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The role of information and communication technology in planning the digital hospital

Understanding EMRAM and how it can be used by policy-makers, hospital CIOs and their IT teams

Implementation lessons on the use of innovation in information technology in the developing world

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Anahcp is the national organization that represents and serves excellence private hospitals in Brazil. Established in 2001 to advocate for Brazilian private hospitals before legislative and regulatory bodies, disseminating best practices throughout the national health system, benefiting all Brazilian Citizens.

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**Vision**
To be acknowledged as the leading association in representation and advocacy activities for excellence private hospitals, leading the health care system improvement.

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Collaboration, Entrepreneurship, Integrity, Social Responsibility, Excellence Management.
For several years now, health information technology and management systems (HITMS) have been seen as a potential game-changer that could transform the future of health care through its innovative capabilities – improve safety, lower cost and make life easier for the staff working in the health sector. In only a few decades, since the computer became generally available, the HITMS industry has grown from zero to a multibillion dollar industry globally.

In the USA alone, PricewaterhouseCoopers has estimated that providers spent more than USD 88.6 billion in 2010 in developing and implementing electronic health records (EHRs), health information exchanges (HIEs) and other initiatives. In Europe, although almost 75% of health care provision in the major markets is controlled by the public sector, spending on information systems has continued to grow despite the recent financial crisis in the European Union. Although spending on HITMS has been estimated variously at 2-3% of total health care spending in the USA and Europe, in the emerging markets and low-income countries it is still reported at less than 1% of total health care spending.

The contributing authors to this edition of the World Hospitals and Health Services showcase a few innovative approaches to HITMS, some of which were demonstrated at the recent Healthcare Information and Management Systems Society (HIMSS) Conference in New Orleans in March 2013 and at the last IHF World Hospital Congress held 18-20 June 2013 in Oslo, where top health care professionals shared their knowledge about the opportunities in new technology (http://www.ihf-fih.org/Events/Past-Events/38th-World-Hospital-Congress).

Giuseppe Lacanna discusses how HITMS has become the new shaping tool of the hospital environment. Lorren Pettit describes how the Electronic Medical Record Adoption Model (EMRAM) developed by HIMSS Analytics team has become a universally recognized maturation model of a hospital’s electronic medical record (EMR) environment. Salim Hasham and Saleem Sayani highlight how innovations in information technology affecting accessibility, affordability and quality health services in the developing world by bringing the marginalized communities closer to health care systems, using the Aga Khan University (AKU) Hospital system as an example. Holly E Russo and William D Kirsh show how better information systems can help improve compliance by patients in taking their prescribed medications, with 33% to 69% of all medication-related hospital admissions in the USA being due to non-adherence to prescribed medicine regimens. Yunkap Kwankam summarizes the experience in telemedicine and reports substantial growth in this area recently in both financial volume and numbers of people served. Mike Casey describes how junior doctors of today start their education and careers with an iPad rather than a stethoscope. Rodolphe Bourret portrays the integrated approaches of telemonitoring for noncommunicable diseases. Finally, John Casillas describes what banks can offer in transaction processing and secure protocols.

In this vast array of innovation and growth, the real challenge for HITMS now lies in demonstrating results. Many governments, having already spent billions of dollars on HITMS, do not want to hear more about what could happen in the future until seeing concrete achievements to date. Unlike the pharmaceutical industry or the medical technology industry, the health information industry has had a period where new innovations were not put to the test by the FDA, EPA or European safety and efficacy standards. That honeymoon period is now quickly drawing to an end. In the future the HITMS industry is likely to be subjected to much greater scrutiny in terms of both patient safety and value for money. A misdiagnosis or death due to an HITMS glitch is as serious as a contaminated knife on the operating table.
The role of information and communication technology in planning the digital hospital

ABSTRACT: Hospital structure is undergoing radical changes, forced by contemporary market trends, new demands from different stakeholders and a common interest in innovation. Health care expenditure around the globe continues to rise at unsustainable levels. In this context efficiency and optimization become the keywords of the process aimed at lowering costs and increasing the quality of care services. Efficiency and optimization leads to innovation, and innovation in the contemporary age leads to the power of information and communication technology (ICT). This paper discusses how ICT became the new shaping tool for hospital environments and highlights one of the best examples of its implementation.

Hospitals have performed many different roles from their first appearance up to the present. Their morphology has evolved from shelters for poor under the management of religious orders to resorts where people spent the last days of their life in the eighteenth century, and then the glorious era of medical technology, which made them a sort of medical bulwark.

Miller in 1997 described the hospital as “an institution which provides beds, meals and constant nursing care for its patients, while they undergo medical therapy at the hands of medical professional physicians. By carrying out these services the hospital strives to restore its patients to health” (Miller 1997). The Declaration of Alma Ata (WHO 1978) defines health as “an undeniable human right.” Therefore, hospitals have become providers of “undeniable services.” However in the last decades many changes have occurred in the health care panorama, declaring the traditional way of conceiving hospitals as highly unsustainable and obsolete. The reason of this unsustainability lies in “a gradual transition towards a health care system driven by market approaches, where it is for the demand to determine the supply” and not vice versa (Mens and Wagenaar 2010). Already in 1992, academics were warning that financial pressures on hospitals and their high consumption, which were exceeding more than half the overall health care budget.

According to the Organisation for Economic Co-operation and Development (OECD), hospitals worldwide absorb 30% to 40% of all health care expenditure; for example, about one-third of US health care is provided by hospitals, 35% in France, 42% in Australia and Korea, 44% in Turkey and the Czech Republic and 45% in Denmark, while nearly half of health care in Japan is provided by hospitals.

Experts point out that it is not possible to cut hospital expenditure by limiting the supply, but by increasing the quality and effectiveness of the services and health care products provided.

Quality and effectiveness are directly linked to innovation, and innovation nowadays is mainly driven by information and communication technology (ICT) solutions. The improvement in information technology is rapidly changing hospital scenarios.

The development of telenmedicine, the possibility for the patients accessing health care knowledge via the Internet, the possibility of carrying out diagnosis “at a distance” are all elements that show an openness in a traditionally closed system which now faces towards its end users: the patients. “Patients increasingly demand to be seen at times that are convenient for them, rather than health professionals. The Internet gives them the opportunity to be informed about their diseases better than their physicians” (Neuberger 2000).

This may already be enough to prove an inversion of trends into the way a hospital operates, a radical change, a paradigm shift which shows an increasing empowerment of patients.

The power of ICT and the hospital structure

Fundamental to this transformation is the digital infrastructure – known as information and communication technology (ICT) – that enables information sharing among health care providers, payers and patients. However, the implementation of new ICT into the hospital environment is not always easy, above all for cost reasons, and sometimes also for cultural reasons.

Automation of hospital administrative processes, such as patient registration, admissions and discharge is relatively widespread. Yet fully digital hospitals – that run a range of clinical applications and advanced hospital information systems interconnected by a robust and reliable infrastructure – are exceptions rather than the rule.

Digital hospitals, whether newly-built or existing operations retrofitted with the latest digital information technology, promise to boost efficiency and quality through better integration with all sources of care. ICT enables the deployment of eHealth systems that provide online information, disease management, remote monitoring and telenmedicine services that can extend the reach of scarce medical resources and expertise. Digital hospitals provide faster and safer throughput of patients, creating more capacity
through process efficiencies, while also containing costs.

It is interesting to highlight that until few years ago, hospitals were built around a medical technology, that we may call “heavy technology”, which involved choosing certain kinds of spaces, which morphologically were far away from being flexible. This trend, today harshly criticized, led directly to the era of the so-called “megahospitals”, buildings that were often outdated before the project was completed, difficult to manage in terms of real estate value and surely not patient centred.

Today, as we have already said, new hospitals look at efficiency and quality, not only to lower expenditure, but also to support the patient condition in the medical environment. In order to reach this goal ICT plays an important role, and often new spaces are designed in a flexible way because they can count on the power of ICT solutions. Therefore, we can say that even nowadays hospitals continue to be built around technology, but a different one. A technology that, in this case, is not a “heavy” one but a “soft” one. A technology that doesn’t determine the dimension of spaces or impose constraints, but allows spaces to be completely free for use, while being perfectly connected and operational. The advantages that the implementation of ICT offers are various. Some of them include: improvement of patient outcomes, safer and healthier environments, decreasing amounts of paper documentation and a reduction of administration.

A good example of digitalization
The Jeroen Bosch Hospital, in the city of ‘s-Hertogenbosch in The Netherlands, is one the best examples of where the power of ICT was able to completely automate the ambulatory care system, and radically transform the layout of its traditionally planned outpatient departments (OPDs).

The goal of hospital managers was to provide empowerment and comfort for the patients, while integrating the latest information health care technologies to improve the quality of care services. To accomplish this task the hospital managers, together with the architects involved in the project, decided to make a clear division of the pathways for both patients and the medical staff. The idea was to split the environment into public spaces, mostly related to patients, and medical ones, intended for visits. The focus was to make patients feel that they were in a more medical environment only after they walked into the doctors’ offices area, also defined as the “back-office.” On the other hand, the “front-office,” was conceived to have a more public and less medical atmosphere, where the patient could express empowerment, not feel restricted, and have more control of the environment. It is within this framework that the concept of the new automated policlinic was developed.

