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Proposal of an output method for Purchasing Power Parities for (non market) health services

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Abstract

The development of an output method for health services in PPPs cumulates number of handicaps :

- the relationship between outcome (health status or health gains) and output (contribution of health services or health system) is less tight than elsewhere (some experts advance that 80% of the outcome does not come from the output);
- numerous providers are involved in “a complete treatment”, and differently across countries;
- the “complete treatment” is supposed to be the ideal (but vague and perhaps impossible to catch, as a treatment is never completed before the death of the patient), the elementary procedure only a practical second best which will miss some technological progress (with the replacement of a procedure by another);
- health administrations have established very detailed DRGs (Diagnosis Related Groups), with several hundreds of items, but each country has done it on its way from the same original (American or Australian);
- the framework of the health accounts and this of national accounts do not coincide (scope, classifications).

From a purely PPP point of view, only “health services” are comparison-resistant within the health care system, and among them only “hospital services” are really comparison-resistant, for it should be possible to estimate the price of a consultation by a general practitioner or a specialist (or the number of consultations), or even the price of a single “treatment” by a specialist or a dentist, even if they are classified as “non-market” providers.

In any case, the classification of activities/products as in national accounts should be the central axis of PPPs and measurements of output. That means that the ICHA-HP classification of health care providers in the System of Health Accounts should be the main dimension to use for PPPs if they are to rely on detailed data from SHA, but this classification should be slightly revised to coincide with the scope of National Accounts, concerning the boundary between health and social (“nursing care” in SHA is very close to “social with accommodation” in NA and should be isolated or excluded). Considering that the same activities can be fully “market” or fully “non-market” according to the countries, but should be comparable, the market / non-market status of the “provider” will perhaps be forgotten, or used for national weightings.

If outcome is to be analysed in the same framework as output, that means that this providers classification should be crossed with the International Classification of Diseases (last updated ICD-10) dimension, exercise already experimented by some countries in so-called “cost of diseases” analysis. But it is an ambitious perspective, not compulsory for PPPs purpose.

In any case, we suggest to calculate PPPs according to the following formulas :

$\text{VAL} = \text{VOL} \times \text{PRICE}$ $\text{VAL} = \text{QUANT} \times \text{UNIT COST}$ $\text{VOL} = \text{QUANT} (\text{num. of treatments}) \times \text{QUAL H} (\text{average health gain of a treatment}) \times \text{QUAL NH} (\text{other health quality})$ $\Rightarrow \text{VOL} = (\text{VAL} / \text{UNIT COST}) \times \text{QUAL H} \times \text{QUAL NH}$ $\Rightarrow \text{PRICE} = \text{UNIT COST} / (\text{QUAL H} \times \text{QUAL NH}) = \text{VALUE} / \text{VOL}$
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If we are to calculate hospital services only, with a “classical” price approach, it should be possible to estimate “case vignettes” of treatments involving hospital services only, as the EU Health BASKET project is currently doing. Even 5 or 7 prices could be considered as enough, but it does not prevent from checking that the content of “hospital services” and of “general practitioners” is the same across countries in the case of general practitioners operating in hospitals (private / public) or prescribed drugs. If it is not spontaneously the case in National Accounts, it would imply the contribution of health accounts experts to arrange a presentation of National Accounts aggregates in a homogeneous way.

A direct volume approach of hospital services, by number of treatments by DRGs in a common classification inspired by the original US one, was our first idea, but it appears that the national classifications are not at present close enough. Anyway, some DRGs are common to all countries, and they could provide easy “unit costs” with correct quality parameters (perhaps less precise than case vignettes of EU Health BASKET), which could be used in the “classical” price approach mentioned above. Of course, the same precautions are to be taken for the homogeneity of the content of “hospital services” and other providers connected. But anyway, for unit costs by DRGs or for prices by EU Health BASKET project, a common imprecision relies in the conventions adopted for ventilating some costs but “forgetting” some other ones (10%, 20% of total hospital costs are not ventilated through DRGs ?).

DRGs like most of EU Health BASKET prices would estimate acute care only (psychiatric and rehabilitative care would be estimated by reference prices or by some simple number of occupant days).

The more ambitious approach, also the only one which could reduce all obstacles to comparability, would be to reconcile output and outcome, national accounts and health accounts, around a common framework crossing an adjusted classification of providers and an adjusted classification of diseases (+ prevention + some collective services...), that is a harmonisation of the “cost of diseases” national approaches. With strict recommendations on the homogeneity of the content of each provider, and instructions to ventilate all auxiliary or secondary costs among “diseases”, this framework could synthesise the current approaches of “case vignettes” according to EU-Health BASKET, “burden of diseases”, “health gains”, could match the DRGs classifications and would provide “health in volume” according to the two significant axes (output by provider, outcome by disease).

This work, led mainly by health accounts experts for it is beyond the competence of PPP experts, would be completed by quality adjustments of two orders : “health treatment” and “non health treatment”, the first one connected with QALYs and the second one explored by projects like HCQI.

1 - The background of National Accounts

As a general guideline, Purchasing Power Parities methods of volume and price should be inspired by the same concepts as National Accounts.

SNA 93 (par. 16.133-16.135, 16.138) and ESA 95 (par. 10.25, 10.26, 10.42) recommend to use output methods for individual non market activities like health (instead of input methods using index of costs as price deflators). A task force devoted to volume measurement of non market health was organised by Eurostat in 1998, and the subsequent Eurostat's "Handbook on price and volume measures in national accounts" published in 2001 gave recommendations for such an implementation. It was supposed to be applied this year 2006 for dissemination, in particular for health by all EU-members, under commission decision 2002/990/EC. But the handbook had left a large place for choice and interpretation, and we know some countries have not respected the deadline. Hence, a similar questionnaire was launched by Eurostat and OECD in June 2006 to know better the practical solutions applied, whose recent results are exposed in chapter II. Among all, we dispose especially of a rich information about the UK, with several methods proposed to the public (the definitive choice is still pending) and a quite good documentation for France, Italy and the Netherlands.

In the UK, the ATKINSON review and subsequent reports have explored in detail which quantitative and qualitative indicators are to use in non market activities (in particular for health) and have improved or criticised what NA of UK were already doing ; the Atkinson review has enounced nine fundamental principles to guide the reflection and the calculations in this domain.

First of all, the "output" is to be distinguished from the "outcome".

According to SNA 93 par. 16.135, "*individual health services [output] consist of various kinds of consultations and treatments provided to patients, which can be described and documented in considerable detail. Detailed records of such services frequently exist for administrative purposes.*" Par. 16.136 adds : "*The output of health services needs to be clearly distinguished from the health of the community [outcome]. Indeed, one reason for trying to measure the output of health services may be to see the effect of an increase in the volume of health services on the health of the community. This obviously requires a measure of the volume of health services that is different from health itself. It is well-known that there are many other factors such as sanitation, housing, nutrition, education, consumption of tobacco, alcohol and drugs, pollution, etc., whose collective impact on the health of the community may be far greater than that of the provision of health services.*"

ESA 95 par. 10.26 insists : "*As these results depend on several other factors as well, it is not possible to measure, for example [...] the volume of health services by the improvement in the health of the population.*" and delivers some recommendations in par. 10.42 : "*For non-market services provided to individuals, output estimates can be based on quantity indicators. [...] for non-market health services the indicators should reflect treatment in hospitals or visits to doctors or nurses. [...] there is a quality dimension reflected in the amount of resources provided per [...] patient. Care must be taken to use data with a detailed breakdown so that each indicator for which calculations are made is as homogeneous as possible in respect of costs. It is only then that changes in the mix of products are shown correctly as volume changes.*"

