

# **EVOLUTION AND FUTURE TRENDS OF HOSPITALS**

## **SYSTEMATIC LITERATURE REVIEW**

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## **EVOLUTION AND FUTURE TRENDS OF HOSPITALS SYSTEMATIC LITERATURE REVIEW**

**Elaborated by:** Escuela Andaluza de Salud Pública, S. A.  
Granada, España

**In collaboration with:** Técnicas de Salud, S. A.  
Sevilla, España

**Coordinated by:** Pan American Health Organization (PAHO/WHO)  
Area of Health Systems Based on Primary Care

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**This paper has been elaborated by** (in alphabetic order):

**EASP, S. A.:**

Doreen Carroll (edition and translation support)  
Juan José Mercader Casas  
José Ignacio de Oleaga Usategui

**TÉCNICAS DE SALUD, S. A.:**

Arturo Álvarez-Rosete  
Francisco Barroso  
Carmen Granés  
Antonio Moreno  
Lisa Wimmer  
(With overall guidance from Antonio Durán)

**PAHO/ WHO:**

Enrique Cabrera  
Reynaldo Holder  
Soledad Urrutia

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## INTRODUCTION

### 1.1. Scope and purpose

In today's developed countries it is quite commonplace to recognize that factors related to the graying of the population pose serious challenges to their health systems. At the same time, in developing countries, the ongoing economic crisis is contributing to a gradual erosion of the international donor community, with concomitant repercussions on financial and human resources in many areas. Consequently, the historical foundation, in terms of the organization and management of health systems throughout the world, is under pressure; more specifically, the design and function of hospitals as they relate to other health care service centers, is being questioned from several different perspectives. The emergence of these and other factors raise doubts on the overall future of healthcare - particularly of hospitals- more than in past decades.

The Pan American Health Organization (PAHO) recently analyzed its activities in this field with the aim of identifying the factors behind this evolution in an attempt to identify current trends and a road map to illuminate the way forward. PAHO is developing a Regional Agenda for Hospitals in IHSDN through a consensus-building process involving their Member States. It has organized expert meetings to examine the world context and lessons learnt, explore trends in different regions and identify the issues at stake in order to help countries prepare their respective health services and health systems reforms.

One activity, among others, to move further in that direction is an agreement between PAHO and the Andalusian School of Public Health in Granada, Spain to conduct a systematic search and review of literature on **THE HOSPITAL OF THE FUTURE: HOSPITAL NETWORKS**. The present document is one product more in this collective effort.

The review focuses on state of the art approaches to re-establishing and redefining the functional boundaries (limits) of hospital services. It will address the kinds of ongoing changes that can have an impact on questions such as:

- What health services are being produced (profiles), in what circumstances and for whom?
- Delivered by whom, where and when?
- How is each service delivered in the different parts of the world?

This overall goal of this report is to assist PAHO in its efforts to clarify the boundaries of health service organizations in different regions of the world and facilitate the identification of current trends. More specifically, its goals are: (i) to carry out a literature review on "past history and future trends of hospitals", and (ii) to develop a data base to provide updated technical information on the topic.

The original product was presented in Spanish and contained the following:

- a.) A summarized version of the review's results, organized by topic and geographical area
- b.) Consultant's comments and assessments
- c.) Identification of information gaps on subjects under review
- d.) Data base of the literature reviewed (digital format)

The report is structured as follows:

- I. Introduction.
- II. Current pressures on how health services are organized and managed.
- III. Innovations in the organization of health services in light of such pressures
- IV. A brief assessment of the current situation and relevant information gaps.

## 1.2. Methodology for the literature review

The bibliographic review was carried out between October 10 and December 7, 2011. It included articles and books published by prestigious authors and institutions on the overall subject matter – “the future of hospitals,” “renewing hospitals,” “hospital innovations,” “tomorrow’s hospitals,” “hospitals of the future,” “history and future trends of hospitals,” “integrating health networks” – within the framework of the transformation of health care systems over the past decade.

In line with the above objectives, this systematic review was not circumscribed to any particular country or geographic zone but rather covered all publications considered adequate in terms of content. Nonetheless, special emphasis was placed on geographic areas known for their innovations and considered to be of particular interest for countries in the Americas (specifically, Europe, and within Europe, Spain and the United Kingdom).

Articles in specialized journals published in both English and Spanish were reviewed from the year 2001 on, including books and reports in the following disciplines:

- health sciences;
- health economics;
- sociology;
- political science;
- management; and
- organizational theory.

Researchers first focused on bibliographic databases and search engines (particularly those made available to them through access to Andalusia's Virtual Library on Health). Among them: the Applied

Social Sciences Index and Abstracts (ASSIA); BVHealth; Healthcare Management Information Consortium (HMIC); PubMed and Web of Knowledge ISI.

The terms used in the research were (numbers in brackets represent the amount of relevant references found in each case):

- hospital AND service\* AND restruct\* (n=384)
- service AND mix (n=705)
- hospital AND service\* and redesign\* (n=309)
- service AND reconfig\* (n=87)
- high AND volume AND continuity AND care (n=23)
- hospital AND service\* AND restruct\* (n=384)
- acute AND day AND continuity AND care (n=50)

The Latin-American and Caribbean Information Centre in Health Sciences, also known by its original name, *Biblioteca Regional de Medicina (BIREME)*, a specialized centre of the Pan-American Health Organization/ World Health Organization (PAHO/WHO), as well as the Virtual Library on Health, were also consulted but have not referred to in detail here, in the understanding that both the nature and content of such database are well known by most readers.

A manual review of key technical publications, such as the "British Medical Journal," "Lancet," "Health Policy," "Health Affairs," "Health Services Research and Policy," or "Gaceta Sanitaria" was also included as part of the research effort.

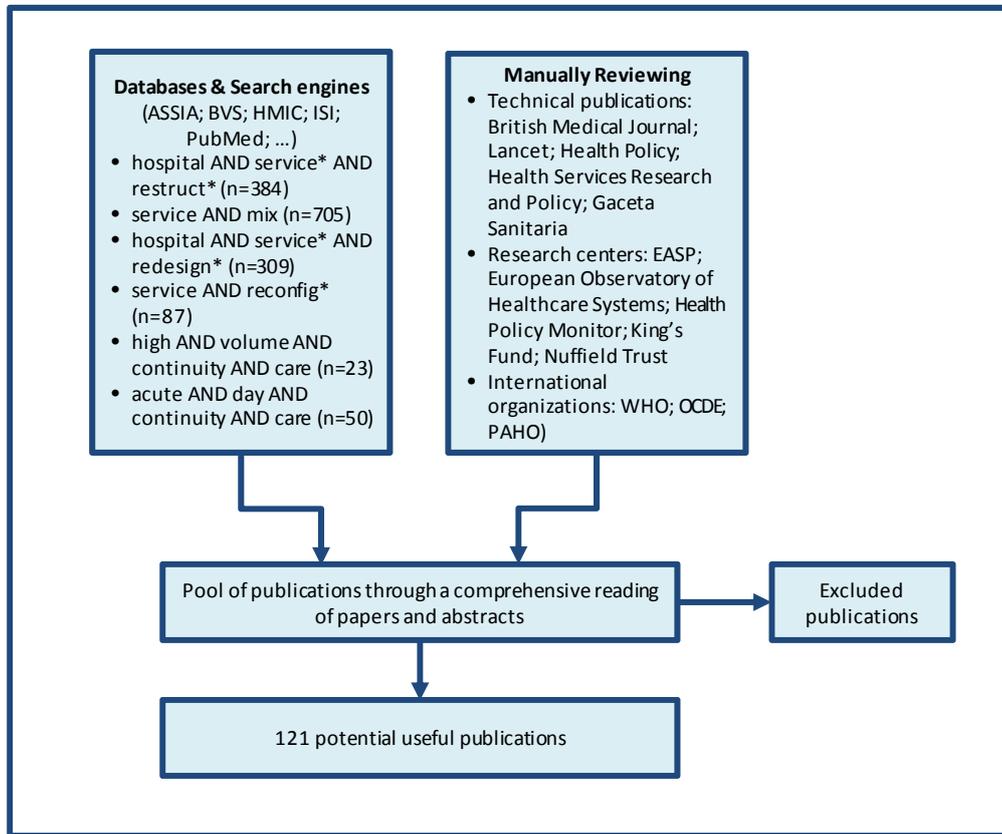
A manual review was also done of other international resources and organizations accessible online that are considered relevant in the field, including: the Andalusian School of Public Health, European Observatory of Health Systems and Policies; Health Policy Monitor; King's Fund; Nuffield Trust; OCDE; Pan American Health Organization; World Health Organization, etc. (also accessible online) have also been used.