Check-in stations and screens, showing the time and room where the visit should take place were the main devices installed into this new type of OPD. The patient that walks for the first time into OPD is registered at the central registration desk and provided with an ID card where all their information is stored and on every future visit this will be uploaded. Once the patient has his own card, he can simply walk to the check-in station, follow the check-in procedure, have a look at the screen where the time and the room for the visit will be shown, wait for a short time, and finally walk into the doctor’s office. After the visit, if needed, a new appointment will be uploaded on the ID card of the patient directly by the medical staff. This slim procedure allows the patients to be completely independent, less stressed, to have more privacy and shorter waiting times before the visit. Furthermore, the implementation of this new system also brings benefits directly to the hospital management. The use of independent check-in stations encompasses the removal of the acceptance desks and their staff, and a huge reduction in the amount of paper: this means costs efficiencies for the hospital management and also reductions in stress connected with waiting times and noise levels.

The new system of OPD, based on new spatial planning and the implementations of check-in stations, has been proved to raise satisfaction levels for users, above all, the patients. A research survey conducted by the author of this article has identified four groups of patients, categorized by satisfaction levels for the new polyclinic system: not satisfied, indifferent, satisfied and very satisfied. The results have shown that most of the patients are generally satisfied. Patients like to have control of their environment even within the hospital, without being dependent on nursing staff. Moreover, they pointed out that with the implementation of the check-in stations the whole process is more efficient in terms of time. Indeed the waiting times before a visit are really short: about seven minutes. During the waiting times the patients have the possibility of sitting into the lounge area, where they can read, navigate the Internet through a Wi-Fi connection or enjoy the nice view of the garden through the large windows installed in every outpatient department.
Conclusions
The digitalization of the hospital is today a challenge that can be won with the power of ICT solutions.

These solutions trigger radical changes into the old way of conceiving the hospital structure, and represent a means by which to renovate the way of designing and running healthcare facilities.

However, there is no sure-fire recipe or guaranteed blueprint to reach the complete process of digitalization. The temptation to acquire successively more capable technologies and digital-aware machines risks creating islands of automation and further fragmentation of patient and clinical data.

By viewing patient needs holistically, digitization becomes a means to an end, and priorities become self-evident. A patient centric or “outside-in” approach to service planning, design and delivery is sure to achieve greater patient satisfaction, staff buy-in, and technology-enabled efficiency.

The Jeroen Bosch Hospital’s experience represents a good example of this viewpoint. It provides a clear demonstration of the shaping power of ICT and of the way digitization is used to integrate services and information across traditionally separate hospital/allied care or public/private boundaries, so that patients experience end-to-end care that transcends departments, visits, episodes, and even life stages. The capabilities of tomorrow’s hospitals depend to a significant degree on what we invest today. Navigating these opportunities and challenges has never been more important. Considering the possibilities offered by ICT, these solutions represent a unique opportunity to re-shape the overall hospital structure and change the way the hospital together with care services are conceived.

Giuseppe Lacanna is a health care architect. He is a PhD researcher at TU Delft, Department of Architecture, Chair of Complex Projects, in The Netherlands. He is involved in a unique research programme which runs over several countries in Europe. He is also a member of the UIA-PHG young leaders group and he leads the R&I department of EGM architecten b v, the biggest architectural practice specializing in health care in The Netherlands.

References
Understanding EMRAM and how it can be used by policy-makers, hospital CIOs and their IT teams

ABSTRACT: The Electronic Medical Record Adoption Model (EMRAM) developed by HIMSS Analytics has become a universally recognized maturation model of a hospital’s electronic medical record (EMR) environment. Numerous health care organizations (HCOs) throughout the world spend significant time and resources to improve their EMR standing. Yet, to the health care information technology (HIT) outsider, the value of the EMRAM and the outcomes of the efforts tied to advancing EMR capabilities are virtually unknown. This is a significant concern when efforts around the EMR compete for scarce health care resources.

This article purposes to establish the EMRAM as a valuable framework for policy-makers and hospital leaders. To accomplish this end, we begin with a necessarily brief description of the EMRAM process and stages. Our attention will then turn to examples of the model’s use and presence throughout the world, before ending on the EMRAM’s benefits for varied health care audiences.

The EMRAM is a maturation model focused on the adoption of the EMR in a hospital. It was created by HIMSS Analytics, the research arm of the HIMSS Worldwide organization. Recognizing its unique position in amassing the HIT inventory of hospitals and their affiliated entities throughout the world, HIMSS Analytics leaders originally developed the EMRAM in 2005 as a means of tracking the adoption of EMR applications within hospitals and health systems in the USA. HIMSS Analytics leaders followed the EMRAM with the Ambulatory-EMR Adoption Model (A-EMRAM), a similar type schema for tracking the adoption of EMR applications in physician offices and ambulatory clinics, in 2011.

The basic premise of the EMRAM is that a health care facility’s adoption of EMR technologies can be scored using the IT inventory data captured in the HIMSS Analytics Database. Partitioning an health care organization’s (HCO) EMR capabilities along an eight stage continuum, HIMSS Analytics developed a proprietary scoring methodology which defines an HCO’s progression from a paper-based environment (EMRAM Stage 0) to EMRAM Stage 7, the pinnacle of an environment in which paper charts are no longer used to deliver patient care.

The eight stages of the acute hospital EMRAM are as follows:

Stage 0 – Laboratory, pharmacy, and/or radiology information systems are not installed. While there may be some departmental systems, these systems are not integrated throughout the organization. As a result, the patient record is essentially completely paper based.

Stage 1 – The core ancillary information systems (laboratory, pharmacy and radiology) are all automated. While data is not yet being stored in a central database and the patient record is still primarily paper based, the core clinical data related to results and medications are stored electronically allowing for clinical cooperation between these ancillary departments.

Stage 2 – A Clinical Data Repository (CDR) containing clinical orders and results from the core ancillary departments is installed and operational. This central database creates the foundation for a patient centric electronic medical record allowing for the development of cross departmental rules as well the automatic generation of orders (e.g. microbiology automatically generating a pharmacy order; recorded patient allergies automatically generating warnings in pharmacy and radiology).

Stage 3 – Nursing Documentation, (Classic) Order Entry and Electronic Medication Administration Record (eMAR) are all automated. The availability of these applications allow nurses to expand the capturing of and online access to core clinical data, to include nursing notes, vital signs, and medication history. These applications also allow for the trending of vitals which can eventually feed complex rules systems such as sepsis alerts, as well as allowing for basic clinical decision support including duplicate order checking and order sequencing. The efforts of EMRAM Stage 3 tend to be a nursing satisfier resulting in nurses becoming strong users of the EMR and significant supporters of the medical staff’s transition to online medical records.

Stage 4 – Computerized Practitioner Order Entry (CPOE) is live and operational. In this stage, physicians and other ordering practitioners, enter their own orders supported by a Clinical Decision Support System (CDSS). The introduction of CPOE into the EMR permits staff to more quickly act upon a physician’s orders, whilst the CDSS ensures the orders are guided by standardized, evidence-based up-to-date clinical care protocols. Finally, the CPOE also allows HCOs to have consistent order histories for record reviews, as well as diminishing the variances in orders among medical residents and students.

Stage 5 – Closed Loop Medication Administration (CLMA) is employed. CLMA ensures pharmacy orders are verified by a
pharmacologist before unit dose medications are dispensed. Bar coding of the patient and unit dose medication is employed at the point of care to ensure the “5 Rights” of closed loop medication administration are supported (the right patient, right drug, the right dose, the right route and the right time). These efforts are designed to reduce medication errors, improve patient and family confidence in the care delivered, and enhance nurse satisfaction.

Stage 6 – Physician Documentation, full Clinical Decision Support System (CDSS) and Complete Radiology Picture Archiving and Communication System (PACS) are installed and utilized. The clinical guidance in the Physician Documentation is supported by the full CDSS allowing physicians to better adhere to evidence-based care. The CDSS enabled Physician Documentation also helps standardize charts, improve audit results, and support stronger coding. At this stage, all radiology images are available for review within the EMR environment. This stage not only allows practitioners faster access to radiology results and impressions, but can improve diagnostic efficiency and improved service to the medical staff with image availability throughout the organization. The utilization of PACS can also provide an HCO significant savings on film costs and storage space; space which could be converted to a revenue generating activity.

Stage 7 – Complete EMR with a data warehouse, business continuity plan, health information exchange, data and system governance and medical devices integrated with the EMR. At Stage 7, the hospital essentially operates a paperless environment with 90% of all physician orders entered by physicians in CPOE, and 95% of all patient IDs and medications attempted to be verified at the point of care. A Stage 7 hospital is expected to use a clinical data warehouse to analyze outcomes, protocols and care delivery processes as well as demonstrate specific care improvements. Stage 7 hospitals are also required to have a well-defined systems governance structure and can demonstrate their disaster recovery and business continuity plans.

