodes of care are compared. Unwanted outcomes like readmissions, complications and mortality will be documented and compared .Selected cases in the sample were abstracted and reviewed by one expert consultant physician to decide whether these can be safely transferred to the ambulatory care.

Costs and effectiveness can therefore be more easily measured for the benefit of clinicians, administrators and patients supporting the value of ambulatory cardiac angiographies rather than performing those in an inpatient setting.

This study confirms the feasibility of transferring many cardiology procedural cases from inpatient into the ambulatory setting.

Evaluation of ambulatory care's activity using different classification system

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Aims: The need to guarantee the distribution of the sanitary performances within times and modalities that satisfy principle of clinical and organizational suitability and economism in the use of the resources, requires actions in order to optimise the relationship between supply and demand. This job analyses the ambulatory care in the Local Health Unit of Bologna, examines the territorial distribution of the performances produced in this area or consumed by the citizens, with attention to the flows of mobility and the reservation system.

Methods: The analysis is lead for delivery specialties and according to the classification system FA-RE (created from Agata Fadda and Francesca Repetto) used in the Emilia-Romagna Region. The complementariness of the two systems concurs to focus the type and the context in which the performances have been distributed. The classification FA-RE attributes in a specific way all the performances to five groupings (Visits, Diagnostic, Laboratory, Therapeutic, and Rehabilitation) and ulterior subgroups.

In order to estimate the offer we analysed the Density of the Absolute and the Weighed Offer, using the concept of offer point (presence of a

specialties near a structure) like elementary unit of survey. To the performances delivered have been placed side by side those which is possible to book. We also examined, using the standardized Indices of Consumption, the mobility flows and the consumption of performances by the residents, and we represent the results with maps.

Results: The results point out a wide and articulated system of structures that covers all the needs and requirements of the population, but with a different possibility to complete the procedures to evaluate and treat conditions in relation to the logistic conditions, technological equipment and competences available in the different areas. The standardized Indices of Consumption and Offer demonstrate the direct relation between performances offer and use from the population. Low is the percentage of possibility to book exams/visits on the Unified Centre of Provincial Reservation.

The distribution in the FA-RE evidences the high percentage of: Diagnostic, Visits, and Therapeutic, with differences between public and private structures. It is possible to appreciate differences on mobility between the peripheral districts and that city.

Conclusions: The ambulatory care represents the most frequent way to approach the Sanitary Service: in Emilia-Romagna Region every year 60 million performances are delivered, with an increment of the complexity of the case-mix, due to the technological and organizational development that concurs to avoid the hospital admission. The conclusions supplied from this study are the point of departure for programming accessible and coherent services with the needs of the citizens and financing.

Refinement of the Diagnosis Procedure Combination payment system

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Aim: In 2003, the Diagnosis Procedure Combination (DPC) payment system was introduced in 82 Japanese academic hospitals. In both 2004 and 2006 the case-mix classification system was further refined and applied for 62 community hospitals in addition. DPC uses the disease-dominant grouping system comprised of three core elements: principal diagnosis indexed in the 10th version of the International Classification of Diseases, procedures, and co-morbidity or complications. This presentation explores the variability of resource use, and we conclude that the grouping logic requires refinement.

Methods: We attained our clinical information and rates from the DPC administrative database. Information was compiled from 174 institutions (80 university hospitals, 2 national centers, and 92 community hospitals). 441,142 patient cases from 2003 were analyzed for refinement in 2006. Independent variables included demographic location and the core elements listed in the DPC definition table. In Japan, charge is determined according to a standardized fee-for service revenue schedule known as the nationally uniform fee table. The multiple linear regression analysis was used to identify factors explaining variation of dependent variables including, length of stay (LOS), total charged cost (TC), and DPC based charged cost per case (c-DPC) or per day (d-DPC). DPC based charge is for hospital administration and some ancillary service, where some physician fee is not considered. Among 591 Major Diagnostic Categories in total, respiratory neoplasm was selected as an example to exhibit the methodology behind the refinement process of DPC.

Results: A total of 14,034 patients (69% male and 95% were malignant cases) from 170 hospitals were enrolled. Pulmonary lobectomy was the most performed surgical procedure being performed in 21% of the cases, chemotherapy was required in 32%, and chronic pulmonary disease was present in 10%. Linear Regression analysis demonstrated that chemo-radiation explained the variation of LOS, TC, c-DPC, and d-DPC (standardized coefficient 0.427, 0.391, 0.388, and 0.150 respectively). The coefficients of determination for this model were 0.287, 0.401 0.304, and 0.081, respectively.

Conclusion: Using this methodology, we determined the factors that should be considered in the DPC payment system. In response to the DPC based payment determined by the ministry, healthcare providers will be planning to change practice behavior, which will result in the optimization of care. Therefore, in cooperation with clinical experts and the ministry, we propose the uninterrupted cycle of investigation-and-determination process where the DPC payment system is further refined.

DRG data in support for a better planning of hospital services and resources

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Romania already has three years experience of DRG classification and hospital financing. Patient-level data collected from all the hospitals allows us

to develop clinical and financial evaluations useful for decision makers, hospital professionals and investors.

The purpose of this paper is to present a framework model developed in order to support informed decision making in hospital services planning and resource allocation at the level of the eight regions in Romania.