Standard Internet search engines such as Google, MSN and Yahoo were also used.

An extensive series of articles published in English and Spanish between 2001 and 2011 were consulted. A screening process on selected websites was used to discard titles or abstracts that did not meet the research criteria. After filtering, the results were formatted onto Excel files and then the entire document was edited. The volume of potentially useful publications included 121 references.

Publications that lacked either a macro and /or meso perspective on the process of redesigning hospital services were omitted, as were documents whose analyses were limited to a single case or experience rather than a broader approach. Another exclusion criterion was applied to articles lacking acceptable methodologies (e.g. editorials or opinion articles). Only publications that treated the subject thoroughly, or research articles in the strictest sense, were included.

Figure 1: Methodology for the literature review



A more detailed case analysis (accessing the complete text or the abstract, when necessary) permitted references to be classified into two categories:

- Papers reflecting a general view of health services (n= 29)
- Papers addressing innovative approaches to the organization of health services (n= 92)

The 29 articles in the first category were then distributed according to their references to one of the following topics:

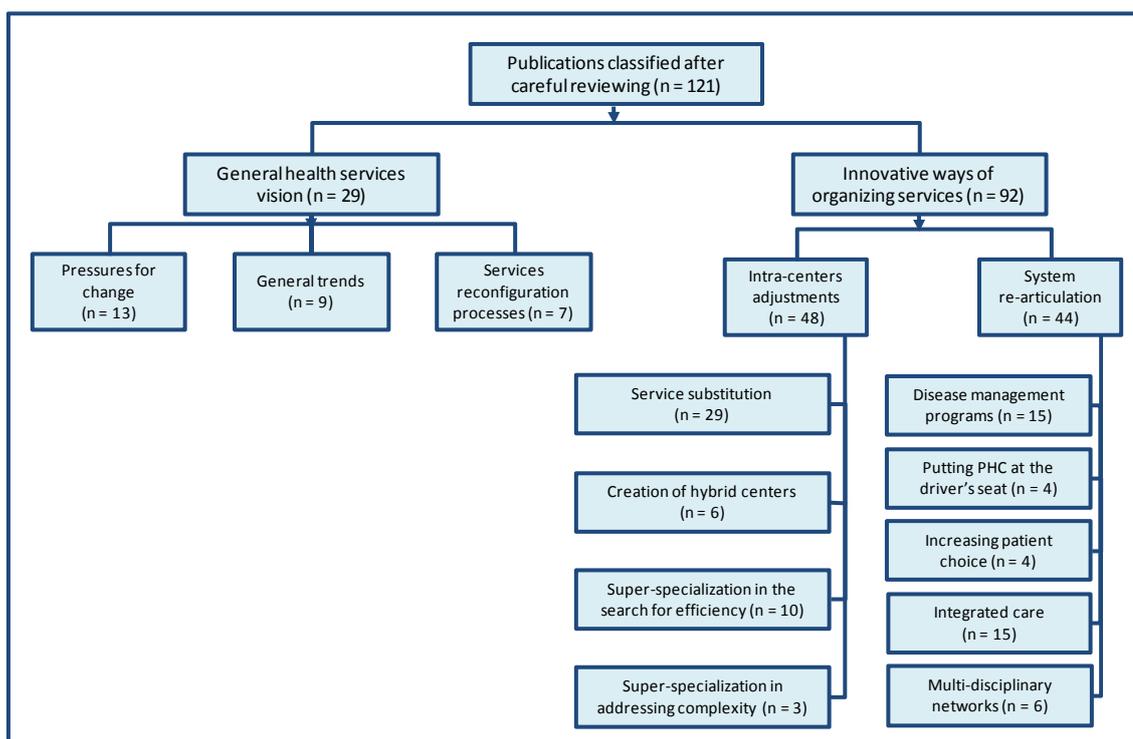
- Pressures for change (n= 13)
- General trends (n= 9)
- Service redesign process (n=7)

The 92 articles in the second group were in turn distributed into two blocks:

- 48 dealing with intra-centre adjustment
- 44 dealing with system redesign

Finally, each one of those categories was organized as per the next diagram:

Figure 2: Results of the reviewing



This exercise generated a database (attached in the electronic format BdeD.xls) containing 121 potentially useful articles that can be searched by using the followings fields:

- ID
- Publication year
- Reference
- Abstract
- Geographical area
- Key word
- Access on-line to the publication, whenever possible

In addition to presenting a general list of publications, the data base groups the texts into three blocks:

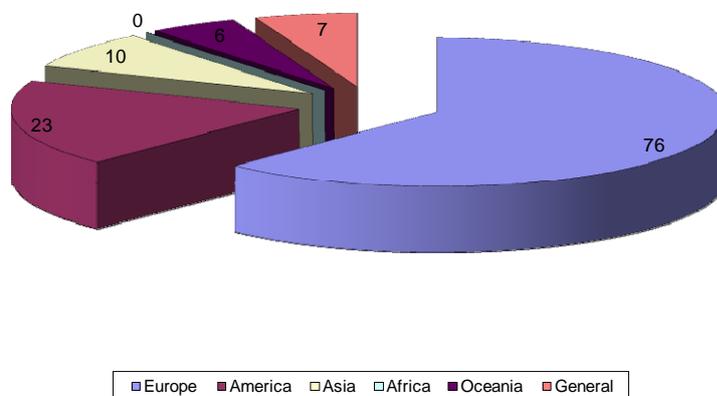
- Useful readings
- Recommended readings
- Key readings

In order to facilitate consultation by future database users, all articles are presented as grouped by:

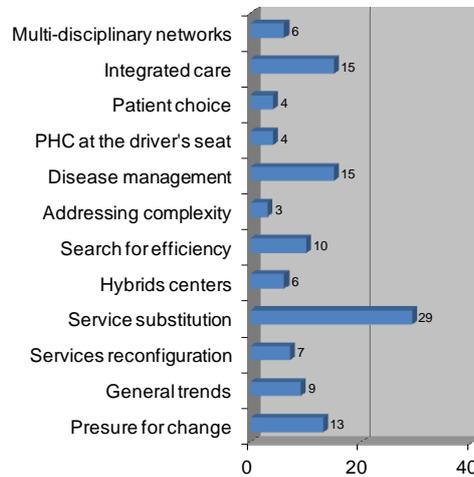
- Geographic zone
- Keyword
- Year of publication

(Please consult the following graphics for additional information)

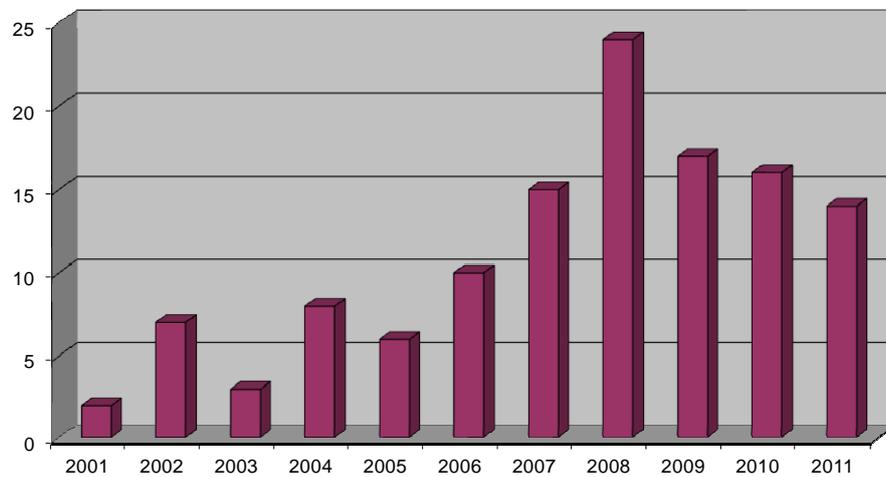
**"Hospitals of the Future" - Systematic Literature Review**  
**Distribution of references as per Geographic Zone**



**"Hospitals of the Future" - Systematic Literature Review  
Distribution of references as keywords**



**"Hospitals of the Future" - Systematic Literature Review  
Distribution of references as per year of publication**



## II. CURRENT PRESSURES ON THE WAYS HEALTH SERVICES ARE ORGANIZED AND MANAGED

The three main services organization modalities - hospitals, primary healthcare centres and specialized healthcare centres - have survived over many decades without undergoing major changes. In fact, their strength resided precisely in their ability to adapt to the many diverse circumstances existing between countries, income levels, political preferences, etc. At the moment, however, several factors are exerting substantial pressures that are provoking changes in decades-long patterns of service organization. This section attempts to identify the sources of those pressures and the mechanisms through which they come into play. This report will present an in-depth analysis of some of the most significant changes in health service facilities taking place in the following areas:

- New technologies;
- Changes in user preferences;
- Increased service production costs.