Global adoption of EMR
While the EMR originated in the USA and has been US centric in its development, HIMSS Analytics has allowed for slight regional modifications to the model as EMR has been adopted in other countries. For example, the requirements of EMR Stages 5 and 6 in the USA have been flipped in Europe. These variants are thought to be minor at best and have been granted in large part given systemic factors within the host country.

Recognizing EMR’s US roots, it should come as little surprise that EMR has its most extensive history, and perhaps most extensive documented impact, on hospitals in the USA. HIMSS and HIMSS Analytics have collected numerous examples of HCOs in the USA documenting positive benefits from advancing their EMR capabilities. These benefits include both clinical (e.g. reductions in medication errors), financial (e.g. cost reductions realized from the elimination of dictation expenses), as well as experiential benefits (e.g. physician satisfaction with the access to patient information). That being said, EMR’s impact is not limited to the USA. The international impact of EMR is evident by the growing number of non-USA based hospitals recognized by HIMSS Analytics for meeting EMR Stage 7 requirements. At the time of writing, the following three hospitals outside the USA used the EMR as a roadmap to guide their EMR strategy and have subsequently been recognized as EMRAM Stage 7 hospitals:

- Seoul National University Bundang Hospital, South Korea;
- Hospital Marina Salud de Denia, Spain;
- The University Medical Center Hamburg-Eppendorf, Germany.

This list is expected to grow exponentially as a number of international hospitals have already achieved EMRAM Stage 6 and are marching forward to achieve Stage 7 status.

Beyond the requests of international hospitals to be scored by HIMSS Analytics, we have also seen how one country employed EMRAM scores as a proxy to rate the quality of care offered at a hospital. In early 2013, the Canadian Broadcasting Corporation (CBC), a government funded media outlet in Canada, developed a system to rate Canadian hospitals in order to make hospital performance more transparent to Canadian residents. The rating system devised by a panel of health care experts, cited the use of the EMR as one variable in defining the quality of the care delivered at a hospital. These experts assumed that hospitals with advanced EMR capabilities had a greater likelihood of realizing select clinical benefits (e.g. reductions in medication errors) than hospitals with lower functioning electronic or paper-based medical record systems. The CBC therefore included the hospital’s EMR score in their rating system algorithm to represent the hospital’s EMR capabilities, where the hospital’s EMR score was positively associated with the hospital’s assessed quality of care.

Utility of EMRAM
Obviously, organizations throughout the world find some value in the EMR. Otherwise, why seek to be certified as a Stage 7 hospital? Why include EMR score as a proxy measure for quality of care?

At its core, EMRAM is a maturation model which provides guidance to various stakeholders. The value of this guidance, however, varies by audience. The value of EMR for policy-makers is substantially different than the value for hospital administrators or hospital-based information management personnel. We can perhaps best demonstrate these varied value propositions in terms of the way in which EMR is expressed; (1) as a benchmark and (2) as an individual score.

EMRAM as a benchmark
As a benchmark, EMR is most valuable to policy-makers. By presenting the distribution of hospitals and their EMR scores in a specific market/region, policy-makers not only have a snapshot of the general EMR capabilities of hospitals within said market, but insight into the challenges ahead of them in encouraging the widespread use of these technologies. The US experience is most illustrative.

The call for electronic medical records in the USA extends back to the Bush administration. In 2004, President Bush set as a goal that every American would have an electronic health record by 2014. Yet at that time, the extent to which hospitals and physician offices were utilizing EMRs was a huge unknown. In fact, it was not

1 http://himssanalytics.eu/emram/stageawards/Stage6Hospitals; http://www.himssanalyticsasia.org/emram/stage6hospitals.asp
2 see Rate My Hospital http://www.cbc.ca/news/health/features/ratemyhospital/index.html
These findings suggest government intervention will policy-makers know if their 2018 goals are going to be met?

Secretary of State for Health (UK) Jeremy Hunt announced the NHS would be paperless by 2018 when he outlined his digital records vision for the health service. Yet without a measure in place to assess how close NHS hospitals are to being paper-free, how will policy-makers know if their 2018 goals are going to be met?

Table 1: Distribution of EMRAM scores in US hospitals (2006–2012)

<table>
<thead>
<tr>
<th>EMRAM Stage</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
<td>20.4%</td>
<td>19.3%</td>
<td>15.6%</td>
<td>11.5%</td>
<td>10.1%</td>
<td>9.0%</td>
<td>8.4%</td>
</tr>
<tr>
<td>Stage 1</td>
<td>17.4%</td>
<td>14.0%</td>
<td>11.5%</td>
<td>7.2%</td>
<td>7.1%</td>
<td>5.7%</td>
<td>4.3%</td>
</tr>
<tr>
<td>Stage 2</td>
<td>40.0%</td>
<td>37.2%</td>
<td>31.4%</td>
<td>16.9%</td>
<td>14.6%</td>
<td>12.4%</td>
<td>10.7%</td>
</tr>
<tr>
<td>Stage 3</td>
<td>18.7%</td>
<td>25.1%</td>
<td>35.7%</td>
<td>50.9%</td>
<td>49.0%</td>
<td>44.9%</td>
<td>38.3%</td>
</tr>
<tr>
<td>Stage 4</td>
<td>3.1%</td>
<td>2.2%</td>
<td>2.5%</td>
<td>7.4%</td>
<td>10.5%</td>
<td>13.2%</td>
<td>14.2%</td>
</tr>
<tr>
<td>Stage 5</td>
<td>0.5%</td>
<td>1.4%</td>
<td>2.5%</td>
<td>3.8%</td>
<td>4.5%</td>
<td>8.4%</td>
<td>14.0%</td>
</tr>
<tr>
<td>Stage 6</td>
<td>0.1%</td>
<td>0.8%</td>
<td>0.5%</td>
<td>1.6%</td>
<td>3.2%</td>
<td>5.2%</td>
<td>8.2%</td>
</tr>
<tr>
<td>Stage 7</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.3%</td>
<td>0.7%</td>
<td>1.0%</td>
<td>1.2%</td>
<td>1.9%</td>
</tr>
</tbody>
</table>

Having a measure like EMRAM in place makes it more likely that the desired end will be achieved, because as the old business adage goes: “The things that get measured are the things that get done.”

EMRAM as an individual score
As an individual score, EMRAM is most valued by hospital IT leaders and their staff. EMRAM provides a roadmap for IT leaders and their staff to follow in developing an HIT acquisition and implementation strategy. As opposed to developing their IT strategy in isolation and “re-inventing the wheel”, EMRAM prescribes a path the Chief Information Officer (CIO) should follow. This path could and should be shared with the IT staff so they can rally around a shared vision of where the organization is heading with their EMR efforts. The hospital’s individual EMRAM score then provides the CIO and his/her staff with a navigation milestone by which to adjudicate the progression of their journey. Armed with one’s individual capability score, CIOs are better positioned to argue their budgetary needs in order to achieve their targeted EMR maturity state.

Summary
The HIMSS Analytics Electronic Medical Record Adoption Model (EMRAM™) has offered the health care industry, a maturation model of the electronic medical record in a hospital. EMRAM provides context and guidance to EMR adoption efforts. The value of this context and guidance varies by audience. For policy-makers, EMRAM allows them to ascertain the progression health care organizations are making towards advanced EMR capabilities as well as the need to intervene in order to encourage EMR adoption. For hospital IT leaders, EMRAM provides a roadmap to follow in developing HIT acquisition and implementation strategies.

While the value of the EMRAM and the outcomes of the efforts tied to advancing EMR capabilities may be virtually unknown to the HIT outsider, this is expected to change. Given increased efforts to install electronic medical records in hospitals throughout the world, it is highly probable that reliance upon the HIMSS Analytics EMRAM will escalate as hospital leaders compete for increasingly scarce health care resources.

Article kindly reviewed by Professor Louis Rubino, California State University, Northridge.

Lorren Pettit is the Vice President, Market Research for HIMSS Analytics, a not-for-profit health care information technology research organization associated with the HIMSS Worldwide organization. Mr Pettit also serves as an Associate Professor of Medical Sociology and Gerontology in the Indiana University system.
Implementation lessons on the use of innovation in information technology in the developing world

SALIM HASHAM
VICE PRESIDENT, HEALTH SERVICES, AGA KHAN UNIVERSITY, KARACHI, PAKISTAN

SALEEM SAYANI
DIRECTOR, AGA KHAN DEVELOPMENT NETWORK (AKDN) EHEALTH RESOURCE CENTER (EHRC) FOR SOUTH-CENTRAL ASIA AND EAST AFRICA

ABSTRACT: Information Technology (IT) innovation and its impact on health care is of particular relevance to the developing world, which spends a fraction of what health systems spend in OECD countries. Given the issues of accessibility, affordability and quality health services in the developing world, IT can play an important role by bringing marginalized communities closer to health care systems. Aga Khan University (AKU) and the eHealth Resource Center (eHRC), which are part of Aga Khan Development Network (AKDN), are active in the developing regions of East Africa, Central Asia and South East Asia and are currently initiating new changes in the use of IT and also the manner in which it is deployed. The eHealth programmes implemented and the lessons learned by AKU and eHRC in achieving its core values of impact, access, relevance, and quality through implementation of these innovations are described. These can be of value to health systems and academic medical centres in the developing world wanting to leverage scarce resources to create meaningful impact using IT.