Importance of the issue in Romania of 2007: urge for restructuring hospital facilities and properly plan the number of hospital beds, over-utilization of hospital care and some procedures, limited social health insurance funds (5% spent for primary care and 52% on hospitals), no usage of professional needs assessment and market studies in hospital services planning, raising costs of hospital care, perverse incentives for attaining hospital performances (over-coding), preparations for a national program for hospital accreditation, need for continuity of care, EU structural funds to be raised and properly spent in hospital rehabilitation and quality of care.

Hospital sector reform is now one of the priorities for our health system in terms of financing, MIS, infrastructure, technology, patient care, management performance. Stakeholders are interested in this kind of data analysis and overviews, especially in the context of EU integration.

Method: correlate demographics, hospital resource and service utilization and other relevant dindicators with hospitalized morbidity in order to document hospital services planning and restructuring at regional level. European comparisons are also used for several indicators.

Results: The model allows us to have a comprehensive view of the hospital sector within socio-economic context for each development region and to consistently conclude the issues to be addressed. Inconsistencies between the population needs and hospital resources and services, along with access problems, regional potential for development and evidence-based recommendations for decision making in the area, are the results expected from this study. It is also supporting the hospital preparation and evaluation prior to accreditation process.

Conclusion: Restructuring the hospital sector and planning hospital services cannot be properly accomplished without a complex analysis of multiple variables and relevant correlations, with a special focus on hospitalized morbidity.

Session 18
Local and International Experiences with Case Mix II

How to detect inconsistencies in health care supply between geographical units

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Aim: Our investigations aim to detect spatial variation of hospitalization ratios between Austrian districts depending on the availability of hospitals. The identification of over- and undersupplied regions is of high importance for further health care planning.

Methods: A Bayesian smoothing model is used to account for small area variation. A special term for structured hospital effects is developed. This term is modelled as a conditional autoregressive (CAR) prior, regarding effects between districts and hospitals as well as effects between hospitals. These effects are modelled as patient flows depending on population sizes of districts, capacities of hospitals and distances between districts and hospitals and are called availability effects. An adequate travelling distance is defined.

Data: Data from routine hospital documentation of the Minimum Basic Data Set (MBDS) of the Austrian DRG system are used. Results are presented for the hospitalization ratios of cataract surgery and bypass surgery.

Results: For cataract surgery strong hospital effects were found. Thus, we can conclude that the number of cataract interventions strongly depends on the availability of hospitals. For bypass surgery no hospital effects were found. Hence, health care supply for heart surgery does not depend on the availability of hospitals.

Conclusions: Our model is a strong tool to detect inconsistencies in health care supply that depend on the availability of hospitals. The model is applicable to any diseases and medical procedures available from routine hospital documentation. Results can be important indicators for further health care planning, since over- and undersupplied regions can be identified.

Linking two case mix databases to analyse stroke continuity of care

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Stroke is among the main causes of adult chronic disability. Following professional recommendation, rehabilitation of such patients should start within 24-48 hours in the acute care hospitals and require, in most of the cases, specialised rehabilitation in specific units as follow-up. Effective rehabilitation relies on a coordinated, multidisciplinary team approach. We decided to link two available case mix databases for this type of care: acute case mix database (GHM, the French DRG) and rehabilitation case mix database (GHJ, a French acronym). The anonymous unique patient identifier (AUPI), used since 2001 in both acute care and rehabilitation case mix databases, give the opportunity to build a continuous patient path.

In the local area around Saint Etienne (France), 13 acute care hospitals and 12 rehabilitation centres, from public and private hospitals, try to work together in order to insure the continuity of care namely of patients with stroke. Physicians need activity indicators but there is no available specific information system (electronic clinical record). The Saint Etienne area rehabilitation organisation, has decided to use these two case mix data bases.

From the 2005 regional case mix databases (the last available), 1827 patients with ICD-10 codes I61.-, I63.- or I64 are selected in acute care database and 521 in the rehabilitation database. 237 patients are both in acute and rehabilitation databases. Different results will show:

- Client types from each hospital
- Path types between hospitals
- Quality assurance (rehospitalisation)
- Patient characteristics by path type: functional status, age

AUPI is missing for 4% of stays in the case mix databases. Feasibility of the method is demonstrated. Case mix databases are suitable to assess the continuity of care and shall be used more by the different health actors.

Pre-cultivation of DRG in Czech Republic

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Aims: Czech Republic is striving for wide spread utilization of DRG based patient classification system, but after more than 10 years it is still the objective to meet.

In these years pilot projects for DRG systems (both AP-DRG and IR-DRG) have taken place and eventually Czech Republic adopted localized version of 3M's IRDRG for limited utilization (e.g.

regulation of payment on national level or internal usage in few hospitals).Nowadays Czech Republic aim is to more extensively implement DRG system based on above-mentioned version of IR-DRG. To achieve this goal Ministry of Healthcare commissioned National reference center to begin project of so-called Pre-cultivation of DRG. Goal of the presentation is to explain background and objectives of the project and share experience learned during the project.

Methods: Analysis of DRGs clinical and cost homogeneity.

Data: Collection of detailed data (hospitals reimbursements claims) from all health insurance companies in Czech Republic.

Interval of data used for analysis 1.1.2005 - 30.6.2006.

Results: Project is in progress

Objectives of the project are to:

- Correct shortcomings of Czech localization of IR-DRG, which include in the first place mapping of procedures between IR-DRG native classification of procedures and Czech List of procedures
- Create customized version of Definition manual and corresponding version of Grouper
- Review of method documents (e.g.: definition of acute case of hospitalization)
- Calculate new set of relative weights

Conclusions: n/a (project is in progress)

Aspects of hospital performance in Romania from an age related perspective

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Aim: To describe the use of hospital services, at national level, by age groups, in Romania, in order to see if there are important differences that would support changes in the delivery of hospital services in the future.