### II.1. New technologies

New technologies represent one of the most indispensable factors in service production, and probably constitute the one input that has undergone the most significant change over recent decades due to availability, ease of use, potential, cost, mobility, etc. Although new technologies have created new modalities of services (for example, until recently the idea of a mobile Intensive Care Unit was difficult to imagine) their influence is even broader, impregnating the entire health system under the aura of "medical progress".

In addition to the continuous evolution of new technologies, great strides are also being made in the fields of pharmacy and biochemistry that, in turn, are affecting the treatment of chronic diseases such as diabetes (insulin pumps, glucose measurement, etc.), mental health (psychotropic drugs) and cancer (oral chemotherapy, biological markers and personalized medicine). New, less invasive surgical and improved and improved anaesthesia procedures also permit faster patient recovery. Advanced diagnostic imaging and laboratory technologies, and certainly those in the information and communication spheres, are already available in a portable version, thus raising questions about the possibility/need to concentrate their use exclusively in hospital environments.

More specifically, the emergence of non-invasive diagnostic techniques (computerized scanner, magnetic resonance, endoscopy, echography, etc.) or less aggressive ones (digital angiography, puncture biopsies) facilitate the diagnosis, on an out-patient basis, of most medical processes. Thus, a majority of patients can be studied and taken care of without need of traditional hospital admission. This, in turn, increasingly promotes what has come to be called "single act consultation" or "high resolution out-patient activity" as efficient alternatives to in-patient care and traditional out-patient activities. This model of care seeks to include the performance of all necessary techniques in one single visit in order to speed up diagnosis and treatment.

Kidney dialysis has ceased to be a service provided exclusively in hospital settings, as is openly proclaimed by patients' associations and the leading producers and researchers of specialized equipment: "blood dialysis can be performed in a hospital, in an independent dialysis centre or in the very home of the patient, who, in coordination with his doctor, is best suited to decide which option is most suitable, in accordance with his/her clinical situation and personal preferences". In addition, dialysis is profitable and represents one example of investment opportunity for the private sector, although one drawback is the often heavy dependence on a single payer.

While the literature shows that information and communication technologies are necessary tools to fine tune health care centers and help reorganize health services, the mere introduction of these technologies does not guarantee improved management outcomes (or much less, better health outcomes); following the introduction of health information systems it should be noted that positive experiences often coexist with experiences that fall far short of meeting expectations. New developments in the design of computer systems and advances in the field of telecommunications permit large amounts of data and information to be managed and disseminated online to other service-providing institutions. Informed decision-making through inter-linked entities is becoming ever more plausible, and ever less expensive. This, in turn, makes it possible to introduce new technologies for managing medical information into out-patient departments and, at the same time, permits the online reception of radiological and laboratory diagnostic tests (Rosa – Jimenez et al., 2005). For patients, all of this can be translated into reduced waiting times.

The most likely consequences of all of these factors will be improvements in how clinical tasks are organized, more refined measurements of professional performance and more exact methods for calculating unitary costs and productivity. Instruments based on geographic information systems (GIS) are also available for identifying specific regions with deficits in access to primary care services based on specific attributes of the population and healthcare utilization patterns. Tools like this now permit the elaboration of maps based on socioeconomic levels, population density, insurance status and the utilization of emergency and/or primary care services.

A study conducted in Singapore analyzed the margin of efficiency derived from the application of specific decisions to hospital activities (for example, whether or not specific activities carried out internally were concentrated in service clusters or not; outsourcing work to specific local providers or other among providers; etc.). The study suggests that the use of information and communication technologies becomes a competitive factor for service improvement and the reduction of operating costs.

Overall, technological changes with repercussions on the nature and organization of services are occurring with ever-increasing speed and the scope of their impact can be expected to broaden as well (bedside laboratory kits, mobile radiology, etc.). Many treatments requiring the ongoing attention of specialists (prostheses, transplants, etc.) are no longer going to require treatment exclusively in hospitals; the high speed of change is going to stimulate efforts to design more flexible, multi-functional spaces both inside and outside of traditional institutions. In fact, for example, 85% of all non-urgent

elective surgery in the United Kingdom, and most cataract operations in OCDE countries, are now carried out on an out-patient basis, eliminating the need for occupying a hospital bed.

## II.2. Changes in user preferences

In many countries changes are taking place simultaneously as health system users/ clients/ citizens/ patients and "stakeholders" begin to have a bigger say than ever before in terms of what they consider to be acceptable service. More importantly, their preferences have changed. People feel they are in a position to evaluate and judge the services they receive and are less willing to accept the "asymmetry of information" intrinsic to relationships with health professionals, thus making it even more difficult than ever to satisfy their expectations. People are also aware that they can "purchase" almost anything at a distance and have those products delivered to their doorstep; individuals have more and more mobility; people are accustomed to travelling across ever larger distances; and populations are increasingly concentrated in urban environments. There can be no doubt that all of these factors affect individual attitudes toward the provision of health services as well.

Moreover, people are increasingly exposed to the idea that health services form part of a broader machinery capable of avoiding pain or suffering, often inviting them to use these services more frequently, for example, when searching for a second opinion or crossing over national boundaries to practice variants of what has been termed "medical tourism." Consequently, the total volume of services, their intensity and their variety are growing non-stop.

Citizens' perceptions of their own dignity and rights, their expectations regarding the services provided, etc. strongly influence the way they perceive quality. Beyond whatever is considered managerially "convenient" for a healthcare facility, patients now demand a response to their preferences - hence the explosion of statistics-based applications for management techniques favoring quality that have been gleaned from other sectors of the industry (i.e., "management by processes," "lean management," "six-sigma," etc.). Incidentally, while under certain circumstances basing quality standards on strict adherence to guidelines and norms can have its advantages, its overuse can contribute "routine approaches" that often emphasize averages and means when more complicated variables may be at play.

Publishing standards of care for the design of health centers reflects this situation. For example, in the case of neonatology units detailed consideration is given to aspects such as space, unit location, area for direct neonatal care, electrical installations, lighting, noise levels, equipment, nursing personnel, communication systems, maintenance and renovation ensure adequate privacy and intimacy, increased respect for needs related to social support and communication, and an adequate guarantee of flexibility and accessibility (Garcia del Rio et al., 2007).

### II.3. Increasing service production costs

Financing represents the framework where contrasts become most evident between which services are desired and which services the health system can reasonably offer. For that very reason, financing exerts a key influence on the service production function. Notably, “cost increases” have perhaps been the most remarkable feature to receive attention in virtually all health systems during the last few decades -in absolute figures/ per capita, as a fraction of the GDP - and at growth rates exceeding the growth of the economy. The causes likely to explain such a phenomenon have always been a combination of: greater availability of technologies -probably responsible for some 50% of the historical increase in healthcare expenditure in the case of Europe in recent decades; higher public expectations (partly linked to a societal increase in wealth), increases in costs relative to inputs; to a lesser degree, the graying of the population as a cause of disability and disease; and other determinants that are difficult to quantify.

Healthcare has proven to be much more resistant to increases in productivity than other sectors of the economy, perhaps because it shares many traits in common with the “handicraft industry”, such as a great dependence on human resources and little room for labour-saving technologies (an effect analyzed in the 1960s by William Baumol and William Bowen who studied the difficulties inherent in improving productivity in certain activities, noting that the same number of musicians is still needed today to play a Beethoven symphony as in the XIX century , even though today their real salaries are much higher).