The handbook on price and volume measures in national accounts, par. 4.13, gives a definition of health output : "*Health output is the quantity of health care received by patients, adjusted to allow for the qualities of service provided, for each type of health care*" and specifies : "*The quantities should be weighted together using data on the costs or prices of the health care provided. The quantity of health care received by patients should be measured in terms of complete treatments.*"

To describe a complete treatment is a challenge: *“Using a complete treatment as the measurement unit requires account to be taken of the whole bundle of complementary services constituting a treatment : medical services, paramedical services, laboratory and radiological services and, in the case of hospitalisation, non-medical services such as the provision of food and accommodation. In practice, the feasibility of measuring complete treatments is dependent a lot on the degree of fragmentation of the services making up a treatment (i.e. to what extent the various medical acts which constitute a treatment are supplied by different providers). [...] A specific aspect of the concept of a complete treatment is the re-admission problem. If a patient has to go back to hospital because of the same illness, this means that the original treatment has not yet been completed. A second treatment for the same person is only recorded if the patient is sent back to hospital to be treated for a different disease. A kind of re-admission problem also exists for medical and dental practice services. A patient who is treated by a specialist for a specific disease will often need several consultations. Ideally, all visits (first visit + continuation visits) related to the same diagnosis should be counted as one treatment. Later in this section, the argument is made that the equation : one visit = one treatment is likely to hold only for general practitioners.”* The handbook does not quote medicines and drugs, for the general framework of National accounts for price and volume considers “health” as an activity and a product, not a function like in the COFOG approach : the case of other (linked) goods and services provided by other units is to be treated within other activities and products (like manufactured goods). As data transversal to different providers are difficult to obtain, the handbook accepts a description first by activity, then by “full treatment” inside an activity, which is nevertheless something quite different.

The handbook suggests a stratification relying on CPA classes (classification of products) : *“hospital services (CPA 85.11), medical practice services by general practitioners and specialists, and services delivered by out-patient clinics (CPA 85.12), dental practice services (CPA 85.13), other human health services (CPA 85.14)”*. Let us notice that ISIC classes are very close (dental practice services remain in ISIC 85.12, other human health services are numbered ISIC 85.19) and CPC classes are very similar to ISIC ones, codified “93” instead of “85” ; general practitioners services (CPC 93.121) are distinguished from specialists (CPC 93.122) and dentists (CPC 93.123) at 5 digits, but the handbook suggested different indicators anyway (number of first visits versus number of visits). For hospital services, the handbook suggests to rely on so-called DRG-type classifications : *“DRG (Diagnosis Related Groups) systems are used to classify hospital stays into groups that are medically meaningful and as homogeneous as possible with regard to resource use. Each hospital stay is classified in one, and only one, DRG based on medical and administrative information about discharges. In recent years DRG systems have been introduced in many countries to assist hospital management and funding decisions. DRG systems vary across countries, but they are sufficiently similar. They are always very detailed consisting of several hundreds of diagnosis related groups.”*

What about quality adjustments ? In principle, fully quality-adjusted DRGs make an “A” method (the best solution), only partial quality-adjusted DRGs make a “B” method (sufficient, but better can be done). Quality can come from *“better performing equipment, better performing doctors and nurses or changes in the 'hospital environment' such as the occurrence of infectious diseases in the hospital, medical errors, additional facilities for patients etc.”* The handbook refuses in principle QALY indicators as direct measures of output : *“For volume measurement the focus is on outputs, not on the final outcomes as measured, for example, by summary indicators like gains in Quality Adjusted Life Years attributable to a specific treatment. However, information on specific aspects of outcomes might serve as proxies for changes in the quality of the service output.”* and concludes : *“Further research on appropriate indicators is needed.”*

The ATKINSON principle B summarizes in general the relationship between output and outcome : *“the output of the government sector should in principle be measured in a way that is adjusted for quality, taking account of the attributable incremental contribution of the service to the outcome.”* In that way, it is not obvious why QALY indicators should be rejected : Quality Adjusted Life

Years attributable to a specific treatment (including “life comfort”), used in a fine detail of treatments, neutralizing the specific background of the patient, should exactly measure the contribution of the service to the outcome.

It is hoped that the next SNA 1993 Rev 1 will clarify this relationship between output and outcome, and will introduce this terminology in the international handbooks (clarification item C10).¹

In the United Kingdom, “*The most important improvement made in June 2004 was the differentiation in the NHS output index of many different types of health activity. This was made possible because of the availability of unit cost information at a disaggregated level from the Reference Costs. Information on changes in activity had been available for several years from Hospital Episode Statistics (HES), and had been the source of information on activity for the National Accounts prior to June 2004, but only at an aggregated level, and only with unit costs at the aggregate level. It was thus possible in 2004 to differentiate between some 1.700 NHS activities [DRG-types], as compared to only 16 previously.*” (Publication of ONS on Public Service Productivity : Health, February 2006, par. 4.10, previous recommendation of ATKINSON review n° 8.2).

In the UK, quality adjustments have not yet been incorporated in national accounts : “*One set of estimates of NHS productivity is based on current National Accounts estimates of output as in Blue Book 2005. [...] This set of estimates takes no account of quality change, however, and must be firmly understood as such.*” (ibid., par. 1.4) But a lot of reflections and calculations have been made (previous recommendation of ATKINSON review n° 8.5), either by Direction of Health (DH), either by the Centre for Health Economics at the University of York and the National Institute of Economic and Social Research (York / NIESR), waiting for a public debate and a general agreement. DH proposed and estimated a number of quality indicators : “*survival rates ; health effects ; an adjustment for life expectancy for survival rates and health effects ; waiting times ; improvements in primary medical care ; longer term survival rates for myocardial infarction ; patient experience ; in addition, DH proposes a new quality measure that uses value weights instead of cost weights for statins used to treat patients with coronary heart disease (CHD). This impact is also included in quality adjustments.*” (ibid., par. 1.6) If these proposals of quality adjustments estimated by DH are approved, they will have an impact of +1,8% per year in output growth (ibid., par. 1.7).

¹ See <http://unstats.un.org/unsd/nationalaccount/AEG/papers/m4nonmarketOutput.pdf> and <http://unstats.un.org/unsd/nationalaccount/AEG/papers/m4reportnonmarketOutput.pdf>

³ We can wonder why NA have not described occupational health care as “wages in kind” and hence in final consumption of households. But PPP should follow the conventions of NA.

2 - The background of a System of Health Accounts, “costs of diseases” and health economics literature

A system of health accounts (SHA), focusing on the expenditures, has been developed by the OECD, Eurostat and the WHO. It is not a satellite account (see chapter 8 of “*A System of Health Accounts*”, OECD, 2000 for a full explanation) for it does not respect the CPC classification nor the titles and definitions of national accounts aggregates, but it is close enough to our purpose for using it as a “proxy” of satellite account. The output of “health” in a NA sense (but in a broad definition of activities) can be put side by side with the “total current expenditure on health” of SHA, and the actual final consumption of health with the “total current expenditure on health minus occupational health care”, as occupational health care is described in intermediate consumption in national accounts³.

Three classifications at least have been developed for the purpose of this system of health accounts : functions (ICHA-HC), providers (ICHA-HP) and financing (ICHA-HF). The classification of the providers is the closest to the national accounts use, for activities as referenced by ISIC or products by CPC, and even for the COFOG or the COICOP functions, but its consistency with NA own classifications is far from perfect. Above all, the classification most in favour in the SHA is the “functional classification of health care”, though improperly denominated according to NA standards, as the “functions” do not mean “finalities” or “purposes” : they cross a dimension “steps in the process of production” (curative / rehabilitative / long-term nursing / ...) with a dimension “modes of production” (in-patient / day-care / out-patient / home care /...), of low interest for NA⁴ and our purpose to measure the result of the production. ICHA-HF evokes the classification of institutional sectors and sub-sectors in national accounts, but more intended for the final consumption expenditures or current transfers than for the output, so it is also of a low interest for our specific purpose.