Method: The method used was a statistical analysis of the minimum set of DRG data reported by the hospitals in Romania, during 2005, the first year in which all Romanian hospitals reported DRG data. The analysis consisted of looking at the main hospital performance indicators by age groups.

Results: Regarding hospital performance indicators in the studied year the following were highlighted:

- The total number of cases were the highest in the adult age group (16 -64 years) followed by the age group over 65 years
- The average length of stay was the highest at the age group over 65 years
- Most of the uninsured patients were found in the adult age group (16 -64 years)
- The case mix index increases as the age group increases, the highest being in the age group over 65 years
- Being admitted in emergency is highest at the 0-1 year age group (60%) as compared to 40% in other age groups
- Being admitted by referral from a GP is lowest in the same age group 0-1 year (11%) and increases as the age increases
- The most frequent reasons for hospital admittance by age are as follows:
    - For 0-1 years normal birth and acute respiratory diseases
    - For age 2- 15 years pneumonia and digestive problems
    - For age 16 -64 years abortion and medical problems of the back
    - For over 65 years eye problems, vascular disease and cardiac failure

Conclusions: The use of hospital services in Romania have some characteristics:

- The elderly have the longest ALOS, the highest case mix index, being mainly referred to hospital by their GP
- The main reasons for hospitalization of the elderly are eye problems, cardiovascular diseases and cardiac failure
- The adult group accounts for most of the total number of cases in hospital, the highest number of uninsured persons
- Children have the lowest ALOS, have a lower case mix index than the other age groups, are admitted mainly in emergency, mainly for infectious diseases.

Out-patient DRG-classification-system in the Hospital district of Helsinki and Uusimaa

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Aims and Methods: To describe how the process to develop a suitable classification system for the out-patient care has gone. The drg-classification is now used for the reimbursement as well as for counting the out-patient visits and the in-patient episodes. One purpose is also to describe the contents of the care.

Data and Results: To show how the DRG-classification looks like, and to tell about the data of our Hospital District, how it looks like from this year.

Conclusions: In principle we are satisfied with the system, but it still needs to be developed further. The rehabilitation, telephone contacts, nurse contacts, emergency care and self care under hospitals responsibility should be better considered in the future.

Posters

A model of managerial information system and the management of a public health institution

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Introduction: The National Cancer Institute (INCA), a technical branch of the Federal Government, under the direct administration of the Ministry of Health, is mostly concerned with the development of nationwide actions for cancer control, and is a reference for cancer care services in Brazil's Integrated Public Health System (SUS). Besides delivering specialized cancer therapy, INCA fully participates in the making of national policies for cancer prevention, diagnosis and treatment, and also in human resources formation. So INCA plays an essential role in ruling and standardizing cancer care in Brazil. In 2004 INCA developed a managerial tool called SISPLAN, based on a proposal to establish a planning and budgetary management system, able to render planning clear and decentralized, focused on results. SISPLAN separates all institutional actions into projects and activities, thus enabling that resources allocation be widely analyzed, with resources optimization and ensuring the explicit inclusion of such actions in the institutional budget.

Objective: This paper - part of a doctoral dissertation - aims to evaluate whether an institutional health management, concerned with results can be based upon a managerial information system such as the SISPLAN.

Method: Statistical survey on SISPLAN's data (2005-2007) including recorded projects, analyzed, effectively carried out and finished ones, with the respective analysis on fulfilment of budgetary goals for each year.

Results: Preliminary data analysis shows the best understanding on this managerial tool in the presentation of better structured projects. So there was a reduction in the number of projects in the last three years, but the number of approved and more qualified projects increased. In 2005, 474 projects were presented, and 43 were approved; in 2006, 226 presented and 80 approved; in 2007, 214 were presented and 87 approved. The analysis of fulfilment of budgetary goals has not been concluded yet.

Conclusion: This study shows that application of this managerial tool at INCA enables the implementation of more relevant projects, more adequate to the institution's guidelines, and within the planned budget. As a managerial tool, SISPLAN facilitates the development of the participative management in all levels. Despite the difficulties, the progress achieved along this process is unquestionable.

Implementing an essential medicines list: effects on pricing and utilization in the west bank, palestine

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The purpose of this study is to examine the effects of implementing an Essential Medicines List (EML) on medicine prices, utilization and aggregate cost savings in the public sector of West Bank, Palestine. The Palestinian Ministry of Health (MOH) introduced an EML in 2000 to contain escalating medicine costs and improve the rational use of medicine within the public healthcare sector. To assess the effects of the EML implementation, we obtained price and utilization data for 76 medicine groups from the Department of Pharmacy, for 1997/2003. We also collected demographic and economic information from the Palestinian Central Bureau of Statistics for the population living in the catchment areas of the MOH healthcare facilities. We found that after EML implementation, medicine utilization declined by 1.7 defined daily doses (DDDs) per-capita per year, and prices declined by about US $0.0013 per DDD. The aggregate cost savings totaled about US $5.38 million in real terms, using 1996 as the base year. We conclude that the EML implementation was successful in containing medicine costs, and a careful, periodic review and update of the EML should continue to increase cost savings into the future.