AKU is an international university chartered as an autonomous private university and has teaching sites in eight countries including East Africa, Pakistan and Afghanistan. It has a clinical enterprise that operates on a private not-for-profit basis that provides university hospitals, general hospitals, outpatient and community-based health care services as part of a university system that has a tripartite mission of clinical delivery, education and research. eHRC is a grant-funded entity charged with supporting the development of innovative technological solutions to support health care delivery in the developing world. AKU and eHRC, in order to achieve their goal of eliminating disparities in access to health care, determined that two key strategies needed to be implemented. The first was to secure funding for the required infrastructure and the second was to develop affiliations with partners to reach out into communities. For funding support AKU (over many decades) and eHRC teams (more recently) worked with international donor agencies to build trust and establish competency. This attracted critical funding from various donor organizations such as the Canadian International Development Agency, the Aga Khan Foundation, KfW, USAID and the French Ministry of Foreign Affairs to strengthen the infrastructure at programme sites. A key lesson for us is that donors must see clear impact and relevance as these partnerships take a significant amount of time to establish. For building outreach into communities, we established affiliations with the Aga Khan Health Services (AkHS) hospitals and its primary medical centres, which are part of AKDN.

Defining the goals
We understood that a clear definition of goals was imperative. Since the use of technology would change, we also determined that we needed to be adaptable and use an iterative process of incorporating change into the use of IT in our health systems. Our key goals fit well to a current thesis (Piette et al 2012) and which we adopted as an operating framework of goals we would pursue – namely that the use of information communication technology (ICT) for health has the potential to increase accessibility; reduce cost for patients; improve patient care; support health education and clinical decision-making; promote behavioural change and improve health surveillance and disease management systems. Given the potential benefits of eHealth solutions, AKU has an overarching goal of adopting technology to provide access to low-cost and efficient health care services for the marginalized communities of the developing world.

Building a framework
We found it important to develop a framework to build on and adopted the World Health Organization’s framework of eHealth as “the transfer of health resources and health care by electronic means” (E-Health 2013). Our key operating premise is that eHealth can be utilized to deliver health services (telehealth), to build human capacity and capability (eLearning) and to transfer relevant health information to support decision-making (health informatics) via ICT and mobile phones (mHealth). It became clear after initial implementation steps that a rigorous process was key. Therefore AKDN eHRC followed the Software Development Lifecycle (SDLC) with slight variations to develop all eHealth solutions as illustrated in Figure 1.

Building a successful approach
AKU and eHRC teams initiated multiple eHealth programmes in various communities within Pakistan, Afghanistan, Tajikistan and
Tanzania. The goal was to use technological innovations to deliver telemedicine, mHealth and eLearning services to improve access, efficiency and the quality of health care services to these under-served populations. A key implementation strategy that became clear is that to make health care more accessible and affordable for the population, we had to use simple, cost-effective and culturally appropriate technology. A particular case demonstrates the impact of this approach.

Sidra was born with a congenital brain malformation. When she was only a month old, her family consulted a local pediatrician in Faizabad, Afghanistan, who advised them to take her to Faizabad Provincial Hospital (FPH) where she was admitted as a critical case. While at the hospital, a live teleconsultation with a consultant general surgeon at the French Medical Institute for Children (FMIC) in Kabul diagnosed Sidra’s condition as a complicated case of occipital meningoencephalocele, a protrusion of the brain through a birth defect in the skull bones. FMIC is a four-party joint venture, with AKU as the management partner. Realizing the severity of Sidra’s condition from the teleconsultation, she was referred for surgery to FMIC where a team of surgeons operated successfully, excising the occipital mass and a shunt was inserted to relieve pressure from her brain caused by fluid accumulation. The teleconsultation, according to the consulting physician, enabled doctors to detect Sidra’s condition in time as there was only a very slim chance of her survival.

Teleconsultations

In Central Asia, from 2007 to March 2013, AKU and eHRC teams have supported in excess of 10,000 teleconsultations from Bamyan Provincial Hospital (BPH, Afghanistan), Faizabad Provincial Hospital (FPH, Afghanistan), the French Medical Institute for Children (FMIC, Kabul), Khorog Oblast General Hospital (KOGH, Tajikistan), and the Aga Khan University Hospital Karachi (AKUH.K). These consultations were conducted in the fields of radiology, pathology, cardiology, pediatrics, internal medicine, obstetrics and gynecology, ENT, orthopedics, surgery, pain management, dental and dermatology. Recently, the teams have also connected two sites in Tanzania (Dodoma and Mwanza) with the Aga Khan Hospital Dar-es-Salaam, which has resulted in 22 teleconsultations in the last three months in the field of maternal and child health. These teleconsultation services enabled the isolated communities in the regions to access quality health care services at a minimal cost and without having to travel long distances. This relatively new programme has the goal of assessing the use of innovations in health care service delivery through technology to improve access and quality of care while reducing disparities and cost. It has not been evaluated to determine its impact and outcome. However, this pilot project is an important one and is being watched by many professionals to determine if this approach works and can be expanded in scope.

mHealth

In Khyber Pakhtunkhwa (KPK, Pakistan), AKU and eHRC teams have piloted a safe motherhood programme and referral management system that uses mobile technology to streamline an antenatal referral system and to send behaviour change health messages to registered pregnant women. The programme also integrated mobile technology with teledicine, via MDConsult software, to increase the accessibility of health care services. This initiative increased access to antenatal, natal, post-natal and newborn health services, and promoted preventive health and health seeking behaviour in the target population. Women getting four or more antenatal visits increased from 44% to 66% and women delivering at a health care facility increased from 35% to 55%.

eLearning

Along with the telehealth and mHealth projects to enable access to health care, AKU and eHRC have supported 117 eLearning sessions, from 2008 to March 2013, to provide continuous education and training to 2,500 staff members of BPH, FPH, FMIC and KOGH. These eLearning sessions have decreased the professional isolation of staff working in these remote areas and have also built their capacity in using technology and providing effective access to health care for these communities. Our experience shows that eLearning is an effective tool to train and educate the health care workforce, particularly to extend the geographical reach of content experts in particular subject areas.

Challenges in eHealth

In almost every region, the biggest challenge we face is the lack of skilled human resources with eHealth capability and a robust public
ICT infrastructure. There is a high staff turnover rate due to skills that are in high demand. AKU and eHRC teams provide training and ongoing technical support to build the capacity of staff members using the technology. The teams have learned strategies to provide hybrid solutions to adapt to specific challenges including connectivity and electricity shortages. These solutions that may be taken for granted in developed economies form a key innovation in the implementation of simple and effective solutions in regions that are remote and where supply chain logistics are cumbersome and complex.

Future direction of eHealth in our network

In the near future, AKU and eHRC will be focusing on expanding eHealth services in East Africa using the knowledge they have gained. We have learnt that by working in low-middle income countries (LMICs) that we must first address the cultural barriers to get service acceptance in the community we serve. Creating eHealth awareness in the physician community is also very critical to the programme’s success. In these countries we also have learned to adapt to low bandwidth eHealth solutions as in some countries there is bare minimum public ICT infrastructure. eHealth expansion in Central Asia is planned over next four years (as illustrated in Figure 2) based on key clusters of health care. A cluster in our strategy is a major health care facility that supports remote clinic, hospital and outreach facilities in our network.

Cluster to cluster interaction is also being promoted where facilities within a cluster interact to provide telehealth support after they have the necessary capability of specialist care and an infrastructure.

A key issue we are grappling with is development of a mechanism to make telehealth self-sustainable in the developing countries we work in. In this regard, AKU and eHRC teams will be initiating dialogue and collaborating with the government sector to promote the understanding and appreciation of technology, to increase eHealth readiness and adoption and to integrate eHealth with regular service delivery. The goal is to develop mechanisms to generate revenue streams for eHealth programmes and make them self-sustainable. The teams will also be focusing on developing eHealth technologies and bringing innovation to the field.

Future direction of hospital-based eHealth

AKU has a two-pronged strategy for innovation in the use of hospital-based IT to support access to health care in remote communities. The first is the development of university hospitals that provide services of the highest international standards and which form anchor institutions for an integrated delivery system. Both Aga Khan University Hospital Nairobi (AKUH,N) and Aga Khan University Hospital Karachi (AKUH,K) have received Joint Commission International accreditation. These hospitals demonstrate that international standards can then form the anchor for a platform around which delivery of eHealth and technology support can be provided to other network facilities.