The distinction market / non market is never used in the ICHA classifications, nor in the SHA.

Apart these classifications introduced by the SHA, there exists above all an international classification of the diseases, the last updated being the ICD-10 (international classification of diseases, 10th version), but some countries still use the previous one : the ICD-9.


Another dimension sometimes used in health economic studies would be the list of the procedures (surgical, non surgical, others). The WHO has provided to member states an “International Classification of Health Interventions”, ICHI, but it is still a beta-version. At the time being, countries use many national or regional classifications : Nordic classification of surgical procedures (NOMESCO 2005), Australian procedure list (ESRI 2004) also adopted by Ireland, French “Classification des Actes Médicaux”...

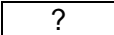
The definition of “health” is very broad in the SHA, for apart all the goods belonging to the COICOP function “health”, the “long term nursing care” (HC.3 in the ICHA-HC classification of functions of health care) is also included, though mainly related as “social services with accommodation” in ISIC (8531), CPC (9331) and in national accounts. The fact that COFOG has kept in division “07 : Health”, group “07.3 : hospital services”, a sub-function “07.3.4 : Nursing and convalescent home services (IS)” introduces ambiguity but an explanatory note restricts them to “*institutions serving old people in which medical monitoring is an essential component*”. So is the “general health administration and insurance” (HC.7), though considered mainly in “general public administration” in ISIC (7530), CPC (9131) and in NA. We propose hereby a “right” selection of the SHA figures for a comparison with “health services” in NA and PPP, derived from table 2 in the current SHA manual (OECD 2000) :

⁴ Except to exclude long-term nursing, considered as mainly social activity, see infra.

Table 1 : Individual health services in NA according to table 2 of SHA

	NA aggregates	hospital services (CPC 9311)	general practitioners, specialists (CPC 93121 and 93122)	dentists (CPC 93123)	other individual human health services (CPC 9319) + part of social services with accommodation (CPC 9331)					
					HP.1	HP.3.1	HP.3.2	HP.2 (93193 + 9331)	HP.3.3 (93191)	HP.3.4 (93193 + 9331)
Health care by function	ICHA-HC	hospitals	offices of physicians	offices of dentists	nursing residential care facilities	offices of other health practitioners	out-patient care centres	medical and diagnostic laboratories	provid. home health care services	all other provid. ambulatory health care
<i>In-patient care</i>										
curative and rehabilitative care	HC.1.1; 2.1									
long term nursing care	HC.3.1	?								
<i>Services of day-care</i>										
curative and rehabilitative care	HC.1.2; 2.2									
long-term nursing care	HC.3.2	?								
<i>out-patient care</i>										
out-patient curative, rehabilitative care	HC.1.3; 2.3									
basic medical and diagnostic services	HC1.3.1									
out-patient dental care	HC1.3.2									
all other specialised health care	HC1.3.3									
all other out-patient care	HC1.3.3									
<i>Home care</i>										
curative and rehabilitative care	HC.1.4; 2.4									
long-term nursing care	HC.3.3	?								
<i>Ancillary services to health care</i>	HC.4									
<i>Medical goods dispensed to out-patients</i>	HC.5									
Total expenditure on personal health services										

 : not classified in health services

 : controversial

Because of the different borderline health / social between NA and SHA, HP.2 should be either divided in two parts / products (HP.2.A : nursing residential care – health, HP.2.B : nursing residential care – social) either being excluded of our comparison, and in pure theory a same split / partial exclusion should happen in HP.3.4 and HP.3.6 (we can consider that health is clearly majority in these two items). For more precision / convenience, HP3.1 could be split in two parts : general practitioners / specialists. Transport of patients by ambulances (CPC 93192) could create a HP.3.7, extracted from HP3.9. Other subdivisions of HP.3 are quite logical but will certainly be too fine a detail for NA aggregates. Moreover, titles of rows (HC, functions) and of columns (HP, activities) seem too close to make their crossing really interesting.

Of course table 2 of SHA numbers more columns, especially HP.4 : retail sale and other providers of medical goods (COFOG 07.1), not relevant for “individual health services”. But we have also to consider the (collective / individual) prevention services and perhaps some residual “collective” health services, sometimes dispensed by “other providers” HP.7.

Table 2 : “Collective” Health services according to table 2 of SHA

	NA aggregates	hospital services (CPC 9311)	other human health services (CPC 93199 ?)	adm. of health (CPC 91122)	operational services related to Social Security (CPC 9131)	health insurance (CPC 7132)	other human health services (CPC 93199)
	ICHA-HP	HP.1	HP.5	HP.6.1, HP.6.9	HP.6.2	HP.6.3, HP.6.4	HP.7
Health care by function	ICHA-HC	Hospitals	provision and adm. of public health progr.	general health adm.	Social Security funds	other social or private insurance	All other industries
Prevention and public health services	HC.6						
Health administration and health insurances	HC.7						
Total expenditure on coll. health services							

Research and development in health (HC.R.3), classified in ISIC 7310 and CPC 8115 are also excluded from the “health services”, in NA as in SHA, but they are not reported in table 2 of SHA, as they are not considered to be “current expenditures” (in NA point of view, they are actual final consumption, but of another product). It would be necessary in an approach by providers / industry to isolate their costs. The same phenomenon exists for education (HC.R.2), classified in ISIC 8030, CPC 9239 and COFOG 09. Hospitals are particularly concerned by these secondary activities. It would be more convenient if table 2 could provide “output of the product” (our main aim in PPP and SHA) and “output of the activity” which could interest more productivity experts.

By convention, SNA 93 reposes health services to be individual : “9.87. *The classification of the functions of government is a classification of transactions designed to apply to general government and its sub-sectors. This classification, which is described briefly in chapter XVIII, distinguishes between expenditure by government on individual services and collective services. By convention, all government final consumption expenditures under each of the following headings should be treated as expenditures on individual services except for expenditures on general administration, regulation, research, etc.: 07 Health [...]*” Note : expenditures on general administration and regulation should not be classified in health services for an activity, but in public general administration.

Therefore, it could seem strange to split between an “individual” health and a “collective” health. We do not propose to do it for NA purposes or PPP dissemination, but it has a sense in health accounts. This particular aspect of collective prevention (an individual prevention exists too), quoted in several health publications⁵ can also make it impossible to be estimated by DRGs (no profile of patients, no pathology, no treatment) nor by “cost of disease” (much often no pathology)... We can quote also the case of staff devoted to the reception in emergency services.

Table 6 of SHA crosses the personal expenditure on health by major ICD-category and by functional classification. It is said page 36 of “A System of Health Accounts” (OECD, 2000): “A breakdown of health expenditure into the major categories of the International Classification of Diseases is available for a growing number of countries. These estimations currently differ widely in coverage and estimation methodologies and usually rely on a large set of assumptions and/or rather small samples. Metadata on these types of estimations can be found in OECD Health Data.”

Such a table, but crossing ICD-categories with the HP providers classification instead of HC functional classification, would be very suitable for our purpose. In fact, a lot of countries have tried to establish a “cost of disease”⁶ by crossing the ICD-categories with the main activities linked to health. Some have restricted their attempt to the “direct expenditures” (it means on health goods and services strictly speaking, plus nursing homes, i.e. HP.1 – HP.4), the majority have included “indirect expenditures” (it can mean public health administration, research, structure...) but most often on “personal health” only (exception for Canada).