In this context, both inside and outside Europe over recent years, it has become popular to defend efficiency with (occasionally questionable) nuances. Under the slogan of “putting resources to sweat” specific performance management strategies have been introduced that use models of care based on high utilization and occupation rates, taking advantage of new technologies and care models that have sometimes created more problems than they solve – beyond the fact that (or perhaps because of?) they were initially introduced erroneously as “resource- saving measures.” The biggest problem by far has been the creation of bottlenecks (between operating theatres and wards and between emergencies and regular care, as well as occasional increases in nosocomial infections).

Health systems have tried to respond to the above pressures by acting on variables such as the institution’s size, working schedules, repercussions on the unit costs of general expenses (“overheads”), etc. By making use of the option to close a day hospital at the end of the working schedule, for example, the hospital can save purely logistical costs (i.e., maintenance, cleaning, lighting, heating / cooling, surveillance, etc.) as well as technical costs (common services such as laboratory and diagnostic imaging, blood bank, reduction in on-duty personnel and/or their qualification, etc.).

As a central element, reductions in the number of hospital beds and the shortening of average length of stay in recent decades have been almost constant throughout Europe –yet their real effect seems to have been not so much a reduction of costs as a concomitant improvement in the use of resources -in addition to illustrating, once and for all, that the “number of beds” says virtually nothing about a hospital’s capacity (Rechel et al., 2009).

### III. SOME INNOVATIVE WAYS TO ORGANIZE SERVICES

As technologies change, consumer preferences evolve, and cost increases continue awareness has increased on how health care facilities operate and the combination of these factors creates new possibilities.

For example, since the 1980s it has been broadly acknowledged that healthcare, too, generally conforms to Pareto's "80/20 rule," one that is widely applied in management. Many conditions (such as chest pain, breast lumps, rectal bleeding and other frequent processes) respond reasonably well to standardized protocols and a number of complex conditions can benefit substantially from care provided by groups of professionals (for example, cancer benefits from joint approaches by oncologists, radiologists and surgeons; gastrointestinal haemorrhages from the collaboration between internal medicine doctors and surgeons; coronary diseases from the collaboration between internal medicine specialists and cardiology surgeons), etc. However, another 20% of medical processes (psychiatric problems, epilepsy, AIDS or diabetes, to mention just a few examples) do so to a much lesser extent (Rechel et al., 2009)

Today's health care is moving away from the classical approach in which patients in a hospital ward remained in their room waiting to be visited by their doctors and then be transferred to other sites to undergo diagnostic tests. The new approach will permit patients to "receive visits" from mobile technologies previously housed in rigid settings, move from one department to another and/or be visited by doctors from a variety of other specialized units.

Numerous factors highlight the need for further in-depth studies on these emerging possibilities. For example, high- and medium-income countries have witnessed improvements in life expectancy over recent decades that have led to profound changes in disease patterns and subsequent service needs. On average, not so long ago, death at an early age occurred more frequently because of high infant mortality rates (a situation that still exists today in many developing countries) and because persons died relatively early, often from simpler causes (normally one sole cause). Today, however, people live longer and the number of health problems per person at the final stage of life (compression of morbidity) is increasing. In fact, many countries are currently confronting higher volumes of chronic conditions such as cancer, senile dementia, polymedicated patients, hip fractures, cerebro-vascular accidents, etc. In intermediate stages of life the situation can also be more complex, due to episodes related to drug abuse, AIDS, morbid obesity, etc.

The challenge is enormous and requires increased efforts to coordinate health services at various levels, beginning at the primary care level, because evidence indicates that it is more effective to treat chronic patients on a coordinated basis rather than through a series of uncoordinated interventions, as has traditionally been the case.

This, in turn, raises questions regarding the need to massively review the classical design of hospital wards according to medical specialties and to move toward the design of a model that groups patients according to their medical needs and level(s) of dependence (critical care, intermediate care, minimal

care, etc., with patients being seen in a rapid assessment/triage unit, often staffed by nurses, responsible for referring them to one level or another). Managing the continuum of care for patients with hypertension, diabetes, COPD, morbid obesity, reduced mobility, visual problems, etc. by integrating services from outside and inside the hospital is a much more difficult task for classical hospital units to solve than attending to acute crises one by one.

In response to a situation of clearly fragmented and segmented health systems, some organizations (the Pan-American Health Organization among them) have repeatedly advocated the need to implement Integrated Health Service Networks (IHSN) understood as *“a network of organizations which deliver, or make the arrangements to deliver, equitable and comprehensive health services to a defined population and are ready to be held accountable for their clinical and economic results and by the health status of the population they serve”*. (Artaza et al., 2011)

Some Latin-American and Caribbean countries, in particular Brazil, Chile, Costa Rica and Cuba, are implementing such initiatives while other countries are exploring the possibility of adopting similar policies in the organization of their health services (PAHO, 2011). The following table (Montenegro and Ramagem, 2009) summarises some of the most relevant cases.

Country	Initiative
Argentina	Law on Creation of the Integrated Federal Health System (Ley de Creación del Sistema Federal Integrado de Salud)
Bolivia	Municipal Network of Intercultural Community Family Health Services (Red Municipal de Salud Familiar Comunitaria Intercultural y Red de Servicios)
Brazil	More Health: Everybody's Right 2008-2011 (Más Salud: Derecho de Todos 2008-2011)
Chile	PHC based health care networks (Redes asistenciales basadas en la atención primaria)
El Salvador	Law on Creation of the National Health System (Ley de creación del Sistema Nacional de Salud)
Guatemala	Coordinated Healthcare Model (Modelo coordinado de atención en salud)
Mexico	Health system functional integration (Integración funcional del sistema de salud)
Peru	Alignments for setting up healthcare networks (Lineamientos para la conformación de redes)
Dominican Republic	Regional Health Services networking model (Modelo de red de los servicios regionales de salud)
Trinidad & Tobago	Eastern Region Health Authority Experience (Experiencia de la Autoridad de Salud de la Región del Este)
Uruguay	Integrated National Health System (Sistema Nacional Integrado de Salud)
Venezuela	Caracas Metropolitan District Health Network (Red de salud del Distrito Metropolitano de Caracas)

The final part of this report will attempt to identify some of the most innovative service modalities that, in our opinion, specifically address some of the problems identified in the first part of this report. Black and white categories are not the issue here; the intent is to classify emerging trends (that in some cases have already been highlighted in earlier analyses) and formulate a response to broader pressures. Although there are some areas in which we would have liked to support our statements with more robust data, efforts were always made to provide sufficient evidence and avoid speculation – as well as the too frequent “grandstanding” often displayed by many sponsors.

Innovations are presented in two separate dimensions:

- (i) “Adjustments in centres”, with four variants (service substitution and rationalization, creation of hybrids, super-specialization in the search for efficiency, and super-specialization in confronting complexity); and

- (ii) Modalities related to “redesigning the health system” as a consequence of the above, with three main variants (“disease management”; “putting PHC in the driver’s seat”; and “increasing patient choice”).

### III.1. Adjustments in centres

#### *a. Service substitution and rationalization*

Perhaps the proto-response in this entire process of change was the idea of “replacing some forms of care with others,” as advocated in the Dutch Dekker Report and popularized in the 1990s as “service substitution”.

Between 1973 and 2003 the total number of beds in England (acute, chronic, psychiatric, etc.) was reduced by approximately one half, but the decrease of 154,479 hospital beds between 1982 and 1998 coincided with the creation of 153,119 privately owned but publicly funded “nursing home” beds (McKee and Healy, 2000). Moreover, 90% of all supported residents in 2007 were already accommodated in independent housing, compared with only 88% in 2003 and 20% in 1993.

In Spain, acute care beds per 100,000 inhabitants was reduced by 25% between 1980 and 2006 largely because of PHC improvements and the development of other forms of care. In recent years a remarkable amount of innovation and a profound review of hospitals’ ambulatory activity have also taken place, with some interesting particularities in the case of Andalusia (Zambrana et al., 2002). The preferred objective of hospital outpatient departments has shifted from following up previously admitted patients to becoming a pivotal element around which diagnostic, orientation- providing and therapeutic strategy setting activities for a PHC-referred patient get structured in a given specialty. Thus hospital admission becomes a support instrument within the relationships between hospital specialists and patients, an instrument to be used whenever necessary but during the shortest possible time. The core work of many specialties, especially non-surgical ones, tends to be developed in the outpatient unit (addressed later in this report as “high resolution centres”).