The second strategy is to develop meaningful and relevant technology solutions that show demonstrable value in improving health standards and care for the populations they serve, and that only university hospitals can provide. Therefore we are working on constructing an eHealth innovation centre in AKUH,K which will include Da Vinci minimally invasive surgery robots; medical imaging and video processing laboratories; and a simulation laboratory where doctors and biomedical engineers can work together to bring innovations to the medical field.

Part of our strategy is the development of population-based health care and the implementation of an EHR (Electronic Health Record) across all our hospitals and outreach clinics. The goal is to integrate remote locations into a delivery system platform of an EHR and eHealth to significantly impact access to health care. Our most significant challenge is the cost of the implementation of such systems, which do improve safety, quality
and outcomes for beneficiaries. However, the cost of such systems is not currently recovered as part of the reimbursement systems in the markets we serve. We therefore have to work on mechanisms for funding these systems so that we keep our services affordable, accessible and also of high quality.

Conclusion
The development and implementation of IT innovations and eHealth by health systems in the developing world can have significant impact on access and the quality of health care. These innovations that use scarce resources to create meaningful impacts need effective partnerships among the different stakeholders, and also relevant infrastructure and capabilities in the remote regions that need access to health care. The leverage of these eHealth capabilities can be enhanced if they are tied to a hub institution that is either an academic medical centre, a general hospital or a tertiary facility.

Challenges remain in funding the wide-spread use of electronic health records which can have an impact on safety and quality and finding funding mechanisms for recovery of their costs. 

Salim Hasham is Vice President Health Services for Aga Khan University. Prior to this, he served as Senior Vice President – Global Services for Johns Hopkins Medicine International. Mr Hasham has also served as President and CEO of a two hospital system in Hawaii and has a 30-year history of international health care work. He has a MHA from the University of Ottawa, Canada, and an MSysEng from Clemson University, USA.

Saleem Sayani is Director of Aga Khan Development Network (AKDN) eHealth Resource Center (eHRC) for South-Central Asia and East Africa. His areas of interest are eHealth innovation and the long-term sustainability of eHealth business models. He focuses on providing health care access using technology to some of the most vulnerable populations in the developing world which AKDN serves. He holds a Master of Networks and Communication Management from Keller Graduate School of Management, GA, USA.

References
Is information technology worth IT?

Population-based medication adherence programmes: A window of opportunities

HOLLY E RUSSO
CHIEF NURSING OFFICER, SENTRY DATA SYSTEMS, USA

WILLIAM D KIRSH
CHIEF MEDICAL OFFICER, SENTRY DATA SYSTEMS, USA

ABSTRACT: Medication non-adherence is a global epidemic causing countless deaths and billions of dollars wasted unnecessarily in health care. Between 33% to 69% of all medication-related hospital admissions in the USA, are due to poor medication adherence with a resultant increase in the cost of care of over USD 100 billion a year (Senst et al 2001). In less developed parts of the world, medications deserve additional attention, as access to medications as well as out-of-pocket costs play a larger role (Taj et al 2008).

To achieve better medication adherence hospitals must employ integrated multifaceted technologies and strategies to improve patient’s quality of life, decrease costs and comorbidities, and reduce avoidable admissions and emergency room visits. This article explores what is known about medication adherence and the use of technology tools, including integrated mobile health, EHRs, e-prescribing, social media and medication reminders.

As an operational definition, medication adherence refers to the degree of compliance to treatment recommendations with respect to timing, dosage, frequency and duration of the prescribed medication (Cramer et al 2008). It is well documented that improved medication adherence has a significant positive effect on health care outcomes with decreased avoidable hospitalizations and emergency room visits and lower overall costs; the root causes of non-adherence are however not well known.

Recent studies are beginning to show clearer trends that point to specific opportunities to improve therapeutic adherence among various populations, regions and socioeconomic strata; these studies are affording opportunities for research on comparative outcomes.

Health care’s increased focus on quality outcomes and cost effectiveness, underlines the need to better understand the role that patient beliefs, health literacy and affordability of medications have on intentional and unintentional non-adherence to medication therapy. In addition, there is a need to explore innovative strategies for integrated, multidisciplinary approaches that improve regime adherence among individuals and populations.

How big is the problem?
The result of non-adherence to medication regimes is one reason many patients experience suboptimal health outcomes, which in turn can have a deep economic impact on the patient, payer, employer, health care organizations, practitioners and society.

According to Piette, Beard, Roiland and McHorney, it is estimated that approximately 15% of patients do not fill their new prescriptions. From those who do fill their prescriptions, approximately 50% will discontinue therapy in the first six months (Piette et al 2011; Sabate 2003). This is referred to as intentional non-adherence, in contrast to unintentional non-adherence, in which a patient forgets to take their medication, is careless with medication taking or simply does not understand the regime.

The financial impact of non-adherence
In their 2001 report, Ernest and Grizzle estimated the annual cost of drug-related morbidity in the ambulatory care setting to be USD 177 billion. This estimate was based upon poor adherence, suboptimal prescribing, drug administration and diagnosis. In 2009, the New England Healthcare Institute updated the Ernst and Grizzle estimate using more current data related to average costs and number of medical events, resulting in a new estimate of USD 290 million annually. Jha, Aubert, Yao, Teagarden and Epstein, examining a cohort of patients with diabetes between 2005 and 2008, found that improved adherence to diabetes medications was associated with a 13% lower cost for subsequent hospitalizations or emergency department visits. On the flip side, a decrease in adherence was associated with a 15% higher chance of hospitalization and emergency department visits (Jha et al 2012). This study projected that improved adherence to diabetes medication could avert 699,000 emergency department visits and 341,000 hospitalizations annually, resulting in savings of USD 4.7 million. In addition, if non-adherence could be eliminated, an additional USD 3.6 million in savings could be secured.

For patients, it’s about more than money
While it is a common perception that costs are at the root of medication non-adherence, out-of-pocket (OOP) or co-payment costs only explain a portion of non-adherence behaviour. However, it’s important to note that most published studies on medication adherence do not adequately include those with incomes under USD 25,000 per year or those with a high school level education or less. Inclusion of cohorts of minority groups is also limited (Piette et al 2011; Sabate 2003). Therefore, there is a built-in selection bias that may skew the analyses.

According to a 2011 study by Piette et al examining cost-related medication non-adherence among low-income and high-income people aged 40 and above, residing in the USA, and having one of six chronic diseases prevalent among US adults, “some patients are sensitive to out-of-pocket cost changes, even when the changes are modest, while many patients continue to report that they do not reduce their medications due to cost concerns, even when they have a limited ability to pay for treatment” (Piette et al 2011). This observation confirms other studies that have also found...
that cost alone is not the only factor for patients’ poor medication adherence. Instead, the lack of perceived need for the medications, concern about side effects, lack of medication adherence education by health professionals and the lack of understanding of their diagnosis are the most common reasons behind medication non-adherence (Gadkari and McHorney 2012; Piette et al 2011).

Piette et al concluded that 79% of the low-income respondents in their cohort with high OOP medication costs reported some cost-related medication non-adherence. They employed a variety of strategies to avoid medication expenditures, including delaying a prescription fill (72%), stopping a prescription altogether (48%), and not filling a new prescription (50%). On the other hand, high-income respondents tend to split pills or take a lower dosage to stretch the medication (Piette et al 2011).

The broader reasons for non-adherence
Research published over the last 22 years has consistently shown that intentional non-adherence to medication therapy is driven by patient beliefs about their treatment, disease and prognosis, and their prior experience with medications. Early studies indicated a strong correlation between demographic characteristics, rather than medication knowledge or beliefs, to explain unintentional medication non-adherence. More recent studies on unintentional non-adherence to medication therapy have been linked to the lack of perceived need for medication, medication effects and concerns, and misconceptions about treatment efficacy. To explore the interrelationship between intentional and unintentional non-adherence to prescription medications in relation to patients’ medication beliefs, a study of predictors of non-adherence unveiled the following multivariate predictors:

- low perceived need for medications;
- medication affordability issues;
- worse self-rated health;
- diabetes or osteoporosis;
- younger age.

These factors alone or in different combinations played a significant part in patients forgetting to take their medications, running out of medications and taking medications carelessly (Gadkari and McHorney 2012).

In their study on the impact of medication beliefs and perceptions, Gadkari and McHorney concluded that the perceived medication need and the perceived medication affordability were stronger predictors of unintentional non-adherence than other perceived medication concerns. Respondents in the lowest quartile for perceived medication affordability scores were 2.32 times more likely than those in the highest quartile to report unintentional non-adherence. Patients in the lowest quartile of perceived medication affordability were 4.65 times more likely to report running out of medication at times. This study was consistent with previous studies in which individuals with lower incomes were more likely to report running out of medications.

Worse self-rated health was also a consistent predictor of unintentional non-adherence. In this study, those with osteoporosis had a higher rate of non-compliance due to not filling a prescription than those with hypertension, possibly suggesting that the perceived seriousness of the disease also plays a key role in whether or not a prescription is filled.