Table 3 : census of studies on “cost of diseases”

Country	Study	Indirect costs ?	Non attributable residual
US	Since (Rice, 1966), regularly updated, last (?) is (Hodgson et al., 1999) on 1995 data.	No	13% before adjustment
Sweden	Since (Lindgren, 1981) on years 1964 to 1975, last (?) on year 1991.	Yes	19% but including dental care and mentally handicapped persons
Germany	(Henke et al., 1997) on year 1990, updated by (Martin et al., 1999) on year 1994	Yes	30% before adjustment
Canada	Since 1987, last (Santé Canada, 2002) on year 1998	Yes	45%
Netherlands	Since (van Roijen et al., 1992) on year 1988, last (Polder et al., 2002) on year 1999	Yes	17%, of which 7% because of indirect expenditures
UK	(NHS executive, 1996) on years 1992 and 1993	Yes	10%
Australia	(AIWH, 2000) on years 1993 and 1994	Yes ?	10% ?
Japan	(Japan, 1999)	Yes	?
Spain	(Spain, 1993)	Yes	?
France	(CREDES, 2003) on year 1998	No	17%

Source : (CREDES, 2003)

⁵ For instance see “encadré 1 : les comptes de la santé en France” in « Des comptes de la santé par pathologie : un prototype pour l’année 1998 », CREDES, biblio n° 1480, May 2003, and « Bulletin d’information en économie de la santé n° 111 : les dépenses de prévention et les dépenses de soins par pathologie en France », IRDES, July 2006.

⁶ and sometimes a “burden of diseases” (years of life expectancy lost)

The method is macroeconomic, relying on administrative or NA data, ventilated top-down (other experiments have been established by microeconomic ways, but it is impossible to ensure the consistency of the total expenditure, hence these experiments are not surveyed here). A residual part of “non attributable expenditure” always remains from this macroeconomic top-down process, either because of prevention, either because of indirect expenditure, either for other reasons. The ventilation raises also the problem of co-morbidity and complications. These experiments have estimated costs of diseases, not unit costs (no prices, but values).

An harmonisation of conventions and techniques of “costs of diseases” is needed, and surely an adaptation of ICD-10 so as to take into account individual and collective prevention, fixed costs as reception in emergency hall, “non remunerable DRGs”, structure... to reduce the heterogeneous and sometimes high “non-attributable residual part”, which biases any international comparison.

A chapter 7 on “price and volume measurement” has been written in the SHA manual, and proposes to use the classification by kind of providers, the closest to the activities :

“7.8 [...]For price and volume measurement, the production side of health care industries can be broken down into the categories shown in Table 7.1 according to major ICHA-HP (health care provider classification) categories with cross-reference to corresponding ISIC categories [...]”

The fragmentation of the system of care between providers is always the problem :

“7.13 Fragmentation of services in the definition of output of health care has to be avoided. Instead, bundles of services that together constitute the treatment of an episode of illness can lead to more homogenous units of output that are better capable of tracking actual cost per treatment which, over time, may consist of a rapidly changing mix of services fostered by technological advances.

7.14. The cost-per-episode of illness approach has long been suggested as an alternative to traditional health care price indexes (Scitovski, 1967). Trial implementations along these lines show promising results (Australian Bureau of Statistics, 1997; and van Tuinen et al., 1997). The further spread of this approach depends on the availability of case-based reporting systems, and on the integration of health care statistics into consistent and comprehensive information systems linking patient data with cost estimates.

7.15. Defining the treatment of an episode of illness as a statistical measurement unit has to take, various parameters into account with the need for standard classification systems and patient information systems:

- *the nature of the patient’s underlying disorder (disease or impairment);*
- *the severity of cases (with/without complication);*
- *the patient’s age and gender;*
- *the commonly performed interventions, resources and technology used (e.g., type of surgery, physician’s consultation, obstetric procedures, laboratory, etc.)”*

The DRGs should fit these recommendations on the parameters ! But it keeps some limitations, so that no classification can match exactly the purpose and overtake the fragmentation of the system of health care :

“7.19. Generally speaking, a basic problem of accurate price and volume measurement in health care is how to tackle the constant shift of some kinds of treatment from one provider industry to another. Among the most important examples are ambulatory surgery and the ambulatory treatment of major psychiatric disorders. These and related examples raise the question of whether the measurement of treatment episodes should stop at the production boundary between health care provider industries. Reduced resource utilisation (and shorter length of stay) in hospitals, e.g., may be partly offset by increasing demand for health care in an ambulatory setting, such as improved drugs.”

At the time being, the inclusion of volume and price in the System of Health Accounts is still a project, but its outlines are fully consistent with the recommendations of the NA handbook and the purpose of PPPs.

Another problematic is that the health economics literature uses other contents for the use of the words “output” and “outcome” :We can quote the vocabulary used by the university of York, Centre for Health Economics (“*Developing new approaches to measuring NHS outputs and activity*”, CHE research paper 6, 2005) :

“4.1 Activities or outputs as the unit of analysis

International guidance on the measurement of government output for national accounting purposes recommends distinguishing activities, outputs and outcomes. In the health service, activities would include operative procedures, diagnostic tests, outpatient visits, and consultations; outputs might comprise courses of treatment which may require a bundle of activities; and outcomes would be defined as the characteristics of output which affect utility.”

“Output” is used for “treatments” and “outcome” for the average output attributable to a treatment, more or less adjusted on quality.

With these definitions, the university of York can give a formula for a quality-adjusted volume index of output (“output” is there used in another sense anyway) :

$$I_{yt}^{xq} = \frac{\sum_j x_{jt+1} \sum_k \pi_{kt} q_{kjt+1}}{\sum_j x_{jt} \sum_k \pi_{kt} q_{kjt}} \quad (12)$$

“Calculation of (12) requires information on the outputs (x_{jt}), the outcomes q_{kjt} , and the marginal social values of the outcomes π_{kt} .”

The marginal social values of the outcomes are here consistent with the QALY approach. EuroQol is a main institute to provide surveys able to determinate health status, and then QALY if measured just before and just after health care. EQ-5D, their last version, counts 5 dimensions in health status / outcome : mobility, self-care, usual activities, pain / discomfort, anxiety / depression.

We would hence suggest this table of translation between health economics and national accounts, if we are to respect as much as possible the European NA handbook on volume and price and the recommendation of ATKINSON review, which privilege an output “of a complete treatment” :

Table 4 : an heterogeneous terminology

Health economics	National accounts
Health status / gains	Outcome
Outcome	Average output of a treatment if neutralized on the patients' characteristics, more or less adjusted on quality
Output	Production process
Activities	Parameters of the production process / intermediate production
Providers	Activities, classified in ISIC / CPC

3 - “Prices” and “costs” : an interesting experience in EU health BASKET project

The object of this project subsidised by the European commission is “to estimate and compare the costs and prices of 10-12 different health services (episode of care) in the EU member states at the micro-level (in- and out-patient care). Information on the resources used and its associated costs to provide care for a set of exemplary cases will be collected by each project partner during WP 9. Costs will be calculated from the provider perspective. Prices will also be collected taking the purchaser perspective.”

Prices quoted here are only expenditures supported by households. As we are interested by “full price” only, they are not relevant for us. The costs of production (by non-market units usually) correspond to our “full price” concept and our “actual final consumption” aggregate.