Avoiding hospital admissions by providing domiciliary hospital care is a scheme under which a healthcare professional actively treats a patient who otherwise would need to go to a hospital. A study in the United Kingdom (Shepperd et al., 2009) shows that results for some particular patient groups of this type of domiciliary services – ‘Hospital at Home Program’, HaHP- are comparable to those that would be obtained with an in-patient stay, at similar or even reduced costs.

In Spain (San Jose et al., 2008), domiciliary hospitalization programs were created in urban tertiary hospitals by means of strong coordination between internal medicine departments, emergencies and respiratory as well as nutritional support teams with PHC teams. A study on patients 60+ years in one region of Valencia (Cotta et al., 2002) calls attention to the need to either create or strengthen inter-

institutional communication channels and mechanisms that could guarantee continuity of care in those cases.

In the United Kingdom, emergency and unplanned service delivery by emergency care teams (formed by emergency care practitioners – ECP - originally general practitioners with specific clinical competences who were also capable of performing tasks usually carried out by nursing staff) has proved as appropriate as the care being delivered in specific emergency centres, reducing the need for subsequent referrals to such centres (Mason et al., 2007). Assigning specific surgical services to specialized nursing teams (surgical care practitioners, SCP) also deserves mention; a study in the London's St. Mary's Hospital Trust (Martin et al., 2007) showed a considerable reduction of waiting times for minor surgery processes, with good results in terms of quality, without eroding patient satisfaction.

A careful look at the consequences of these approaches is warranted, though. For example, a study in Canada on twenty hospitals in a ten-year period shows that bed reductions in the centres concerned were accompanied by increases in the number of times the emergency services became congested, as measured by their inability to accept ambulance-led emergency admissions.

During the last few decades hospitals in several countries (e.g., the Denver Health, the Flinders Medical Centre, the Leicester Royal Infirmary, the A Gemelli Policlinic, or the University of Wisconsin Hospitals and Clinics (Vos et al., 2011) have tried to shift from being functional organizations to ones more oriented towards providing health care services to specific patient groups (by means of, for example, implementing particular programs -clinical pathways or care pathways). This proposal entails emphasizing the processes of care rather than the functional departments involved (mainly radiology and internal medicine), with the hope of achieving more patient-centred care, costs reductions and quality improvements.

Several authors have described two approaches for redesigning functional organizations and reorienting them toward service organizations based on processes: (i) implementing coordination mechanisms -e.g. matrix structures by product lines and (ii) restructuring the organizations in accordance with processes in order to overcome the previously described barriers.

In the first approach, a sequence is established for all types of care provision (diagnostic tests, consultations with a physician, and treatment) and responsibilities are assigned to the professionals involved in providing care to a logistically homogeneous group of patients, meaning, those who need to receive the same type of care in a given sequence (product lines). This way, each one of the professionals involved is in a position to know what is expected of him or her in the previous and following stages.

In the second approach, departments acquire a multidisciplinary focus based on the patients' needs, and not strictly on the professionals' areas of specialization, attempting to address the care process almost without any need to resort to other departments.

Evidence, however, seems to show that none of the above approaches necessarily leads to improving the orientation of care toward processes. Achieving process orientation throughout an entire hospital

requires a much greater effort than what would be involved in implementing isolated projects. The following considerations need to be taken into account, among others (Vos et al., 2009):

- Introducing multidisciplinary departments is not necessarily the best option in all environments; because of the need for sufficient critical mass, consistency with the hospital production structure is important.
- Cultural barriers between medical specialties need to be prevented. Each specialty has its own values, problem-solving mechanisms and language, and they are reflected in each professional concerned. Participating in a multidisciplinary team requires demonstrating flexibility towards other colleagues' fields of specialization.
- Hospitals need to find the necessary balance between optimizing healthcare processes and using the resources of functional departments efficiently (properly responding, for example, to questions such as how to handle scarce resources with different groups of patients almost at the same time).

Modern community psychiatric services have been made possible by de-institutionalization which, among other things, has simultaneously contributed to reinforcing patients' dignity. The need to develop parallel alternative structures to cover the social roles previously delivered by psychiatric centres raises a note of caution, however, since without them there is a risk of lowering health care standards and, in some cases perhaps, of interrupting the provision of services. While Germany, for example, correctly achieved proper service substitution Hungary experienced problems (Stubnya et al., 2010). In Austria the de-institutionalization of long-term psychiatric patients led to a considerable reduction of costs while preserving high quality standards (Haberfellner et al., 2006). A study in England suggests that many elderly with mental health problems admitted to hospitals or residences could receive more appropriate service in their own homes, at more reduced costs, if community services were available (Tucker et al., 2008).

Another innovative alternative for patient health care are shared medical appointments. Shared medical appointments were conceived to increase both patients' access to care as well as the productivity of doctors with very full agendas. Groups of chronic patients with similar conditions (who give their prior consent) are treated simultaneously in one single consultation. Some studies confirm high satisfaction rates in, for example, patients with obesity-related conditions (Kaidar – Person et al., 2006), chronic cardiac morbidity (Bartley and Haney, 2010), hypertension (Watts et al., 2009) or diabetes (Kirsh et al., 2007).

### *b. Creation of hybrid centres*

A direct correlate of service substitution is the proliferation of "intermediate" specialized centres which currently resolve 85% of the elective, not urgent, surgery in the United Kingdom (Maybin, 2007). Similar

figures can be found in the Netherlands where, after the system was redesigned, the reduction in the number of hospitals was perhaps even more remarkable than the reduction in the number of beds. From 1980 until now the number of Dutch hospitals has been cut in half, while between 2000 and 2006 the number of "Independent Treatment Centres" - active in ophthalmology, dermatology, mother and child health care, orthopaedic and cosmetic surgery, radiology and cardiology - grew from 31 to almost 160. These changes occurred following the introduction of new insurance legislation that allowed insurance companies to reimburse health service costs to such entities. As an interesting architectural footnote, this increase in ambulatory care also generated a higher than before space ratio between operating theatres and beds in medical establishments.

The effort to deliver specialized services outside a hospital setting to especially fragile patients, or patients with chronic conditions who require support after their interventions, is not always an easy task (Ploch et al., 2005). For many such patients, hospital discharges can actually place their health at risk. In those cases bed blockages and delayed patient discharges are often the only solution - even when the treatment has been completed, given the scarcity of centers to which the patient can be referred (options are scarce and long-term stays in alternative institutions are too expensive. Moreover, even when referrals are feasible, following up on patients can become especially complex given their special needs in getting to and from a healthcare centre (and the fact that usually more than one centre is involved). The term "intermediate care" (Steiner, 2002) describes services related to patients in their transition from hospital to home, as well as from medical and social dependence to functional independence. These support services represent an attempt to prevent the risk of new hospital admissions by acting as bridges to different levels of care: social, primary, and specialized.

Yet another related development is the "*one-stop shop*" - a service concept that seeks to eliminate unnecessary repeat visits, sometimes integrating PHC clinical (or ambulatory) services into hospital services (Singh, 2008), other times functioning as a polyclinic (Imison et al., 2008). The Martini hospital in Groningen, the Netherlands, reflects such an approach. In that hospital outpatients are grouped according to their clinical needs and services to meet those needs are structured by zones. For example, "high intensity" outpatient services are located close to the intensive and coronary care units and near to day-nursing groups, thus providing a flexible space for nursing wings that can be reduced or expanded as needed with beds from adjacent wings (Rechel et al., 2009).

The NHS Coventry teaching hospital includes an acute care hospital, a clinical sciences building and a mental health centre with beds. Among its many innovative features are the separation of children by ages and the existence of an entire "hot floor" (emergencies, operating theatres, coronary units and cardiology) which is merged into one critical service matrix located on the first floor, thus taking better advantage of common spaces and synergies.