Model of indicators based on the Minimum Basic Data Set of hospitalization (MBDS), of Spanish public hospitals

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Aim: To obtain a synthetic model of indicators with the maximum explanatory value for the monitoring and evaluation of hospital care. The source of data is the Minimum Basic Data Set (MBDS), established for the Spanish National Health System in 1987.

Methodology: As a first step, an analysis of coverage, accomplishment and quality of data source was carried out. National strategy on patient safety (PS), and international projects were analyzed as points of reference (HCQI project, ECHI, AHRQ-PSI).

Clinical data were coded using ICD-9-CM, and grouped with DRG system (AP and APR-DRG).

Dimensions (area of knowledge), lines of adjustment, axes of analysis, filters (restriction condition) and levels of classification were defined for the overall model.

Results: The final proposal contains 7 different dimensions (basic, use of service, clinical effectiveness, efficiency, patient safety, variability and models of clinical practice); 10 main indicators (LOS, readmissions, pre-op LOS, proportion of surgical day cases, hospital acquired infection, rate of caesarean, utilization rate, procedure performance rates, mortality, complications), many of them with several specific sub-indicators. Some of them had more than one potential line of adjustment and several axes of analysis as well as filters. A total of 55 indicators to measure utilization, morbidity, pattern of care, quality and best practices throughout the Spanish public hospital system were obtained and a pilot of their use was undertaken.

Conclusions: It has been shown that the proposed model of analysis is viable and brings relevant knowledge about patterns of use and hospital performance. It permits monitoring and evaluating different suppliers, in its original context and also under certain conditions of significant risk adjusted to identify best practices. Finally, it assesses, compares, and determines the potential to improve the care provided and contributes to a better understanding, organization, and implementation of hospital care quality and patient safety measures.

What health professionals think about patient safety?

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Background: Patient safety is a major concern in healthcare. Literature shows that occurrence of avoidable harm is quite important, at least for the countries in which it has been measured. Different solutions were sought in order to diminish its level, starting with better assessments, financial, or educational actions, but not many of them proved effective. That happens because patient safety is strongly related with organizational culture, and so, measures to improve patient safety should focus on changes in organizational culture.

Aim: To measure the perception of the problem of patient safety among healthcare professionals in Romania, and compare it with other countries and in-between professional categories.

Method: The state of organizational culture in Romanian healthcare environment was tested through a questionnaire, which reveals the opinions of healthcare professionals in regard with patient safety. This is an initial study where the questionnaire was tested on 100 health professionals, and results were compared to respondents from Australia, Singapore, Sweden and Norway.

The tested hypotheses were:

1. Romania is not different from other countries regarding the perception about the patient safety issue. There may be differences in terms of working environment, salaries or productivity of the personnel, but medical culture is the same.

2. Patient safety is strongly related to organizational culture specific to healthcare; different professional categories (doctors, nurses etc.) have a different perception on the issue, and for that matter Romania tends to follow the same patterns.

Results show that no major differences regarding the healthcare cultural environment exist between Romania and the other countries; slight differences could be noticed between professional categories, nurses being more aware than doctors on the need to take action for improving patient safety.

Evaluating patient waiting and service time in primary care Development of an innovative patient waiting and service time tool for routine use in primary care concept and method

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Background: The metric, time, is an indispensable elixir in the evaluation of health systems and has obvious relevance to the patients perception of quality (subjectively) and the health providers evaluation of efficiency (objectively). Indeed the commonest complaint of patients utilizing primary health care services is that they have to endure excessively long waits. There is however a paucity of information on the conceptual and methodological issues in implementing waiting and service time surveys (WSTS) in primary care. Against this backdrop, we have advanced the development of an innovative approach to assessing WST in settings in Southern and Eastern Africa over the last 3 years.

Aim: This paper describes the rationale for undertaking WSTS in primary care, the methods of undertaking such survey, outlines lessons learned in its implementation including pragmatic challenges and proffers systems recommendations to enhance the use of WSTS in primary care.

Method: Local survey teams were formed who identified an average day of the week, during an average season of the year on which surveys were undertaken. Data was collected by means of a paper form given to patients upon their arrival at the health care facility and which they carried around the various service points in the facility. At each service point, the staff member attending to the patient filled in the time of arrival and departure at the service point. Upon leaving the health facility, the time was noted and the form collected. Staff members also completed a staff form which detailed service points in which they worked and how much time they spent at these service points. These forms were then sent to a central collection point where the data was captured. A database application was developed to facilitate the capturing, cleaning, analysis and storing of data as well as the drawing up of standardized reports.

Results: Repeat surveys have been implemented in 2 provinces of South Africa and regions in Tanzania. Beyond merely being a time measurement activity, our experience has espoused a wide scope of benefits of the WSTS in primary care, inter alia; it serves as a process evaluation tool of service time efficiency; a quality measurement tool; an epidemiological profiling tool; and has been successful in its primary aim of identifying and suggesting solutions to long waits for health services.

Conclusions: Our preliminary observations suggest that the routine assessment of WST is possible in primary care at low cost and with high benefit. The universal implementation of such surveys presents the potential for an enriched patient and health facility information system particularly in resource-constrained settings where efficient use of limited resources is critical.

Building a large-scale data warehouse for episode of care analysis

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Introduction of inpatient prospective payment using DPC to Japanese healthcare system is believed to have invoked changes in settings of care, such as diagnostic services and cancer chemotherapy. In order to measure the range and magnitude of such changes, a large-scale data warehouse is needed to facilitate analytic research.