How length of therapy affects adherence
A meta-analysis of peer-reviewed publications from 1970 to 2005 performed by Jing, Sklar, Oh and Li brought to light that one of the most common factors causing therapeutic non-compliance was the length of the therapeutic regime. Drop-out rates for long-term medication therapies were between 40% and 50% (Jing et al 2008). This finding is supported by a 2003 report of the World Health Organization in which adherence to long-term therapy for chronic diseases in developed countries was found to be a low 50% (Sabate 2003). As a comparison, the rate of compliance for short-term therapy was much higher, at between 70% and 80%.

As expected in all instances, compliance to therapeutic regimes that included significant lifestyle changes was the lowest, at only 20% to 30% (Di Matteo 1995).

Adherence by disease state varies by demographic
In addition, the rates of non-compliance associated with different types of treatment also differ greatly. For example, in asthma, the most common form of non-adherence is chronic underutilization of medication, where the patient consistently uses less than what was prescribed. According to the 2003 World Health Organization report, it is estimated that 50% of the prescription drugs for the prevention of bronchial asthma are not taken as prescribed. Interestingly, symptomatic hypertensive patients’ compliance with blood pressure medication varies as well – from between 50% to 70%. Similarly, and based on studies included in the aforementioned 2003 World Health Organization report, adherence to anti-epileptic drug regimes ranges from 20% to 80%, with better overall adherence among adults (40% to 60%) than among children (25% to 75%). Similar studies on adherence to anti-epileptic medication, also included in the World Health Organization report, range between 20% and 80%, with different ranges of adherence in adults (40% to 60%) and children (25% to 75%) (Sabate 2003). Moriane et al measured compliance and related demographics in a 1996 retrospective cohort of 4,068 elderly outpatients starting anti-hypertensive therapy. Their results show that there was no correlation between gender and compliance. However, their results showed that patients filled anti-hypertensive prescriptions, on average, for only 179 days in the 365-day follow-up period. Good compliance (\( \geq 70\% \)) was associated with advanced age (OR=2.12 for those 85 years of age or older), and white race (OR=0.55 for blacks).

As a general estimate, in the USA, here are 25.8 million children and adults with diabetes, representing about 8.3% of the population (Association 2012). More than 20 studies published in the past few years document that compliance to oral medication in Type-2 diabetics ranges from 65% to 85% (Rubin 2005; Jing et al 2008). This indicates that the rest of those patients are still at great risk from complications – even though they have access to care.

A study on medication adherence among Latino and non-Latino white children with asthma found that medication adherence differed by ethnic group, with non-Latino white families demonstrating the highest level of adherence (McQuaid et al 2012). Significant in this study was the finding that parental beliefs about medication necessity, as well as family organization regarding medication use, were significant predictors of adherence, even for families below the poverty threshold level (McQuaid et al 2012).

Many patients with chronic diseases start out with good adherence to their regime, but over time, the level of adherence
drops. An example that highlights this phenomenon is lipid-lowering medication, where adherence drops to 56% within six months—despite an initial adherence rate of 80%. (Benner et al 2002).

It’s clear that we need a more complete understanding of non-adherence, including the role of culture and linguistics, age, race, comorbidities, type of patient education, environmental factors and even genetic factors.

The practitioner perspective
In a qualitative study of 40 general practitioners, designed to examine the thoughts and feelings of providers on their patients with diabetes compliance and adherence challenges, practitioners articulated their frustration that many patients do not achieve the expected evidence-based medical outcomes—even after the practitioner has spent considerable time educating the patient, explaining the reasons for treatment and detailing the complications that result from non-adherence. Interestingly, the core solution identified by the practitioners revolved around improved approaches to communicating with patients, tailored patient care, shared care, joint decision-making and the use of probability and other tools to engage the patient in a better understanding of their disease. This approach of working with multidisciplinary teams, using cultural-competent coaching and engaging a patient support team encouraged better compliance and adherence compared to the more common one-way, intermittent communication many practitioners employ with the patients (Wens, Verneire, Roven, Sabbe and Denekens 2005).

How can technology improve medication adherence?
The increased adoption of electronic records would allow for the implementation of systems that could identify delayed filling on an initial prescription, thus allowing the physician to intervene and perhaps prevent poor adherence. Additionally, automated reminders are being more widely used by retail pharmacies to alert patients that their prescriptions should be refilled and remind physicians to contact their patients who do not refill their prescriptions (Granger and Bosworth 2001).

The use of adherence apps for smartphones represents a sensible approach to improving adherence that could be easily made to comply with varying requirements and tailored to satisfy individuals with impairments and disabilities. Since the ownership of smartphones is increasing worldwide, with 85% of US adults owning a cell phone (Fox and Duggan 2012), the potential impact of smartphone technologies on adherence, particularly in the management of chronic disease, is significant.

This readily-available technology offers a variety of features that can be used to help patients and health care providers improve medication-taking behaviour—especially when therapeutic regimes require significant lifestyle changes. A 2013, article published in the Journal of the American Pharmacy Association identified and ranked 160 adherence apps for Apple, Android and Blackberry mobile devices (Dayer and Gubbins 2013).

Social media provides practical support
The term social media refers to the use of web-based and mobile technologies that are commonly used for interaction and communication within networks. A study sponsored by CVS Caremark looked specifically at social media adherence tools to find the association between social support and medication adherence in a variety of disease states, and to explore the features of social support that might encourage better behaviour (Scheurer, Choudhry, Swanton, Matlin and Shrank 2012). The study evaluated published literature and included 50 peer-reviewed studies in the final analysis (Scheurer et al 2012). Four categories of social support for patients were identified and evaluated: structural, practical, emotional and a combination approach. Results indicated that greater practical support was more consistently related to improved adherence to medication, with most studies evaluating practical support identifying a significant association between social support and medication adherence (Scheurer et al 2012).

Leveraging a patient’s existing social contacts and networks could be one way to improve patient medication adherence. There are a number of products that have been in this arena for some time, such as technology-enhanced pill bottle caps that record when a person opens the bottle. Another example is a device that can be loaded with seven days’ worth of medication, programmed with the patient’s medication schedule, and set with visual and audio alarms. If the patient fails to retrieve the medication, the company will first try to call the patient. If there’s no answer, they will then call the designated support people specified by the patient.

A recent article in Pharmaceutical Commerce entitled “Social Media and Medication Adherence: Theory and Promise (2013),” the authors discussed two new solutions to recently emerge: MediSafe® and Abiogenix®.

MediSafe® is a free Apple iOS and Android app that combines a smartphone with a cloud-based database. A main characteristic of this app is that it creates an ecosystem of supporters, such as care providers, family and friends, who receive notifications of when and if the patient has taken their medications. This network of supporters can provide reminders for missed dosages and the app can be configured for texting and call-backs, as well. Patient-facing features include a database of pill photos to confirm that the right medications and dosage are being taken. A health care system and pharma-facing component of the app collects usage patterns and demographics to provide insights into patient habits. This approach assists in bringing back ownership of health and disease process to the community.

Abiogenix® uses hardware called uBox,® and functions as a day-by-day pillbox, loaded with communications-enabled electronics to transmit usage patterns to the patient’s virtual “circle of care.”

These two new products are an indication that the market is alert to the importance and effectiveness of patient social and peer networks in improving compliance with medication regimens—and could be key to improving quality and clinical outcomes while lowering costs.

Conclusions and next steps
It is apparent that adherence to medication plays a significant role...
in outcomes among all demographic groups, and an approach is needed to address the continuing problem of non-adherence.

An overall plan must address the different variables and risk involved, including an understanding of the patient and support group and the co-pay tiers among those with prescription insurance. Vulnerable populations, and those without coverage, need to understand the existence and efficacy of generic low-cost medication equivalents and be informed about prescription assistance plans and 340B discounts or subsidies for eligible prescriptions. These programmes can provide access to prescribed medications that are otherwise out of reach.

It is also critical to not only evaluate the patient and family relationships, but to ensure the patient’s understanding of the disease process, the reason the medication is needed, the temporal or continuous secondary effects of the drug, the risks of medication avoidance and the overall importance of the medication for the patient, the family and the community of compliance. This greater understanding encourages medication adherence as a means to increase overall quality of life.

Establishing connectivity between the different stake holders, while creating an atmosphere that facilitates communication between the health care team and the patient’s team, is of equal importance. This connection is a critical step to ensure that the patient’s team and the patient can speak freely about their fears and apprehensions around the therapeutic regime, including potential medication side effects.

From the health care team’s stand point, it is important to have in place mechanisms that allow comparative outcome analysis. There is also value in utilizing biomarker measurement to increase the efficacy of treatment and preventive measures and to create patient-specific feedback loops. The health care team must also use educational tools regularly and continuously to support patient-based decision-making.

In conclusion, the key to improving medication adherence depends upon a deeper and broader understanding of the population served – as well as a willingness to embrace new approaches and tools that allow patient-provider-support team collaboration – to truly make a difference.