The Dutch Orbis Medical Park is structured along three lines: (i) systematized work processes, (ii) separation between the flows of goods, patients and personnel and (iii) a powerful information and communications system. Clinical care and other aspects of the medical park's activity -from planning to financing and human resources systems- aim to create value for all stakeholders by using a transparent approach based on objective information. Rooms and consultation spaces have the same size and the

same equipment and in principle do not belong to any pre-determined service or unit, being used according to needs and workload instead.

Andalusia has recently been opening facilities called “high resolution centers,” a concept that has been defined as “an ambulatory care process in which a diagnosis and its related treatment are established and reflected in a clinical report, with both activities being performed in one day and at a previously agreed upon time with users who have received the opportune information” (Zambrana et al., 2002). According to service portfolios and published activity data (SAS, 2011), such centres carry out diagnostic tests and specialized consultations, as well as low complexity ambulatory surgery, without in-patient overnight stays (although beds are available).

The initiative appears to have emerged as part of a public commitment by the Andalusian regional government that “no Andalusian citizen will have to travel more than 30 minutes of distance to reach a hospital center” (Junta de Andalucía, 2011). Between the year 2005 (when the first high resolution center was inaugurated in El Toyo, Almeria) and the date that this report was drafted in 2012, fourteen such centers had opened (SAS, 2011). The most recent one, Nicolas Salmeron in Almeria, was inaugurated in September 2011. Twelve more are either under construction or in the early development stage (Junta de Andalucía 2011). Their geographic locations do not fit any specifically defined pattern either with regard to the prior existence of more complex hospitals or proximity to health centers serving the local population.

Despite what the term itself suggests, these “high resolution centers” do not specialize in specific medical processes nor have we found any evidence on the impact they might be having on reducing the number of minor procedures performed in nearby hospitals of reference.

Although an in-depth analysis on this type of center is well beyond the scope of this document, available information seems to indicate that high resolution consultations do not necessarily lead to more effective continuity in care. In fact, the pattern of relationships between these new centers and primary health care is no different from what can be found at any other hospital – including waiting lists for outpatient consultations with specialists.

These centers do generate satisfaction among users, according to a survey conducted by the Andalusian regional health services (SAS) , *“A Survey on the Satisfaction of Clients in High Resolution Centers Pertaining to the SAS between 2010-2011 (SAS, 20210).”* Survey results indicate that 55.5% of the patients interviewed were “very satisfied” with the care received in their center and another 38.2% said they were “satisfied” (representing an overall satisfaction rate of 93.7%). A similar survey conducted in hospitals unrelated to the category “high resolution center” produced very different results: for these same categories only 43.3% of hospital patients said they were “very satisfied” and 45.6% said they were “satisfied” (representing an overall satisfaction rate of 89%).

Other autonomous communities have also been involved in similar initiatives, for example, the Integrated Health Centre *Alto Palancia* in Segorbe, Castellon.

### *c. Super - specialization in the search for efficiency*

Another response to these challenges, depending on certain circumstances, is the emergence of super-efficient centers, particularly in the private sector. These centers attempt to concentrate material and human resources into one single building to improve productivity based on low-variance processes, low cost, and high frequency – to achieve competitive advantages on an international market scale, among other reasons.

Although examples of improved efficiency through the diversification as opposed to the concentration of technology have been reported to facilitate intra-hospital flows (diagnostic imaging, for example), over the last two decades specialized single-topic ophthalmology centres have been successfully set up in low- and medium-income countries, particularly India and China.

Many of the best examples of efficiency-enhancement have originated in single specialty centres such as the Aravind Eye Care Center, a “cataract factory hospital” in India where production lines are based on continuous flow processes (Bhandari et al., 2008).

Govindappa Venkataswamy, its founder, opened the first Aravind Eye Hospital in 1976 with eleven beds, employing his own family as staff in order to reduce costs. In 2008, Aravind boasted almost 4,000 beds in five hospitals, performed 270,000 surgical interventions per year, and provided care to more than two million persons. Incomes generated from patients who could afford to pay (barely 47% of them pay for the services provided) cover the care of those who cannot pay.

Four main factors have made it possible for cataract surgery to be performed for under 20 US\$, with results equivalent to those found in developed countries:

- Implementing management systems that emphasize process standardization and continuous improvement;
- The ability to attract and train specialized doctors;
- Access to low-cost technologies; and
- Economies of scale offered in a country whose population is as high as in India.

In the words of a former editor of the Harvard Business Review: “Aravind’s vision and methods owe a lot to Henry Ford. By focusing on cataract surgery as a single ‘product,’ it has developed an extraordinarily efficient work chain process for large volumes. Each step, from patient screening and registration to the intervention as such, has been standardized. The operating theatre is designed to maximize surgeons’ productivity; while one patient is being operated, the following patient is being prepared on a second table. As soon as the first intervention ends, the surgeon can turn and start the next one –and so on, over and over again.”

In his search to improve quality and increase service production capacity, Doctor Venkataswamy was inspired by McDonald’s business model (Miller, 2006) and applied the same principles. Efficiency was

implanted from the very beginning by using standardized healthcare processes and ensuring the participation of highly specialized personnel.

An outstanding example in paediatric heart surgery can be found in the Narayana Hrudayalaya Health Care City located in Bangalore, India (Narayana Hrudayalaya Hospitals, 2011; Harvard Business, 2011). In operation since the year 2001, Health Care City has 10 surgical theatres and 4,800 beds (1,000 of them for cardiac patients) and performs 24 open-heart and 30 other major operations per day (10 times the average in Indian hospitals), which allows Narayana Hrudayalaya to offer free surgery to the poor from India, Malaysia, Mauritius and Pakistan. The center already operates the world's largest free telemedicine network, with 144,000 EKG consultations and 30,109 cardiac consultations in the last seven years.

In Europe, a similar example can be found in the Coxa Hospital located in Tampere, Finland whose regional service of joint prostheses is built on integrated flow systems and systematized healthcare protocols made possible through the collaboration of several institutions and a very sophisticated ITC platform (Rechel et al., 2009).

#### *d. Super - specialization in confronting complexity*

Clearly, operational centres with a capacity to provide numerous specialized services (hospitals truly centered on complex processes) will still remain an unquestionable element in the health care mix, particularly when pathologies characterized by low variance, high frequency and low costs can be set aside. There will always be a need to treat complex conditions and serious emergencies in settings with high resolution capacities. In effect, this would produce a further heightening of the tendency to have certain hospitals assume the responsibility of providing care for the most complicated cases, with the remaining cases to be referred to monothematic centers. Under such a scenario, hospitals would have fewer beds and patients would spend less time in them, but while there the treatment would be more intensive: more radiological services, more endoscopic services, more surgery and greater space around the bed.

In fact, for quite some time several authors have pointed out a need for hospitals to be smaller than they currently are, with boundaries that are less defined and that function as a network of "centres of reference." This would imply designing a set of core installations to serve only the most acute cases in an intensive care approach, with more operating theatres and emergency units than are available in current hospitals. All services would be linked through information technology and supported by massively outsourced services - early discharge, medical-hotel, home care, diagnostic imaging, pathology, laboratories, catering, laundry services, archives, etc.

Numerous centres are already being built and operated that are experimenting with innovative approaches that emphasize how spaces are designed and what kinds of relationships take place in them (Rechel et al., 2009).

Norway's Trondheim University Hospital opted for applying an organ-focused approach by placing patients in different sections of the building according to their symptoms and diseases (for example, problems related to the abdominal region were grouped into: gastroenterology, gastrointestinal surgery, urology and nephrology). This allowed the hospital to overcome the division between medicine and surgery and led to innovations in the organization of its activities, for example, the creation of an "abdominal clinic" or a "renal and urinary tract clinic". One of the explicit goals behind the creation of these clinics is to concentrate health services into smaller, patient-centered blocks of care, thus reducing the need to move patients around within the hospital, and reducing the time spent per patient for its most qualified staff members.

As part of its efforts to speed up deregulation, Korea increased the number of its acute hospitals from 973 in the year 2003 to 1,029 in the year 2004; by the year 2005 that total had reached 1,084. These efforts translated into a remarkable increase in competition among providers and a considerable decrease in their income. Hospitals responded by greater specialization in the provision of certain services. Small and mid-size hospitals began developing their own specialized services to compete with bigger ones. This strategy of specialization led to the reorganization of services and cost containment because it restricted the range of services offered and eliminated those with low volume. The result was the delivery of quality services at reduced costs but in-patient and outpatient activity volumes were not statistically relevant for determining the centres' overall efficiency. The study suggests, in fact, that efficient hospitals had fewer beds (average of 95) than less efficient hospitals (average of 324) and efficient hospitals had fewer doctors and nurses (averages of 23.3 and 61.4, respectively) than less efficient hospitals (averages of 107.1 and 164.0, respectively).