This study collected service records for 16,026,453 outpatient visits from 216 hospitals, and linked them with inpatient service records for 738,115 admitted patients. As a result, a data warehouse of 555,249 unique patients, 682,717 discharges and 2,840,779 outpatient visits spanning four month was obtained to be used for episode of care analysis.

Identifying patients with high pharmacy consumption by using the Adjusted Clinical Groups-Predictive Model in a primary care setting

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Purpose: To identify patients with high pharmacy consumption using the Adjusted Clinical Groups-Predictive Model (ACG-PM) in a primary care setting.

Design and methods: Exploratory design. All the attended patients by five primary care teams along the year 2005 were included. Main collected variables were age, sex, visits, morbidity and total costs for each patient, by adding fixed costs (structural) to variable costs (referrals, diagnostic tests, pharmacy). ACG-PM grouper (Johns Hopkins University; version 7.0) provides the following data for each patient: ACG category (n=106), resource utilization band (RUB), American mean relative weights, probability of pharmacy consumption (PFC) for the next year and specific diseases with greater impact. To assess the model, ANOVA and multiple regression analysis were done; p0.05.

Results: 83,873 patients were studied; with an average number of visits 8.08.1 and episodes 4.83.5 by patient/year 2005; mean age 41.423.0, and female sex 52.9%, p=0.000. Mean cost of care was 502.471,007.03€ and pharmacy prescription amounted to 268.55603.99€. A high RUB (4-5) was found in 4,319 patients (5.3%). Characteristics of patients (n=386) with the highest PCF (0.8) for the next year were: pharmacy costs €1,434.111,150.72; visits: 25.217.1; episodes: 13.04.3; age: 70.312.8; and diagnostics of ischemic heart disease (n=1,637; PCF:17.4), diabetes (n=5,583; PCF:10.5) and lipid disorders (n= 8,460; PCF:12.25), p=0.000.

Conclusions: ACG-PM provides an acceptable estimation to identify patients with high health necessities, who could take benefit from preventive interventions. Health authorities must promote specific actions to improve information systems on the basis of case-mix.

Indicators of hospitals' efficiency

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Till 2003 the reimbursement model of inpatient health care in Slovenia was based on prospective programme planning while at the same time taking into account the limited budget and the number of inpatient cases. In 2003 the reimbursement model changed. Slovenia has implemented the application of DRGs to the funding of acute inpatient care. Reimbursement model of acute inpatient care is not based on standardisation of either inputs (labour cost, material costs, service cost, depreciation) or on determination of required outputs with regard to inputs. For the purpose of comparing hospitals' efficiency the Ministry of Health, Health Insurance Institute as a purchaser and providers have decided to determine indicators of hospitals' efficiency. The article presents indicators of hospitals' efficiency and preliminary results of benchmarking for 7 regional hospitals with the main stress on productivity analysis. The results of the analysis will be used at determining future steps of health care financing policy.

Monitoring most expensive and most frequent DRGs

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Since 2004, Romania has implemented a DRG system for hospital activity evaluation and financing at national level. In three years of experience in coding, reporting and case-based reimbursement of hospitals, various phenomenon have been observed; inappropriate coding (both low- and up-coding) and reporting is to be mentioned here.

The objectives of this paper:

- to analyze the situation of most expensive DRGs reported by hospitals between 2005-2006, as a useful monitoring tool for the Health Insurance Fund and hospitals regarding the level of complexity and financing.
- to analyze the most frequent DRGs as accounting for over 20% of total discharges during 2004-2006, with financial effects accordingly.

Importance of the issue in Romania:

Several expensive cases have been reported by many hospitals during 2004-2005 and an increasing CMI was registered. In the same time, among first 10 and 20 most frequent DRGs at national level, just a small portion are surgical cases. Patients diagnosed with hypertension, back pains and respiratory infections account annually for over 313,000 cases and 2,641,847 inpatient days in acute-care hospitals. They might not have an appropriate coding and grouping, or they could be treated in one-day hospitalization and even ambulatory care. On the other hand, many surgical departments in hospitals and entire specialties register a very low surgical rate. Over-utilization of hospital services and certain procedures is another issue addressed by decision makers. But increasing CMI remains an incentive and a purpose by itself for most of the hospitals and their professionals.

Method and data: DRGs with relative value over 3 (20 diagnostic groups), along with the utilization of certain procedures (such as CT, MRI, angiography etc.) are analyzed at national and regional level during the period 2005-2006. Correspondence (mapping) between the list of 20 DRGs currently used with HCFA18 and list of AR-DRG v.5 as new system to be implemented in Romania, is presented in order to simulate differences that would appear. On the other hand, some of the most frequent DRGs at national level are analyzed.

Results: The expected results are analysis reports useful for hospitals insurance funds and decision makers in order to monitor the most frequent types of cases and the most expensive DRGs reported.

DRG systems offer a great variety of data and instruments for an appropriate and tailored management of hospitalized morbidity and the funds allocated accordingly, with a special focus on the cases/groups consuming the most significant public resources.

Criteria and indicators development for Rio de Janeiro State Sanitary Surveillance of Maternity Services

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The quality improvement of obstetric services is still a challenge for the Brazilian Health System. The fall of the pos-neonatal component of the infant mortality and the maintenance of high neonatal/perinatal mortality, points to the need to monitor the obstetric and neonatal services. The sanitary surveillance services (VISA) are responsible for the risk evaluation of the hospitals. In agreement with the National Agency of Sanitary Surveillance, all hospitals should have, each year, at least, one evaluation visit of the VISA teamwork. In order to contribute to the planning and quality monitoring, indicators for maternity

services evaluation were developed aiming to contribute to the VISA actions of Rio de Janeiro State.