Table 5 Selection of Case-Vignettes to be developed

<i>Need for care</i>	Age group	Type of Care			ECHI*
Appendectomy	14-25	In-patient	Surgery	Emergency	-
Normal delivery	25-34	In-patient	Obstetrics	Elective	+
Hip-replacement	65-75	In-patient	Surgery	Elective	+
Cataract	70-75	Out-patient (day case)	Surgery	Elective	+
Stroke	60-70	In-patient	Medical	Emergency	+
AMI (PTCA)	50-60	In-patient	Medical	Emergency	+
Cough	approx. 2	Out-patient	Paediatrics/GP	Emergency	-
Colonoscopy	55-70	Out-patient	Diagnostic	Elective	+
Tooth filling	approx. 12	Out-patient	Dental	Emergency	+
Physiotherapy (knee)	25-35	Out-patient	Rehabilitative	-	-

*ECHI: related to European Community Health Indicators set (+ yes/ - no)

Countries are requested to give the most “representative” costs and prices, and it is generally understood to be the costs and prices of the dominant provider (public / private). Of course, for our purpose, we would prefer “average” costs and prices, or even “distinct” sets for private and public systems with the corresponding weights.

We can take the case of vignette 3: hip replacement, to imagine how we could use these results for our purpose of PPP prices.

“Vignette 3 - Hip replacement : Female, 65-75 years old, with hip osteoarthritis requiring hip replacement because of considerable impairment is finally (after waiting time if normal in the hospital) admitted for her first hip replacement (one side). The patient is without co-morbidity (i.e. expensive drugs due to treating co-morbidity should be excluded), the surgeon uses the most frequently used implant for female patients; the operation is without severe complications; end of case vignette: discharge (home or to separate rehabilitation institution).”

Table 6 : hip replacement cost, according to EU Health BASKET report

We suggest to collect two sets of costs in each country : public (x%) and private (100%-x%). Perhaps two different matches with HP providers ?

Our addition :	EU Health BASKET project						
	Phase	Elements	Units	no. of units used / patient	Unit Cost	Total costs	
HP providers corresponding	Pre-operative (admission and planning)	<i>Diagnostic Procedures</i>					
HP.1		Imaging (e.g. X-Ray)	No.				
HP.1		Imaging (e.g. ultrasound)	No.				
HP.1		Imaging (e.g. CT)	No.				
HP.1		Laboratory (e.g. blood count)	No.				
HP.1		Laboratory (e.g. blood coagulation, C-reactive protein (CRP), etc.)	No.				
HP.1		Other (ECG, lung-function, etc.)	No.				
		<i>Care before OP</i>					
HP.3.1		Surgeon/Physician input	Patient days*				
HP.1		Nursing input	Patient days				
HP.1		Other (paramedical)	Patient days				
HP.1		<i>Drugs, infusions, injections, etc. Drug A, Drug B, etc.</i>	DD**				
HP.4 ? or HP.1		Operation	<i>Devices (type of implant, stent, etc.) total price paid by hospital</i>	No.			
HP.1			OP-Team (altogether or separately)	Min.			
HP.3.1	Surgeon		Min.				
HP.3.1	Anaesthetist		Min.				
HP.1	OP-nurses etc.		Min.				
HP.1	Drugs (anaesthetics, other?)		DD				
HP.1		OP-Theatre running costs (e.g. sterilisation)***	Min.				
HP.1	Wake-up room						
	Post-operative	<i>Intensive Care Unit</i>					
HP.3.1		Surgeon/Physician	Patient days				
HP.1		Nursing	Patient days				
HP.1		Other	Patient days				
HP.1		Drugs	DD**				
HP.1		Diagnostic Procedures (e.g. imaging, laboratory)	No.				

Possible quality adjustment linked to treatment QUAL H

▲ This matching is fictitious, for we suppose all should be recorded in HP.1, and it should be spontaneously the case for public hospitals, but what is the case for private hospitals ?

Table 6 : hip replacement cost, according to EU Health BASKET report (continuation)

Our addition	EU Health BASKET project					
	Phase	Elements	Units	no. of units used / patient	Unit Cost	Total costs
HP providers corresponding						
HP.1	Post-operative	Therapeutic Procedures (e.g. punctures, drainages, special wound dressing)	No.			
HP.1		<i>Normal Ward</i>				
HP.3.1		Surgeon/Physician	Patient days			
HP.1		Nursing	Patient days			
HP.1		Other (e.g. Physiotherapy)	Patient days			
HP.1		Drugs	DD**			
HP.1		Diagnostic Procedures (e.g. imaging, laboratory)	No.			
HP.1		Therapeutic Procedures (e.g. punctures, drainages, special wound dressing)	No.			
HP.1		Discharge planning	Drugs given to patient until contact with GP	DD		
HP.1	Medical aids given to patient		Units			
HP.1		Planned Re-admissions (when part of care episode)				
HP.1	Overhead (including administration, catering, etc.)	Total, or: - On ward level - On departmental level - On hospital level	Patient days			
HP.1	Capital costs (if taken into account in your country)					

*The unit patient days include personnel costs directly spent with the respective case per day and personnel costs which are not directly spent with the respective case per day (but are allocated to it proportionally) e.g. staff assemblies, studying documents.

Example: there might be 20 min (at an hourly wage of €30/0.50 Cent per minute this results in €10) directly spent with the respective case per day. Additionally there are approx. €1000 of personnel costs per day spent in the respective ward for care not directly spent with patients. Given, there are 20 beds on the ward the additional costs would be €50. Thus, unit costs per day would sum up to €60. Please make sure that personnel costs are not double-counted (e.g. a surgeon whose time is allocated to the operating theatre should not be allocated to the ward at the same time),

**DD: daily doses,

***if not included under general overhead costs,

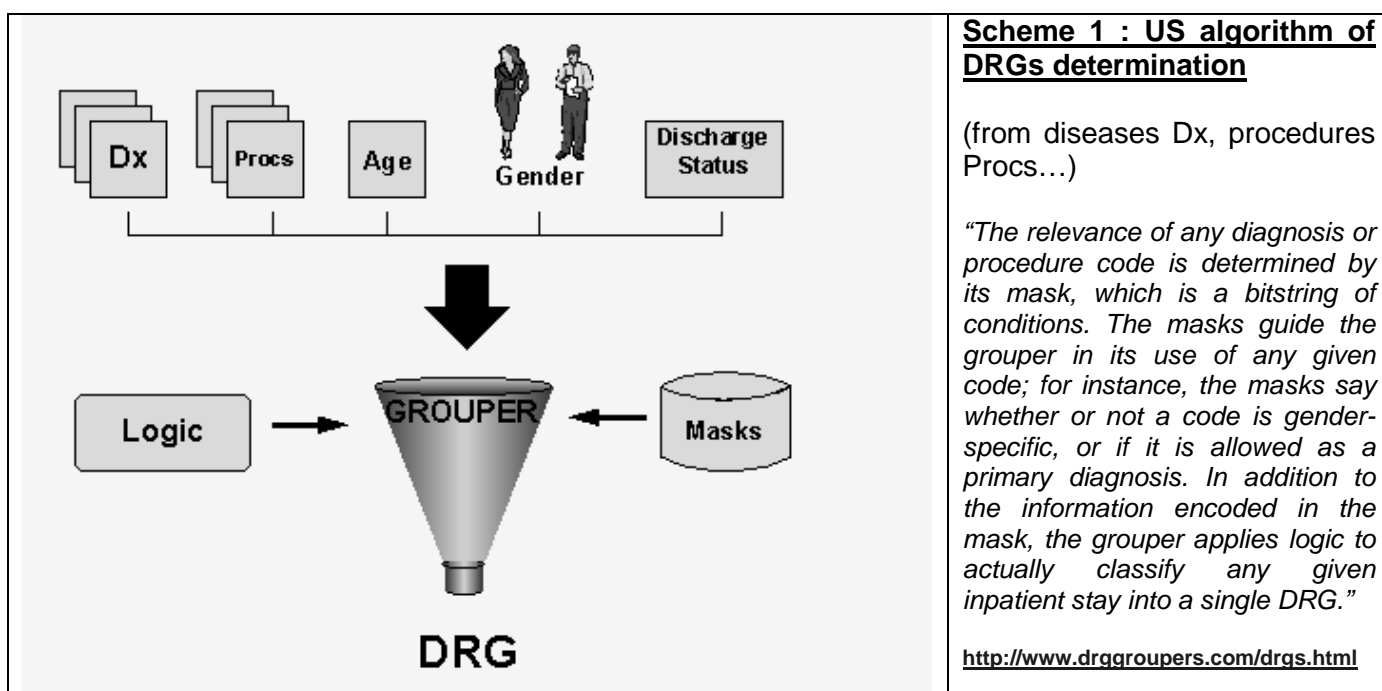
****if not included under operation or post-operative and if relevant