Innovative and inspirational centres are also being built and operated under the strategic direction of the Ministry of Health and Social Affairs in Sweden, where town halls have direct responsibilities in the provision of health services. Stockholm City Council, the biggest in the country, had two university hospitals (the Karolinska Hospital Solna and the Huddinge Hospital) located very close to one another and with some service overlap. In 2004 local authorities decided to redesign how those hospital services were being provided. Alleging functional and financial advantages, they merged the two centers into one single entity, the Karolinska University Hospital, placing them under the management of one single team.

The new Karolinska project (Dowdeswell et al., 2009) confronts key issues for tomorrow's university hospitals: the importance of investing in facilities that permit continuous innovation and knowledge-sharing while facilitating the introduction of technological advances and new healthcare modalities. Some specific features of this new project (currently under development) are the following:

- Service vision based on integration of healthcare levels and adoption of healthcare pathways.
- Strategic planning to adopt innovative changes in the flow of patients to produce the kinds of services needed by the population, taking into consideration demographic and epidemiological changes.
- Establish incentives that foster collaboration between centres.

- Define new and more complementary roles for each hospital unit aimed at converting the centre into a specialized hub of services.
- Integration of three key components: services provision, research and training.
- Parallel development of other commercial operations in the urban development sector.
- Public-private participation models that take advantage of previous European experiences, ensure the viability of the project's goals, and guarantee the sustainability of care provision and research activities.

## III.2. Redesigning Systems

### a. *"Disease Management" programs*

"Disease management programs" are one way of linking health care reform to chronic illness and their aim is to promote treatment under the best and most cost-effective clinical framework possible. Although in some European sectors they have been criticized for merely supporting changes in how health care is delivered (overlooking questions related to more sustainable outcomes in policies, structures, and community resources) and for following a model that is "individualistic" and "based solely on care levels" rather than a "system" model (Nolte and McKee, 2008), these programs have acquired considerable influence under a diverse array of names ("disease management," "case management," "care management").

Disease-management was introduced in Germany in 2002 for types 1 and 2 diabetes; asthma/ COPD; coronary disease and breast cancer. In 2006 patients were given the (rather uncommon, in Germany) possibility of enrolling voluntarily with a general practitioner. The incentive for those who did so was being exempted from having to pay the usual compulsory quarterly charge of €10.

Periodical surveys identified the number of persons who chose to enroll with a GP and in the year 2008 those results were published: approximately 5.5 million insured people had registered, the majority of them pertaining to a cohort of elderly and chronically ill patients. Impact evaluations of this change were also published: 90% of those registered declared that they did not perceive any difference in the care received while 10% declared that they did.

In 2008 many of the 4.7 million patients enrolled in a Chronic Disease Management Program had signed up with a GP who had previously received specific training on the subject (Van Lente et al., 2008).

The introduction of diabetes management programs is also achieving good results in Germany (Szecsenyi et al., 2008). Furthermore, these programs generate positive changes in patients' daily practices and patients rated the new service modality higher than the earlier model.

A clinical trial on ischemic heart disease that offered patients the option of receiving integrated rehabilitation at the ambulatory level was launched in Denmark in 2000. Multidisciplinary networks were established and its members were provided with specific training for treating chronic conditions. The

core team consisted of a general practitioner, a nurse, a physiotherapist and a nutritionist – an expanded version of the team also included a social worker and a psychiatrist.

A study in Spain (Falces et al., 2011) found improved results for patients with ischemic disease, cardiac failure, and auricular fibrillation when follow-up and treatment were redistributed between family doctors and cardiologists. Satisfaction levels were high and there was no need to increase resources.

In the early 90's The Netherlands began setting up healthcare networks under the successful concept of "transmutably care," in search of ways to improve the quality of care for patients who could not live a fully independent life. The purpose of transmural care is to assist patients in managing the "interface" between acute hospital care, primary care and social services.

In Sweden, the implementation of integrated care pathways for patients with hip fractures led to a significant reduction in hospital stays and improvements in the quality of care (Olsson et al., 2006). In that country nurses run clinics for diabetes, hypertension and other chronic conditions, a model that has spread to Denmark, England and the Netherlands as well (Nolte et al., 2006).

Oncology services can be considered a paradigm of multidisciplinary care, an organizational approach that promotes integrated care based on the effective and coordinated participation of different professionals and specialties. In addition to their significance in terms of innovation (Medical Economics, 2009) - advances in genome research, the origin of biomarkers, and the possibility of applying individualized medicine on a case by case basis – oncology services are contributing to better clinical results. A recent study identifies the following issues as relevant for analyzing multidisciplinary cancer care:

- The quality of coordination and communication among professionals from different services is becoming ever more relevant in cancer care.
- The effectiveness of multidisciplinary interventions is highly dependent on their organizational context; excessively rigid hospital organizations and management schemes can hardly respond adequately to patients' needs.
- Professionals specialized in treating specific types of tumours are a necessary element in developing multidisciplinary care.
- The contribution of primary care doctors is becoming increasingly valuable, particularly in tasks related to prevention, screening and early detection.
- Primary care doctors can also be actively involved in the pharmacological treatment of cancer - for example, by providing timely care in the most complicated stages of treatment and, most of all, in palliative care.

### *b. Putting PHC in the driver's seat*

For decades the health care system has been modeled along the lines of networks of care that have been more or less explicit; through those networks patients are referred toward ever higher levels of complexity.

A Canadian study on urban, suburban and rural primary care centres reviewed several aspects related to how, from a patient's perspective, clinical organization and medical practices can lead to better care in terms of: accessibility (possibility to obtain care rapidly in case of sudden disease), continuity (care by doctors who know the details of the patient concerned) and coordination (between the family doctor and the specialist). It found that access is facilitated by the number of doctors in the facility and the existence of a 24-hour telephone service; continuity of care increases when clinics stay open through the afternoon; and coordination is rated more highly when doctors distribute their working hours day between PHC centres and hospitals.

Changes analyzed in this paper also affect the way healthcare networks are articulated and the norms governing them. One important variant is empowering primary care to operate as a "coordination hub" (Rico et al., 2003), which has the effect of "placing primary care in the driver's seat" (Saltman et al., 2003). The goal is to improve the continuity of care and to reduce pressures on care provided at the hospital level while offering financial incentives to providers and patients to encourage more cost-effective patterns of care. One example could be assigning all or part of the hospital budget to PHC stakeholders - as occurred in the United Kingdom's Primary Care Trusts during the 90s when the UK expanded the concept of "GP fundholding" - despite the lack of strong evidence on its success to date (Audit Commission, 2007).

UK Trusts have begun using "case managers" to coordinate services provided to those affected by chronic conditions or with complex social and medical needs - including registration, development and organization of healthcare plans for those patients, as well as a follow-up on the quality of care received

In England pharmacists are also involved in prescription refills, treatment reviews and the delivery of support services for those who want to quit smoking. The role of nurses, too, is essential here, with many of them assuming tasks traditionally assigned to family doctors (Laurant et al., 2005). A study on 30 multidisciplinary teams formed by PHC and specialized professionals who delivered services to patients with chronic obstructive pulmonary disease showed a decrease in the number of hospital admissions for those patients (Pinnock et al., 2009). Those teams were managed by the health care centres.

Changes in Scandinavia are similar. Over the past decade in Sweden the Adel Reform decentralized the coordination of hospitals to the municipal sector, thus reducing the number of acute hospital beds and increasing the number of beds available for chronic patients in nursing homes.

In Singapore, a specific training program with remarkably good results (Lum et al., 2008) made it possible for family doctors to make hospital referrals, particularly for patients with chronic mental

diseases. Similarly, in Mexico family doctors were given the responsibility of caring for patients with diabetic nephropathies, giving them the responsibility for decisions regarding clinical courses of action (Cabrera – Pivaral et al., 2005).