The methodology were developed with the databases from the year 2000 and repeated with the year 2003. We will show the methodology and results using the databases of the year 2000. The databases used were: Live-Birth Information System (SINASC), Mortality Information System (SIM), Hospitalization Information System of the Unified Health System (SIH/SUS), the Cadastral Information of the Health Care Facilities of Rio de Janeiro State and the National Cadastral Information of Health Establishments (CNES). The databases do not have the same cadastral information, however, after a linkage process, all were aggregated by hospital level. The hospitals were classified by being public or private contracted by the public sector, called SUS hospitals and private hospitals. They were also classified by having more or less 300 deliveries per year. The SUS hospitals were classified by level of hospital complexity considering the presence of IUC and/or IU maternal, neonatal or paediatric and obstetric beds. Patients' indicators of quality and risk were constructed. The 451 hospitals were linked and 3 excluded. From the 448 left, 233 were private. From 215 SUS hospitals, 135 had information in all the databases. Two factorial analyses were made with the SUS hospitals with more then 300 deliveries/year, one gathering a selection of risk indicators and other a selection of results indicators. The results indicators explained 51% of total variation of the hospitalizations, while the risk indicators explained 84%. A dispersion graphic classified hospitals into high or low risk with good or bad results.

The private hospitals and the ones with less then 300 deliveries per year were analyzed using indicators constructed from SIM and SINASC databases. Signs of quality problems were found on 99 maternities. Based on the results, the maternities were classified, allowing the managers of the VISA to establish priorities of the technical visits and a monitoring database was constructed.

A diagnostic of psychiatric hospitals and psychiatric admissions in the state of rio de janeiro, brazil, using administrative databases

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Brazilian Psychiatric Reform proposes the de-institutionalization and the establishment of new technologies in mental health care that substitutes the psychiatric hospital. Psychiatric admissions are still one of the most prevalent in the state of Rio de Janeiro which has a great number of psychiatric hospitals.

This study evaluated psychiatric hospitals and psychiatric admissions, in the Public Health System, in the state of Rio de Janeiro, between January 2003 and December 2004. Data was obtained from two different administrative databases: National Register of Health Establishments and Hospitalization Information System. A program which aggregates authorizations of the same hospital admission was used to analyze psychiatric admissions. Hospital, demographic and clinical characteristics were studied.

There were 119 hospitals with at least one psychiatric bed and a totality of 10417 psychiatric beds. There were 48 psychiatric hospitals, 35 of them private and 13 public. 71% of these hospitals had more then 120 psychiatric beds and 8% had less then 40 beds.

Only 22,9% had emergency care, 41,7% had ambulatory care, 43,8% had diagnostic and therapeutic support and 68,8% had Commission of Hospital Infection Control.

There were 68.424 admissions. Private hospitals had the largest number of admissions (70%). Admissions of males (62%), ages between 40-49 years (29%) and diagnosis of schizophrenia (58,6%) were the most frequent. Private hospitals had the largest number of admissions (76,2%). Mean length of stay was of 86 days and 7% was considered psychiatric long term hospitalization. Hospital mortality rate was 0,5%. Both mean length of stay and hospital mortality rate were bigger in more advanced ages.

The possibility of monitoring psychiatric admissions in Brazil using administrative databases with the characterization of long-term hospitalization can help public manager to policymaking, in order to define extahospitalar services to be implanted and to reduce revolving door phenomena, both of them of great importance to the new purpose of mental health model.

Results and Critical Aspects on Romanian Case Based Hospital Financing

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The development of Romanian case-based financing started in year 2000 with an international USAID supported project. After 7 years of gradual implementation, the system is used for almost all Romanian acute care hospitals (276 hospitals), reached some maturity and is prepared to step in for another period.

But which are the main results and the critical aspects that still exist in the Romanian case-based financing system?

Results at hospital level and central level

- Better documentation of the Medical Records and better coding of diagnosis and procedures
- Creation and development of IT & Statistic departments in hospitals (responsible with patient level data collection)
- Creation and development of patient level database with all discharged cases, allowing for better hospital (and services level) management, one based on evidence
- Incentives for technical efficiency (cost containment in order to keep within the prices known ex-ante)
- Development of a unique national database with over 4.7 million records yearly, with demographic and clinical data.
- More equitable financing, showed by the utilization of a unique national tariff in 82 out of 276 hospitals.
- Better coding the CMI increased each year, from 0.7180 in 2004, to 0.7561 in 2005 and 0.7627 in 2006.
- Better efficiency LOS decreased from 7.7 in 2004, to 7.0 in 2005 and to 6.8 in 2006.
- Transparency regarding hospital financing and hospital activity (www.drg.ro)

Critical Aspects at hospital level and central level

- The need for coding professionals
- The need for better control in order to prevent errors or abuses regarding clinical coding
- Turnover of IT staff because of the small salaries in public sector (hospitals), compared with private organizations
- Lack of information and skills at managerial level in obtaining benefits of the use of existing database and insufficient personnel to manage the hospital database
- Lack of real incentives at hospital management level to increase technical efficiency
- Not all hospitals send the Minimum Basic Data Set
- Insufficient information regarding costs incurred or the package of services provided by hospitals in treating patients for the level of reimbursement received.
- Insufficient capacity of institutions to control and detect possible abuses/fraud at hospital level
- No evidence on better accessibility to services or quality of services.
- Insufficient utilization of hospital web-available reports for analysis, research etc.