The EU Health BASKET guidelines say that costs are collected by providers, but we do not see how providers are identified and even if ICHA-HP classification is used. Of course, it is crucial to use these costs as deflators of hospital services only if the corresponding expenditures are recorded in hospital services production and actual final consumption. Indeed, the most easy way would be that SHA give such recommendations for the content by providers (in NA too), so that each case vignette would be connected to only one provider.

Some differences in costs can be linked with differences in quality assigned to the treatment : the kind of hip prosthesis should vary across countries in costs and in quality measured by QALY, so that this exercise gives not only a unit cost but a treatment quality index to correct the sharing between volume and price.

4 - Comparability of national DRGs

The European handbook suggests the use of DRGs for hospital services in National Accounts. As the US classification, then the Australian one, can be seen as the common originals of any DRG classification, we could hope that a common international DRG classification could exist.



As it is shown in scheme 1, this classification relying first on diseases should be naturally consistent with ICD-10⁸ and would have a lot in common with the “cost of diseases” exercises, including the remaining non ventilated costs. It would be more precise, but perhaps less comparable because of the use of procedures, which restrict them also often to acute care. But we could imagine simple indicators for psychiatric and rehabilitative care (number of occupant days).

Even if this international classification was available for one or few specific diseases, and even for an incomplete stratification of one disease, it could be used as providing “case vignettes”, more rough than in the EU Health BASKET project, but more numerous and easy to update each year.

⁸ Possible problems with “complications” and “co-morbidity”.

We analyse at present five complete sets of DRGs: the United States of America (559 items, some no longer valid, version of 1st of October, 2005), France (598 items, version 7, 2002-2003), the United Kingdom (1 731 items, 2002-2003), Italy (506 items) and Sweden (744 items). It must be pointed out that these national classifications vary much often temporally within each country (for instance the "version 7" of France is used only to compare years 2002 and 2003).

Some comparisons seem promising for some countries, logically if one has inspired the other ones, for instance the ocular affections (Major Diagnosis Category 2) between the United States, France and Italy (Sweden has 19 items and not 13, but compatible with these 13 ones) :

Table 7 : Identity of the US, French and Italian DRGs for ocular affections

C M D	US, version 01/10/2005		France, version 7, 2002-2003		Italy, tariffario per le prestazioni	
	D R G	"Diagnosis Related Groups" titles	G H M	"Groupes Homogènes de Malades" titles	D R G	"Diagnosis Related Groups" titles
Ocular affections	36	Retinal Procedures	48	Interventions sur la rétine	36	Interventi sulla retina
	37	Orbital Procedures	49	Interventions sur l'orbite	37	Interventi sull'orbita
	38	Primary Iris Procedures	50	Interventions primaires sur l'iris	38	Interventi primari sull'iride
	39	Lens Procedures With Or Without Vitrectomy	51	Interventions sur le cristallin avec ou sans vitrectomie	39	Interventi sul cristallino con o senza vitrectomia
	40	Extraocular Procedures Except Orbit Age >17	52	Autres interventions extra-oculaires, âge supérieur à 17 ans	40	Interventi sulle strutture extraoculari eccetto l'orbita, età > 17 anni
	41	Extraocular Procedures Except Orbit Age 0-17	53	Autres interventions extra-oculaires, âge inférieur à 18 ans	41	Interventi sulle strutture extraoculari eccetto l'orbita, età < 18 anni
	42	Intraocular Procedures Except Retina, Iris & Lens	54	Autres interventions intra-oculaires	42	Interventi sulle strutture intraoculaires eccetto retina, iride e Cristallino
	43	Hyphema	59	Hyphéma	43	lfema
	44	Acute Major Eye Infections	60	Infections oculaires aiguës sévères	44	Infezioni acute maggiori dell'occhio
	45	Neurological Eye Disorders	61	Affections oculaires d'origine neurologique	45	Malattie neurologiche dell'occhio
	46	Other Disorders Of The Eye Age >17 W Cc	62	Autres affections oculaires, âge supérieur à 17 ans avec CMA	46	Altre malattie dell'occhio, età > 17 anni con CC
	47	Other Disorders Of The Eye Age >17 W/O Cc	63	Autres affections oculaires, âge supérieur à 17 ans sans CMA	47	Altre malattie dell'occhio, età > 17 anni senza CC
	48	Other Disorders Of The Eye Age 0-17	64	Autres affections oculaires, âge inférieur à 18 ans	48	Altre malattie dell'occhio, età < 18 anni

Alas, the titles of the British DRGs make them incomparable :

Code	Label
B01	Trabeculectomy
B02	Phakoemulsification Cataract Extraction with Lens Implant
B03	Other Cataract Extraction with Lens Implant
B04	Other Ophthalmic Procedures - Category 1
B05	Other Ophthalmic Procedures - Category 2
B06	Other Ophthalmic Procedures - Category 3
B07	Other Ophthalmic Procedures - Category 4
B08	Other Ophthalmic Procedures - Category 5
B09	Other Ophthalmic Procedures - Category 6
B10	Major Ophthalmic Non-Surgical Admissions
B11	Intermediate Ophthalmic Non-Surgical Admissions
B12	Minor Ophthalmic Non-Surgical Admissions

Comparison for affections of the nervous system (Major Diagnosis Category 1) are less promising between US and France, and still desperately impossible for UK :