France and Germany have tried to put such a system in place by experimenting with financial incentives (despite the fact that neither country has traditionally required the general practitioner to act as “gatekeeper,” the sole authority responsible for referring patients to a specialist). To increase their organizational and negotiating possibilities these countries have encouraged GPs to join together and form larger clinics or even polyclinics equipped with improved diagnostic equipment and several specialists on staff.

### *c. Increasing patient choice*

In countries where the “demand side” predominates in health systems, patients who can afford to finance their own health coverage have always been able to exercise direct influence on providers by “voting with their feet”. This characteristic has, in fact, been reinforced as a result of recent reforms in many parts of the world.

Many countries with health systems that are mostly publicly-financed, including the delivery of services, have tried to benefit from the existing array of providers (all equally capable and qualified) so that patients can pick and choose according to their preferences.

For example, waiting lists and service rationing have been substantially reduced in the United Kingdom, Denmark and Spain through efforts that combine substantial increases in capacity, financial incentives for shortening waiting times, and options for receiving treatment in another health center. Such efforts, however, are not cheap. One surprise, relatively speaking, was the confirmation that the way services are designed (batches and/or flows) has more influence on creating or avoiding queues than mere installed capacity –that is, more than the presence or absence diagnostic tools, number of doctors, nurses, spaces, etc. The decisive role played by improving flows to prevent queues should refute for once and for all the old complaint that waiting lists are essentially resolved with more expenditure (Government of Scotland, 2007).

#### IV. SUMMARY: SITUATION ASSESSMENT AND INFORMATION GAPS

The authors believe a broad consensus is beginning to emerge that the current situation is unsatisfactory and that it is having an impact on the adequacy and types of services delivered in healthcare institutions.

The supply of traditional hospitals is criticized as being (supposedly) outdated (Edwards and McKee, 2002), with clinical disciplines that function like silos (...while patients increasingly suffer from a larger number of simultaneous problems); with designs based on the episodic treatment of illness (...while many patients suffer chronic conditions); and functional designs based on batches and queues (...while complex medicine today calls for flows and patients dislike having their time wasted). It is also difficult to understand how full-time employees work less than 40 hours per week (...when an 18/7 if not 24/7 regime is necessary). Traditional PHC is also criticized by its (supposed) inability to provide modern solutions. All of these factors combined have increased talk about the current hospital model's (alleged) lack of sustainability (The Joint Commission, 2008).

It seems beyond dispute that the time has come to decide what services should be produced, for whom, where and according to what organizational patterns. Clearly many medical conditions do not necessarily have to be treated in one single setting, nor is it necessary to continue treating them in primary care centers or hospitals, as has been the case up until now. In other words, perhaps the time has come to scale up efforts to address major changes in models that affect the organization, function, and architectural design of health care facilities:

- If many technologies are transportable and cheaper, it could be reasonable to expect a proliferation of "medical practices" and similar services endowed with more equipment and higher resolution capacity than exists in current services. Such outpatient services could encourage the integrated management of persons with a similar illness and facilitate their care on a one-stop basis by a medical team. Will they function independently of each other or as a network? How far they will extend into the health care market is difficult to predict. Perhaps only time will demonstrate to what extent they are capable of connecting with other installations. This will probably depend on specific conditions in given locations – using an analogy from retail sales, a specialized shop can be located in a building anywhere along a street or in one of the many little shops that form part of a larger shopping mall.
- As patients become ever more aware of their time's value and are able to recover more quickly than before thanks to improved anaesthetic procedures and less invasive surgical techniques "day-" or "intermediate-care" surgical units, etc. are also likely to proliferate. The uneven pace over the past decade in OECD countries that adopted non-hospital based cataract surgery (OECD, 2008) shows that beyond its technical viability some sort of incentive-raising decision -in this case, in the form of payment modalities- is needed for improvements to occur. This particular experience offers major political lessons to decision makers (regardless of whether units were organized independently or as a network).

- Achieving healthcare flow processes capable of crossing organizational boundaries is a major challenge (Institute for Healthcare Improvement, 2005); no longer can any single hospital be self-sufficient in all key areas. Even the demands for quality scientific research bypass the scope of a single institution: a clinical trial, for example, may well require collaboration between various national and international hospitals as well as other organizations. That is why many systems have recently devoted enormous amounts of resources to improving “management by processes”. Well-meant initiatives such as these, including the arguably effective development of “clinical guidelines,” will remain but they will need to undergo substantial refinement in order to improve inter-level flow and prevent bottlenecks in hospitals.
- Hospitals simply can’t (“don’t know how to”) go from treating acute cases on an admission-basis to coordinating patient care at other levels for better outcomes, even if they were capable of simplifying the processes. There are no easy solutions to this situation and it is quite likely that a “trial and error” method will proliferate in the search for organizational arrangements. This approach will increasingly include the integration of extra-hospital services, including the family, in medical processes that will be, more than ever before, “patient-centered”. Some authors have even mentioned concerns about increased costs and lower quality due to the loss of economies of scale (Sibbald et al., 2007).
- Architecture in health-related institutions will need to emphasize flexibility as never before, since (i) changes in clinical practice patterns are unavoidable and institutions will need to combine both emergency and regular care and (ii) the general flow of patients, personnel and goods will need to be separated to avoid interferences. The design of multifunctional buildings and multi-use rooms will be essential. It will be necessary to create adaptable spaces that permit care to be provided from one end of the spectrum to another (from intensive care to rehabilitation), in the same space and without having to move the patient.
- An adjustment in human resource levels will have to precede any possible solution because the health sector is intensely dependent on their use. It is also a highly politicized sector, with many vested interests at stake, so there is a very real need to better comprehend the dimensions of the resources involved, ranging from the kind of “skill mix” required to the how the migration of health professionals impacts the provision of care (Sibbald et al., 2004).
- In any case, improved coordination mechanisms between levels of care will be needed. In addition, greater regulatory efforts will be necessary to ensure the quality and efficiency of services provided outside the hospital, as well as the increasingly complex interventions performed inside its walls.
- Overall, ICT-based information systems represent an important step forward in relation to specific improvements (e.g. appointment management systems; planning; operational and procedural analysis; measuring health outcomes, etc.). Yet the generation of health intelligence, understood as an ensemble of actionable, quanti-qualitative information linked to knowledge and skills, supported

by valid and reliable statistics and useful for informed decision-making, has hardly resulted in generalized progress (European Advisory Committee on Health Research, 2003).

Theoretically, an ideal solution could emerge from an “evidence-based analysis” of each service, however this is quite unlikely to occur because operational research is scarce and many aspects of health service production remain clouded by dogma and myth (Nolte and McKee, 2008). Specific reflections based on previous experiences may be useful in setting health policies. While some of them are more directly rooted than others in new possibilities for organizational change, what they all have in common is a questioning of the prevailing models that affect traditional, decades-long healthcare structures, functions and even architecture.

One specific drawback concerns the validity of research findings for societies that are quite different from the original countries in which such research was conducted. The relatively scarce amount of research on this subject can also be quite problematic.

This systematic review draws on a considerable number of publications. Among the 48 articles that addressed what we called adjustments in “intra-healthcare centres,” the literature was quite abundant on the subjects of “service substitution,” “creation of hybrid centres,” and “super specialization in search for efficiency”. However, the topic of “super specialization for facing complexity” appeared much less frequently (scarcely 3 references).

On the topic related to the redesign of health care systems, articles devoted to “disease management programs” were the most frequent (15 out of a total of 44), whereas those focused on “putting PHC in the driver’s seat” were scarcer. Articles emphasizing “increased patient decision-making” were abundant, but almost exclusively confined to the United Kingdom.

By geographic breakdown, the majority of publications refer mostly to Europe (76 articles: 36 on the United Kingdom, 10 on The Netherlands and Germany, and 13 on Spain) and to North America (23: 19 on the USA and the rest on Canada and Mexico). References to Asian countries (in particular, India, Japan and Singapore) and Oceania (both Australia and New Zealand) are less frequent. Finally, publications referring to South America and Africa were remarkably scarce.

This document has identified clear signals that health care is in a crisis situation on an international scale. As in all crises, important concepts are being threatened and there is a very real danger that mechanisms and arrangements that have worked well up until now may be harmed. Yet crises can also open up a world of new possibilities and fascinating challenges that could improve the health status of millions of persons.