The Romanian cased-based hospital financing system showed that the reform of hospital financing can be successfully implemented, but some prerequisites are needed: political support from the decision makers, good communication between institutions involved in implementation, and enthusiastic and solid expertise among local and international people, capable to work in a team.

Development of the Discovery Health Hospital Rating Index (Version II)

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The Discovery Health Hospital Rating Index (DHRI) is the first and only initiative that reports data on hospitals' performance in South Africa. Version II of the DHRI is about to be published

Aims: Discovery Health is keen to promote choice and accountability in the Private Hospital Sector by measuring and publishing performance indicators. Following the publication of the first DHRI, Discovery Health introduced refinements in treatment categories measured, outcome indicator selection, case mix adjustment methods and statistical modelling to produce a more accurate reflection of hospital cost and quality data to the public.

Discussion: In this paper the methodology for choosing treatment categories, outcome measures and the addition of the MedStat staging criteria to the disease severity case mix adjustment is discussed. The most significant areas in determining a hospital's star rating is examined as well as the statistical methods employed to account for small sample variability.

Results: Over 220 000 hospitals admissions falling into 50 discrete categories, covering mainly non-emergency surgery and maternity, were case mix adjusted using a modified IR DRG grouper. These adjustments were further refined using age bands and disease staging (based on ICD 10 diagnosis codes) using the MedStat disease stages. The resulting untrimmed DRG R2 improved to 71.9%.

Performance varied among large hospital groups as well as by region. Characteristics strongly associated with significant increases in adverse outcomes included being a small non-metropolitan hospital performing less than 10 procedures per category.

Conclusions: The DHRI (v.II) demonstrates improved case mix adjustment and statistical method and demonstrates that performance varies among hospitals by Hospital Group, region and size.

Case-Mix for Renal Care in Selenge Provincial General Hospital

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Introduction: In Mongolia, health care financing does not serve as an incentive to improve efficiency. Specially, the health sector has not been fully mobilized within the current financing system. At the end of 2005, surplus of the health insurance fund reached 72% of its annual income and likely to rise from year to year. This is related to a fact that the social health insurance payment method and level does not reflect health service needs and standard costs. In addition payment level has been lower than the market price. In order to fully mobilize the financial resources, there is a need to review the benefit package, insurance coverage, payment methods, levels and real cost of the health services. The payment from the health insurance fund is currently based on number of beds, capacity, and number of outpatient visits of hospitals. Therefore, hospitals have incentive to increase number of beds, provide unnecessary admissions and visits.

Objective: To analyze the cost of the renal care using case mix approach for improve the health care financing system in Mongolia.

Method: Data were collected from over one year period of 2005 using medical record of Selenge provincial hospital and grouped into ICD 10 analyzed the cost of services. The costing analysis was conducted based on the case-mix concept of the top-down costing approach.

Results: The average cost of renal care per day was 7.6 $ US, average cost of one inpatient treatment was the 84.5 $ US. The factors significantly influence the treatment cost were length of stay, followed by discharge outcome, case type and severity level.

Conclusions: A single health service purchasing system financed from public financing should be developed under an integrated management and policy. Output based budgeting should be developed. Secondary health services should be financed by global budget estimated based on case mix.

Workshops

Statistical Methods with Applications to DRG Analysis

Prof. W. Sermeus
Center for Health Services & Nursing Research, Leuven University, Belgium

Dr. Jason M. Sutherland
Center for Health Policy Research and Reform, Dartmouth College, USA

Introduction

This workshop is relevant to professionals who routinely analyze data from 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 methods used for DRG analyses and will justify 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. In DRG analyses, determination of inliers and outliers is an important consideration of statistical analyses. The properties of the mathematical average are compared to most robust measures of location. Advanced measures of DRG analyses are discussed with practical examples.

2) Trimpoint Definition and Outlier Identification
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

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) Discussion and Conclusions

Long Term Conditions

Paula Monteith
Principal Casemix Consultant, Information Centre for Health and Social Care's Casemix Service

Stephen Cole
Principal Casemix Consultant, NHS Information Centre

Virginia Jordan
Head of Standards & Classifications, Information Centre for Health & Social Care Casemix Service

With an ageing population, ongoing advances in medical technology and the increasing need to assess value for money in terms of treatment provision and effectiveness, the area of long-term and continuing specialist care is gaining importance in the United Kingdom especially with regard to gaining an understanding of how to define case mix and evaluate treatment outcomes.

This workshop aims primarily to:

1. Investigate the techniques and information necessary to define long-term care;
2. Assess the extent to which care complexity and patient functionality can be measured and compared across settings, services, and geographical borders – and whether a 'one-size-fits-all' approach is feasible in the longer term;
3. Discuss quantifying and qualifying outcomes rather than outputs.

With an emphasis on rehabilitation and specialist palliative care, the workshop will also investigate how casemix can help in classifying care traditionally delivered outside the hospital setting, and how it can effectively assist providers and procurers of care to understand modern disease management for long-term debilitating conditions.

Lessons learned from the UK will be shared, and attendees will be invited to participate in an open floor discussion to compare international experiences in this arena.