Table 8 : identity and divergence for affections of the nervous system

CMD	United States of America, 1 Oct. 2005			France, version 7 (2002-2003)			
	DRG	"Diagnosis Related Groups" titles	DSS Grp 23 Weight	CMD	GHM	"Groupes Homogènes de Malades" titles	GHM weight, 2002
Affections of the nervous system	1	Craniotomy Age >17 W Cc	8.7004	1	2	Craniotomy for traumatism, age higher than 17 years	0.0018
	2	Craniotomy Age >17 W/O Cc	5.6173	1	1	Craniotomy apart from any traumatism, age higher than 17 years	0.0082
	3	Craniotomy Age 0-17	4.7624	1	3	Craniotomy, age lower than 18 years	0.001
	6	Carpal Tunnel Release	0.7693	1	6	Carpal Tunnel Release	0.0002
	7	Periph & Cranial Nerve & Other Nerv Syst Proc W Cc	6.1466	1	7	Interventions on the cranial or peripheral nerves and other interventions on the nervous system, age higher than 69 years and/or CMA	0.0003
	8	Periph & Cranial Nerve & Other Nerv Syst Proc W/O Cc	9.0253	1	8	Interventions on the cranial or peripheral nerves and other interventions on the nervous system, age lower than 70 years without CMA	0.0008
	9	Spinal Disorders & Injuries	2.4841				
	10	Nervous System Neoplasms W Cc	2.4435				
	11	Nervous System Neoplasms W/O Cc	2.1141				
	12	Degenerative Nervous System Disorders	2.1012	1	9	Spinal Disorders & Injuries	2.4841
				1	10	Nervous System Neoplasms W Cc	2.4435
	13	Multiple Sclerosis & Cerebellar Ataxia	2.5029	1	17	Multiple sclerosis and cerebellar ataxia	0.001
	14	Intracranial Hemorrhage Or Cerebral Infarction	3.6103	1	41	Strict intracranial traumatic lesions, age higher than 69 years and/or CMA	0.0003
				1	42	Strict intracranial traumatic lesions, age lower than 70 years without CMA	0.0003
				1	43	Other intracranial traumatic lesions, except commotions, age higher than 69 years and/or CMA	0.0006
				1	44	Other intracranial traumatic lesions, except commotions, age lower than 70 years without CMA	0.0004
	15	Nonspecific Cva & Precerebral Occlusion W/O Infarct	2.9092	1	5	Interventions on the precerebral vascular system	0.0012
	16	Nonspecific Cerebrovascular Disorders W Cc	1.1679				
	17	Nonspecific Cerebrovascular Disorders W/O Cc	1.8227				
	18	Cranial & Peripheral Nerve Disorders W Cc	2.9104				
	19	Cranial & Peripheral Nerve Disorders W/O Cc	1.206				
	20	Nervous System Infection Except Viral Meningitis	3.349	1	24	Infections of the nervous system except for viral meningites	0.0008
	21	Viral Meningitis	1.9353	1	25	Viral meningitis	0.0004
22	Hypertensive Encephalopathy	2.7355					
23	Nontraumatic Stupor & Coma	1.4845	1	27	Disorders of the conscience and non traumatic origin comas	0.0009	

Affections of the nervous system

24	Seizure & Headache Age >17 W Cc	2.037	1	28	Convulsions, epilepsies and cephalgias, age from 18 to 69 years with CMA, or age higher than 69 years	0.0025
25	Seizure & Headache Age >17 W/O Cc	1.3034	1	29	Convulsions, epilepsies and cephalgias, age from 18 to 69 years without CMA	0.0023
26	Seizure & Headache Age 0-17	1.5205	1	30	Convulsions, epilepsies and cephalgias, age lower than 18 years	0.0016
27	Traumatic Stupor & Coma, Coma >1 Hr	3.5625				
28	Traumatic Stupor & Coma, Coma <1 Hr Age >17 W Cc	3.2038				
29	Traumatic Stupor & Coma, Coma <1 Hr Age >17 W/O Cc	2.5152				
30	Traumatic Stupor & Coma, Coma <1 Hr Age 0-17	1.6814				
31	Concussion Age >17 W Cc	1.8201	1	45	Concussions, age higher than 69 years and/or CMA	0.0006
32	Concussion Age >17 W/O Cc	1.4031	1	46	Concussions, age lower than 70 years without CMA	0.0017
33	Concussion Age 0-17	1.1958				
34	Other Disorders Of Nervous System W Cc	1.9336	1	37	Other affections of the nervous system, age higher than 69 years and/or CMA	0.0021
35	Other Disorders Of Nervous System W/O Cc	1.5267	1	38	Other affections of the nervous system, age lower than 70 years without CMA	0.0012
			1	4	Interventions on the root and marrow for neurological affections	0.0015
			1	11	Transitory ischaemic accidents and occlusions of the precerebral arteries, age lower than 81 years	0.0022
			1	12	Transitory ischaemic accidents and occlusions of the precerebral arteries, age higher than 80 years	0.001
			1	13	Affections and lesions of the root and of marrow	0.0005
			1	14	Tumours of the nervous system, age higher than 69 years and/or CMA	0.0015
			1	15	Tumours of the nervous system, age lower than 70 years without CMA	0.0009
			1	18	Non transitory stroke	0.0115
			1	20	Other cérébro-vascular affections with CMA	0.001
			1	21	Other cérébro-vascular affections without CMA	0.0015
			1	22	Affections of the cranial and rachidian nerves, age higher than 69 years and/or CMA	0.0016
			1	23	Affections of the cranial and rachidian nerves, age lower than 70 years without CMA	0.0017
			1	39	Interventions for affections of the nervous system, except craniotomy, with CMAS	0.0008
			1	40	Affections of the nervous system, with CMAS	0.0111

Some items of the British DRGs list appear also too much specific (or need a translation):

Code	Label
A01	Intracranial Procedures Except Trauma - Category 1
A02	Intracranial Procedures Except Trauma - Category 2
A03	Intracranial Procedures Except Trauma - Category 3
A04	Intracranial Procedures Except Trauma - Category 4

We intend to achieve this analysis with 5 countries by February 2007 and then to conclude : how many DRGs seem comparable for a large majority of countries ? Could it be exhaustive for certain diseases and then lead to a direct volume measurement, or will they be so few that we can only use them as easy case vignettes, for a price approach ?

5 Other quality adjustment (not linked to treatment) - the Health Care Quality Indicators Project

In our mind, ideal collections of prices/costs like EU Health BASKET measure in the same time some quality aspects of the treatments across countries (types of the prosthesis for hip replacement, comparable on a QALY scale ?), so that they provide both notions of “unit costs” and “price” in the PPP purpose.

But the health care system is characterized by other quality aspects, more global, which would be worth taking into account for a more accurate sharing between volume and price. The OECD Health division has launched the Health Care Quality Indicators Project, which could fill this purpose:

“The Health Care Quality Indicators Project (HCQI) responds to the growing interest by healthcare policymakers and researchers in OECD countries in measuring and reporting the quality of medical care. ‘Quality indicators’, here, mean : indicators for the technical quality with which medical care is provided, i.e. measures of health outcome or health improvement attributable to medical care (changes in health status attributable to preventive or curative activity).”

This should correspond, especially for the second category, to the quality adjustment we intend to add to the quantity index.

All the OECD countries are not involved in the same way in this project. Anglo-Saxon countries on one hand and Nordic countries on the other hand are pioneers :

“HCQI builds on the efforts of several OECD countries and two international collaborations in developing indicators of health care quality at the national level. One group of five has been called together by an American foundation, the Commonwealth Fund of New York and represents Australia, Canada, New Zealand, the United Kingdom and the United States. Another group of countries represents the five Nordic countries, Denmark, Finland, Iceland, Norway and Sweden. The members of both groups and fourteen additional OECD countries have accepted the invitation to embark on the first steps towards a comprehensive reporting system for quality of care in OECD Member countries, bringing the total number of participants to 24 countries.”

In October 2004, 5 technical papers were released containing the recommendations of 5 Expert Panels, concerning “cardiac care”, “diabetes care”, “primary care and prevention”, “mental health” and “patient safety”. This last domain is exposed in the report DELSA/ELSA/WD/HTP(2004)18, which recommends 21 indicators :

Table 9 : the 21 indicators suggested by experts on “patient safety” (medical errors) :

Area	Indicator Name
Hospital-acquired infections	Ventilator pneumonia
	Wound infection
	Infection due to medical care
	Decubitus ulcer
Operative and post-operative complications	Complications of anaesthesia
	Postoperative hip fracture
	Postoperative pulmonary embolism (PE) or deep vein thrombosis (DVT)
	Postoperative sepsis
	Technical difficulty with procedure
Sentinel events	Transfusion reaction
	Wrong blood type
	Wrong-site surgery
	Foreign body left in during procedure
	Medical equipment-related adverse events
	Medication errors
Obstetrics	Birth trauma - injury to neonate
	Obstetric trauma – vaginal delivery
	Obstetric trauma - caesarean section
	Problems with childbirth
Other care-related adverse events	Patient falls
	In-hospital hip fracture or fall

Some of these indicators are specific to some DRGs / diseases (like obstetric trauma), other ones are general. A (negative) “score” should be attributed to each of these general medical errors, reduced to a percentage, so as to obtain a general quality index “patient safety” :

$$I_{\text{patient safety}} = 100 - a_1 * q_1 - a_2 * q_2 - \dots - a_{21} * q_{21}$$

q_i = number of medical errors of indicator i , reduced to a percentage among the relevant number of treatments

a_i = score of a medical error of indicator i . It should be less than 1, except if affection acquired in the hospital is worse than the initial affection which has caused the hospitalization.