Holly E Russo recently joined Sentry Data Systems as Chief Nursing Officer and brings 38 plus years of health care experience in technology integration, client-centred care, clinical outcomes and data analyses, marketing and business development and an in-depth knowledge of the 340B program and its applications. Russo has served as Chief Clinical Officer, Senior Vice President of Hospitals and Health Systems for a software vendor in the 340B management industry and has provided consultant services. She holds dual masters degrees from Dartmouth College and in nursing education from the University of Phoenix.

William D Kirsh, MD is the Chief Medical Officer and a partner in Sentry Data System, Inc. He has been actively involved in the development of Sentry’s applications. Dr Kirsh also founded eAppeals, LLC a technology company that simplifies the handling of insurance claim appeals. He served as Chief Executive Officer and Chief Medical Officer for Foundation Health Plan of Florida and Vice-President of Medical Affairs and Quality Assurance at Physician Corporation of America, Inc. Dr Kirsh trained at The Johns Hopkins University and practises acute care medicine at Nova Southeastern University, College of Osteopathic Medicine and in the School of Public Health. He is Executive Vice President of International Health Initiatives, a “not for profit” organization bringing health care technology to underserved populations.

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The way forward for telemedicine in health care delivery

S YUNKAP KWANKAM
CEO, GLOBAL EHEALTH CONSULTANTS AND EXECUTIVE DIRECTOR,
INTERNATIONAL SOCIETY FOR TELERMEDICINE AND EHEALTH

ABSTRACT: Telemedicine has shown substantial growth recently both in terms of financial volume and numbers of people served. It also holds promise for even more growth in the future, driven by both epidemiological conditions and technological advancements. The spread of the mobile telephone into the remotest parts of developing countries, combined with its multiple applications in health and mobile financial services will extend telemedicine to vast swathes of the world’s populations. However, some challenges, primarily in dealing with the regulatory environment, will need to be overcome for this potential to be fully realized.

In 2010, the World Health Organization published a report from the Global Observatory for eHealth (GOe) series titled “Telemedicine: Opportunities and developments in Member States” It reported on the results of the second global survey on eHealth carried out by the GOe in 2009, to which 114 countries (59% of all WHO Member States) responded (WHO 2010). The telemedicine part of the survey focused on two key aspects. Firstly, telemedicine application areas, namely: teleradiology, teledermatology, telepathology and telepsychology. Secondly, it examined four mechanisms that facilitate the promotion and development of telemedicine solutions. These are: + the use of a national agency; + national policy or strategy; + scientific development; + evaluation.

Although national averages mask huge variations within a country, some of the findings of the GOe survey shed light on global telemedicine. For example, they confirmed that teleradiology had the highest rate of established service provision globally (33%). And according to the American Telemedicine Association (ATA), in the USA this is the leading telemedicine modality, with 5 million patients having a diagnostic test read by an off-site specialist (Hertz 2013).

Growth of telemedicine
What the GOe survey did not cover, and could not foresee, was the rapid growth of telemedicine. According to the BCC Research report – “Global markets for telemedicine technologies” – the global telemedicine market grew from USD 9.8 billion in 2010 to USD 11.6 billion in 2011 and is expected to reach USD 27.3 billion in 2016, with a segmentation into the telehospital/clinic market segment and telehomecare as shown in Figure1 (BCC Research 2013).

In terms of patients covered, InMedica in their report “The world market for telehealth – An analysis of demand dynamics 2012” indicate that in 2012 there were an estimated 308,000 patients remotely monitored by their health care provider for congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), diabetes, hypertension and mental health conditions worldwide – see Figure 2. This form of telehealth, they project will reach 1.8 million patients worldwide by 2017.
Experts also estimate that in 2012 a further one million patients had implantable pacemakers or other devices monitored remotely, and about 400,000 patients received mental health services via telemedicine, while about 10% of all intensive care beds were linked to an intensivist who was off-site.

Drivers for telemedicine in health care delivery
This observer sees two main types of use cases, which will further drive telemedicine in the future. In the developed world, telehome care, monitoring chronic care patients (the sick) with COPD, CHF, etc., will be the key driver. The demographics are clear. With more and more people living longer with conditions requiring chronic attention, such as hypertension, diabetes, etc. and the increasing labour costs of chronic care provided by health workers, there is a strong case for telebiomonitoring of sick persons in their homes.

In the developing world, a different set of compelling conditions
prevail. These are more economic and developmental than epidemiological and will push phone-based telemedicine to become the most practised way of remotely caring for people’s health. The growth opportunity is driven primarily by issues of access to technology. The penetration of mobile phones into the farthest reaches of the developing world is providing greater geographic as well as population coverage, thus offering a means of reaching large swaths of the population. Within that broad reach, the technology offers the additional possibility of targeting specific individuals, for example pregnant women. The same approach of targeting large numbers of specifically identified individuals, which has been done in the past in anti-retroviral (ARV) programmes for HIV positive patients, offers health care providers and public health authorities major options for remote interventions on a scale not seen before.

Add to this connectivity paradise, the maturity of mobile financial services to the point where there is widespread trust and use of mobile phones not only for transferring money, but also for their use in cashless transactions, even surpassing the use of credit cards. The context is thus ripe for patients to seek services, instantly.

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**Challenges**

Despite the many strong drivers for the growth of telemedicine, there are major impediments along the way. The WHO/GOE report indicates that developing countries are likely to consider resource issues, such as high costs, underdeveloped infrastructure for high-bandwidth applications, and lack of technical expertise to be barriers to telemedicine. On the other hand, developed countries are more likely to consider legal issues surrounding patient privacy and confidentiality, competing health system priorities and a perceived lack of demand to be barriers to telemedicine implementation.

Zanaboni and Wootton investigated constraints to the growth of telemedicine by focusing on two high-level topics: 1) the process of adoption of telemedicine in comparison with other technologies; and 2) the factors involved in the widespread adoption of telemedicine. They conjecture that each topic is subject to the following hypotheses: “First, the advantages for users are the crucial determinant of the speed of adoption of technology in health care. Second, the adoption of telemedicine is similar to that of other health technologies and follows an S-shaped logistic growth curve. Third, evidence of cost-effectiveness is a necessary but not sufficient condition for the widespread adoption of telemedicine. Fourth, personal incentives for the health professionals involved in service provision are needed before the widespread adoption of telemedicine will occur” (Zanaboni and Wootton, 2012).

In both developed and developing countries, the regulatory environment is not keeping pace with developments in technology, even in the most modern health care systems. The thorniest area of telemedicine for delivery of health care services is that of regulation dealing with the relationship which needs to exist between a patient and a clinician before a legal prescription (the start of all therapeutic interventions) can be made.

An appropriate and delicate balance needs to be struck between concerns about privacy, safety and confidentiality on the one hand, and the need for innovative ways of providing health services to people, who are increasingly more knowledgeable about their health, more demanding of their providers, more mobile and away from home and the work place.

**The future of telemedicine**

Telehomecare is likely to dominate telemedicine in the future, in terms of financial volume. With a compounded annual growth rate of 18%, fuelled by the increasing number of persons needing chronic care, it is likely to surpass hospital/clinic-based telemedicine in the near future. And the predominant beneficiaries will remain those in industrialized countries.

Just as eHealth is the future of health, mHealth or mobile eHealth is the future of eHealth. The diffusion of cell phones into the remotest parts of most developing countries make phone-based telemedicine a key option for curative interventions as well as for preventive measures. Also when phone-based telemedicine is combined with powerful algorithms for diagnosis, such as those embodied in the Medoctor system (www.medocotor.com), and followed up with information on clinical practice guidelines, the first key steps towards better health outcomes will have been taken – through proper diagnosis and evidence-based advice on treatment.

In terms of its public health impact telemedicine, through phone-based telehealth (which includes non-clinical interventions) is likely to be the next major achievement of ICT in health. Already, mHealth is being seen by both WHO and the International Telecommunications Union as the flagship of their joint programme in the next major public health battleground – the fight against noncommunicable diseases (NCDs).

**A shift in paradigm**

A subtle but hugely significant shift has appeared on the telemedicine landscape. This is the shift into prevention. Programmes addressed at pregnant women, who are not
technically ill, are the first inroads into large-scale prevention and wellness programmes, which will eventually dominate mobile phone-based health care services. Programmes such as MAMA, text for baby, etc. are already doing this. The significance of this lies in the fact that the most abundant resource in the health system is people. They variously can be beneficiaries, providers and stewards of the system. With fewer and fewer health workers per unit of population, and health care costs spiralling almost uncontrollably, prevention and wellness take on very significant roles and telehealth offers the possibility to transform the patient (citizen) from a passive observer into an active participant in the therapeutic process. With selective dissemination of information now possible on a massive scale, the ingredients are in place for the next quantum leap in improved health outcomes through the empowerment of citizens. This has been a dream outcome for ICT in health for a long time – the paradigm shift from health care narrowly focused on curing diseases by health care professionals in formal health care settings, to a broader focus on health and wellness, and the empowerment of people to help take care of themselves whenever the need arises and wherever they may be.