A Smooth Introduction to Case mix for new comers

Jean Marie Rodrigues
Professor of Public Health and Medical Informatics in Saint Etienne Medical School, France

Dana Burduja
Program Director at the Centre for Health Policies and Services (CHPS) in Bucharest, Romania and Consultant for the Infrastructure Development for Health Financing Reform in Turkey

Terri Jackson
Associate Professor with the Australian Centre for Economic Research on Health at the University of Queensland (ACERH UQ), Australia

Daniel Z. Louis
Research Associate Professor of Family Medicine and Managing Director of Jefferson Medical College's Centre for Research in Medical Education and Health Care, USA

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)
2. Overview of Case mix implementations in the world (Dana Burduja)
3. Case mix and quality of Care (Terri Jackson)
4. Case mix and severity (Daniel Z. Louis)
5. The topics of a week Summer School (Jean-Marie Rodrigues)
6. Discussion

Go with the flow in the Continuity of care – The workshop on CONTsys concepts and workflow

Francois Mennerat
CEN CONTsys Task Force leader

Carolyn Hyden

Jan Lindmark

Jacob Hofdijk
Team Manager Integrated Care, Ministry of Health, the Netherlands

The terms prEN 13940-1 System of Concepts, part 1 – Basic concepts (CONTsys) and prEN 13940-2 – System of concepts to support continuity of care – Workflow will not be known by many of the PCSI members. These are the terms used for the standardization work of care delivered in the health network, mostly defined as Continuity of Care. The standard 13940 has been accepted by the CEN community. It provides the base concepts for describing the care delivery within health systems. The next step is to extend the model with the workflow dimensions. This second part is concerned with concepts relating to "Who" (patient involvement, provider, 3rd party), "Why" (health issues), "When" (time frames, contacts, periods of care, episodes of care) and "What" (decision support, use of clinical knowledge and activity). With the gradual adoption of the paradigm shift from supply oriented to demand thus patient centred health systems the base concepts need to support the dynamics of the semantic stable collaboration between health providers.
As the main theme of the 23rd PCSI conference is " Continuity of Care " it is essential to devote a workshop on the work of the CEN CONTsys working party.

Objective of the workshop

Introduction to the base concepts for systems used in the continuity of care. Continuity of care delivery is new in health, information systems need to be prepared for this change. The workshop will provide the basics of concepts for continuity of care delivery, a base for a successful change process.The examples presented will illustrate the potential of the new agreed CEN Standard. The workshop will give meaning to the numbers 13940 and the letters C.O.N.T.S.Y.S.

Program
The 3 hour workshop will introduce you to the System of concepts to support Continuity of Care systems.

1. Introduction to the workshop (Jacob Hofdijk)
2. Introduction to the CONTsys EN 13940
    a. Part 1: Basic Concepts,
    b. Part 2: Workflow in Continuity of Care

3. Presentations of some examples of the Contsys
    a. The Swedish Flow model (Carolyn Hyden)
    b. The Samba Model (Jan Lindmark)
    c. The Dutch Episode approach to integrated care delivery (Jacob Hofdijk)
4. Discussion

From CaseMix to clinics: How can we use administrative data for clinical research?

Wilke, M.H.
MD. and CEO of Dr. Wilke GmbH – inspiring.health, Munich, Germany

Background:
In many countries vast data collections are existing, which all – more or less – are containing coded patient information. These data collections are mainly used for administrative purposes especially in the Case Mix 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 Case Mix – 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 work power for extra double or triple data acquisition for various purposes could be saved.

Goals of the workshop:

To find out, which added value for clinical work can be drawn out of CaseMix – routine data.

Items to be covered:

- Contents of DRG – data in different countries
- Clinical research questions suitable for analyses with routine data
- Limitations
- Possibilities for international collaboration

Schedule:
14:00 Opening, introduction
14:10 Clinical research questions that could be handled with DRG – routine data
15:00 Variety of data in different countries
15:30 Coffee break
15:45 Presentation of a sample project
16:00 Some reflections about data quality, conclusions
16:30 The End

Intented preferably to:

- Clinicians dealing with CaseMix
- IT – experts
- Case Mix economists
- Clinical coding stuff

Background needed:

- Knowledge of the respective local CaseMix System
- Clinical background
- Knowledge of data structures and content that is today mainly used for Case Mix

Development and Use of Outpatient Classification Systems as the Basis for Outpatient Prospective Payment Systems – The U.S. Medicare example and other country examples as the basis for a facilitate discussion.

Jugna Shah
President and Founder Nimitt Consulting

Goals of the workshop: To share the outpatient

Items to be covered

1. Explanation of the U.S. Medicare Outpatient Classification System called Ambulatory Payment Classification (APCs)
2. Explanation of the payment policy parameters used under the Medicare Outpatient Prospective Payment System (OPPS)
3. Brief explanation (either formally from pre-determined presenters or informally from the audience) and discussion of what other systems are in place or under study and the key features of the classification system and the payment system
4. A discussion of the important features of an outpatient classification system (i.e., what should be the primary variable for grouping, diagnosis or procedure etc.) and the key features of designing a payment system (i.e., packaging or bundling of services together, items eligible for separate payment, discounting multiple procedures, etc.)

5. Open discussion of the positive/negative incentives created by various outpatient payment systems
6. Future of outpatient and inpatient classification and the movement to episode classifications
7. Other, as defined by participants

3 hour workshop with a 20 minute break

Author's List