In some fields like obstetric, a “local” quality index “patient safety in obstetrics” would be combined with this general quality index on patient safety.

6 - Conclusion: PPPs according to three scenarios

Whatever the domain and the stratification where these estimates will take place, the basic idea is to estimate simultaneously value, volume and price, including quality adjustment, of what is actually finally consumed by households from providers in respecting the following formulas :

$$\begin{aligned} \text{VAL} &= \text{VOL} \times \text{PRICE} \\ \text{VAL} &= \text{QUANT} \times \text{UNIT COST} \\ \text{VOL} &= \text{QUANT (num. of treatments)} \times \text{QUAL H (average health gain of a treatment)} \times \text{QUAL NH (other health quality)} \\ \Rightarrow \text{VOL} &= (\text{VAL} / \text{UNIT COST}) \times \text{QUAL H} \times \text{QUAL NH} \\ \Rightarrow \text{PRICE} &= \text{UNIT COST} / (\text{QUAL H} \times \text{QUAL NH}) = \text{VALUE} / \text{VOL} \end{aligned}$$

a) Hospital services by some case vignettes like in EU Health BASKET

The content of health goods and services actual final consumption (in current prices) according to the classification: drugs (health goods) / hospital services / physicians must be harmonised, and SHA rules should allow that (it would need a reprocessing of general practitioners in UK with the exclusion of drugs, and a general reprocessing of private hospitals with the inclusion of surgeons...).

It is supposed the price of physicians' consultations will be obtained directly (average unit costs for non-market) or a number of consultations / treatments will be collected.

For the remaining hospital services, whatever private or public, a dozen of case vignettes like in EU Health BASKET extended to OECD countries could provide an index of unit cost, and sometimes an index of price (taking into account the treatment quality), applied to hospital services as a whole.

In a last step, a list of certain HCQI indicators would be used for a new quality adjustment.

The market / non market status would not be taken into account.

b) Hospital services by some DRGs unit costs

The approach is the same as in a), but common DRGs could provide many more "prices" (unit costs) than a dozen, and be applied to a stratification of hospital services by ICD-10 main diseases for consistent expenditures (same content in expenditures and in prices). No quality adjustment could be hoped in a fine detail (by treatment). The costs not ventilated by DRGs / ICD-10 would be counted for zero, on an assumption that ideally all expenditures should be ventilated by ICD-10 and that the result of the calculation expenditures of ICD / cost of DRGs gives consistently the "true" volume.

In a last step, a list of certain HCQI indicators would be used for a global quality adjustment.

c) the "ambitious" solution : outcome and output, SHA in volume and PPPs

This is the ambitious project suggested by some tables and classifications of SHA (see chapter III) and encompassing the first two approaches. The right framework should cross the ICHA-HP providers classification (to be adapted) with the ICD-10 International Classification of Diseases (to be adapted) dimension, exercise already experimented by some countries in so-called "cost of diseases" analysis. This dimension could be secondarily stratified by "international DRGs".

In a first step, we need first fair values of actual final consumption at current prices, strictly consistent with national accounts, but with harmonised contents of providers drugs (health goods) / hospital services / physicians as exposed in a) (national accounts can be reprocessed according to SHA but in the same "health" boundaries).

The following table is the central framework of any PPP-SHA model :

**Table 10 : Variant of table 6 of SHA, providing “health output” in current prices
= “total current expenditure of health”**

	Hospital services	Nursing and residential care health	Nursing and residential care social	Offices of physicians	Offices of dentists	Other ambulatory care and other health services	Medical goods	Gov adm health	Social security funds health	Health insurances	O t h e r
Major ICD categories	HP.1	HP.2.A	HP.2.B	HP.3.1	HP.3.2	HP.3.x + old HP.5	HP.4	HP6.1+ HP6.9	HP6.2	HP6.3+ HP6.4	H P 7
Infectious and parasitic diseases											
...											
Accidents, poisoning and violence											
All other categories											
Individual prevention											
Total pers. current exp. of health											
Collective prevention											
Other coll. services											
Reception in emergency services											
Total current exp. of health											
Occupational Health care ?											
Sec. activities (educ., R&D...)											
Total output of the providers											
Consistency NA – SHA											
NA and PPP final cons.											
CPC codes	9311	93193	9331	93121,2	93123	93191,2,9	352+481 +48312	91122	9131	7132	
PPP COICOP codes	110630 + 120211 + 130212.4 + 130220	110623 (part)	111240 + 120500 + 130500 (parts)	110621 + 130212.1	110622 + 130212.2	110623 (part) + 130212.3	110610 + 130211	140000 (part)	111240 (part)	111253	
COFOG codes	07.3.1 + 07.3.2	07.3.4	10.2 ?	07.2.1, 2	07.2.3	07.2.4 + 07.3.3 + 07.4 (part) + 07.6	07.1	07.4 (part)	10.1 + 10.2 ?	Not applicable	

The providers can have secondary activities (education, R&D) but are supposed to correspond to only one product inside the health boundary.

As we can see in table 6, the alignment of HP classification with ISIC / CPC classifications and conventions also worthy for national accounts does not need a big effort. "HP2.B" is put here for a clarification, but would of course be excluded of any definition of "health". The PPP classification of table 2400 should be adjusted to fit with the finer detail of activities (long-term nursing care with health services predominant, part of 110623 basic heading), above all if public administration, social security fund and insurances connected with health are to be isolated. The PPP classification of table 2400 should also include a more precise ventilation of health care provided by NPISH : we have supposed here it was only hospital services, but is it the case in Switzerland and the US for instance ? If needed, NA and PPP could isolate general practitioners, specialists and transport of patients by ambulances.

From the ICD classification side, two different problems occur :

- "by rows", can we add items like individual and collective preventions, occupational health care ? We should find an exhaustive partition as non ventilated costs bias the comparisons.
- "by columns", is it possible to ventilate health administration, health insurances, social security funds ? A model would be necessary, with strong guidelines from the upcoming OECD Health-specific Purchasing Power Parities task force.

In a second step, numerous case vignettes would be defined as in EU Health BASKET, not only for hospital services (at least one case vignette by main disease in ICD-10, so 20 case vignettes, with an average value of public and private hospitals) but also for other providers. The common DRGs could suggest corresponding case vignettes. As much as possible, the reports would provide costs and quality (of the treatment) indices. Some "prices" would be available for a whole column. More rarely they would give two deflators for two different providers in the same row, included in the same treatment.

In a third step we should adjust this first volume / price (cost) sharing with other "health quality" (not linked to a specific treatment) provided by HCQI or WHO collections. The challenge is to collect numerous national data and then to reduce them in a single multiplicative index.

The table 10 would then provide successive "quantities" and "volumes" consistent with "values" for the SHA framework. PPPs would be derived from these volumes for the row "total current expenditure of health (minus occupational health care)", for health services at least, health goods perhaps, other services connected to health less likely.