Implications for hospitals
As far back as 1995, Mitchel in his book City of bits: Space, place and the infobahn saw the impact of the information society on hospital architecture as follows: “The hospital designer’s task, much like the task of microprocessor chip layout, has been to arrange a lot of identical storage units and a few specialized, central processing facilities for the greatest possible circulation efficiency under statistically predicted patterns of use” (Mitchel 1995).

Beyond the physical aspects of the hospital, we see telehealth transforming the hospital catchment area from an identifiable geographical region to a potentially boundless virtual community. For example, the Massachusetts General Hospital in Boston has an entire wing for examining radiological studies and providing expert opinion to medical practitioners all over the world. Market share for hospitals is now only loosely constrained by geography. As John McConnell, writing in The Lancet in 1993, pointed out, “For any procedure that involves vision or sound (e.g., monitoring the progress of anaesthesia or giving an opinion on a biopsy slide, fetal ultrasound, or computed tomography scan) – and potentially even touch – the physician need no longer be present in the same room, or even in the same country, as the patient or specimen” (McConnell 1993).

A small study in Davis California is indicative of the bonanza that awaits hospitals. The retrospective study of hospital and physician billing for patients transferred from 16 hospitals from July 2003 to December 2010, showed that the average number of patients transferred per year to the children’s hospital increased from 143 pre-telemedicine to 285 post-telemedicine. Similarly, average annual hospital revenue increased 67%, from USD 2.4 million to USD 4.0 million, while average professional billing revenue more than doubled, from USD 319,977 to USD 688,443 per year. The authors concluded that “in a competitive health care region with more than one children’s hospital, deploying pediatric telemedicine services to referring hospitals resulted in an increased market share and an increased number of transfers, hospital revenue and professional billing revenue” (Dharmar et al 2013). What is true for pediatrics is equally true for other specialist hospitals. And the world has an increasing appetite for specialist care.

Conclusion
Telemedicine is best known for its ability to provide medical advice from a distance, thus extending the care-giving capacity of health professionals beyond their physical reach. Given the acute shortage of health professionals in the developing world – in 56 countries worldwide where, according to the 2006 World Health Report, the health workforce density (number of doctors, nurses, pharmacists per 1,000 population) was below the threshold required to provide even basic services – phone-based telemedicine could provide an alternative, even as the health workforce is built up.

As Desmond Tutu put it when asked whether eHealth can help narrow gaps in social inequality across the world, and if so, how: “Technology is a major driving force of our civilization. Whether through medicines to heal the sick or products for growing food to feed the hungry, or most recently ICT to fuel economic and social growth, technology has always been intertwined with human development. Today the technology most accessible to the poor and disenfranchised is the mobile phone. If we want a vehicle for reaching the underserved with interventions from health and other sectors of the economy, the mobile phone is the technology of choice. eHealth and mHealth, which use mobile phones, can help the previously helpless share in the benefits of an improved social environment where they live (Tutu 2012).”

Many of these anticipated benefits from m/eHealth will accrue to the individual through telemedicine. To reach this goal it is imperative that the six “eHealth Grand Challenges I outlined in a paper in the special themed issue on eHealth of the Bulletin of the World Health Organization in May 2012, be addressed (Kwankam 2012). Grand Challenges for eHealth hold equally true for telemedicine and as I cautioned in a previous piece for the IHF Reference Book, hospitals and hospital associations need to be aware of, prepare for, and properly manage, the transformation, induced by ICT in health, as it will change forever, the role of hospitals in the business of producing health (Kwankam 2009).

S Yunkap Kwankam holds a PhD in electrical engineering and was elected to the following American honour associations; Eta Kappa Nu (Electrical Engineering), Tau Beta Pi (Engineering) and Sigma Xi (Research). He is CEO of Global eHealth Consultants, Geneva, Switzerland. He is also Executive Director of the International Society for Telemedicine and eHealth and member of the World Economic Forum’s Global Agenda Council on Digital Health. From 2004 through August 2008 he was eHealth Coordinator at WHO, responsible for overall coordination of eHealth work across the Organization. Before joining WHO in 2001, he was Professor and Director of the Center for Health Technology, University of Yaoundé, Cameroon.
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New age app doctors

MIKE CASEY
CHIEF EXECUTIVE OFFICER, FUTURE LABS GROUP, LONDON, UK

ABSTRACT: Junior doctors of today are being issued with an Apple® iPad when they start their education. They will be the senior consultants of the future. The junior doctors rate of adoption in new technology is far greater than before as they have been born in a digital age. This is fortunate, because every country with sophisticated health care is exposed to greater demands on the service either through increased numbers of elderly patients or more sophisticated treatments. Doctors need to be more mobile to flexibly treat their patients. They need to be able to access patient details while they are on the move. They need to be part of the innovation revolution. They are born in the digital world and need to be central to the design of clinical applications and technology in health care – they are “new age app doctors.”

Junior doctors at the University of California, Irvine, USA, are being supplied with iPads when they start their medical education (http://news.uci.edu/features/have-iPad-will-travel). In Manchester Metropolitan University in the UK they are doing the same (http://www.mms.manchester.ac.uk/about-us/whymanchester/education/innovativeteaching/).

Young educated doctors of today will expect mobile health technology to be like water, assumed and available. They are “new age app doctors.”

Cultural change
Hospitals across the western world are reinventing themselves to keep up. They are large enterprise organizations with slow rates of change. It is not the technology that slows them down, it is the culture.

True change is happening when you see a visionary drive forward. Take Ottawa Hospital as an example, Dale Potter their CIO has deployed 3,400 iPads and 1,300 iPhones to their staff. Dr Glen Geiger, the Chief Medical Officer, stated that “after a week of deployment one of his doctors forgot her iPad and decided to drive back home and get it – that is clinical engagement.”

When we deployed iPads to paediatric Intensivists at Great Ormond Street Hospital in London they took to it like ducks to water. They had taken years to perfect their infusion calculator to assist clinicians in giving the right infusion dose to a neonate. Within weeks they had the calculator on the iPad.

So the doctors love it and more to the point they rely on it to treat patients. What sort of things can they do now? How about talking 100 languages? With a translation app a UK doctor can converse in Arabic with a patient to reassure them about their treatment plan. They can show them a picture of a blocked artery in their heart and they can explain where the stent will be placed.

All patients are stressed and intimidated by medical professionals describing their fate. It is a natural reaction and hospitals recognize this. They are striving to achieve new ways of increasing patient satisfaction and starting to measure themselves on compassion. The iPad is helping them achieve a level of interaction with a patient that is much more direct and informative.

Doctors are the new inventors
New age app doctors are your inventors; they will drive the requirements for information on a tablet computer. They will demand access to clinical systems that are visible on their iPad. In large hospitals it challenges the old guard and creates an odd process of denial and protectionism. It is understandable that they hold on to the security blanket of traditional computing. However the world is changing around them.

Doctors in the UK are challenged by a common problem. For example a senior consultant showed that it can take up to five minutes to log in and find patient details using a traditional PC or
Mobile Cart.

In a busy UK hospital you will see clinicians queuing up to use one or two PCs in a ward. All this adds time and is not acceptable in hospitals of today or the future.

We need to truly mobilize clinicians and send information to their tablet when they need it. During our testing we found that we could log in to the same patient information in under 5 seconds using an iPad.

There are some key requirements in an acute hospital setting. They need to see pathology results, they need access to PACS X-ray images and the reports. They need access to patient history. In a more sophisticated setting they need to order pathology tests and prescribe safely. NHS England has recognized the requirement to innovate and issued a GBP 260 Million Technology Fund called “Safer hospitals safer wards,” a primary requirement of which is to stimulate e-prescribing and foster a climate of open innovation.

Governments across Europe are recognizing the requirement to innovate locally and fund it. The clinicians want it, so why are we not seeing wholesale adoption? One argument is the time and cost to transition to mobile working.

In a recent article a hospital calculated its ROI to be nine days when they deployed iPads. http://www.forbes.com/sites/dannumuro/2013/06/02/hospital-calculates-the-roi-of-an-ipad-at-9-days/

Fundamentally, if it is not money, then it is a cultural change that is required. The new age app doctors of today will be the senior consultants of tomorrow. We need a new approach to lead innovation and embrace it as a daily requirement.

There are innovators with some wonderful examples of mobile medical technology. Take an ECG app from Airstrip technologies. With this app a cardiologist can now log into a cardiac monitor at a patient’s bedside. To understand the context, it is inevitable that a cardiac patient will have a minor heart attack when the senior clinician has left the ward and driven home. Normally a nurse or junior doctor will be calling the consultant to take instructions. They will be describing the event over the phone. With the app the clinician can log into the heart monitor from home and review the ECG history – note the new trace and prescribe based on direct information.

Making doctors mobile

How mobile can we make clinicians? The picture below was taken on an Intercity train travelling from London to Manchester. We logged on to a heart monitor in the USA and even though it was a test system, it showed we could connect across continents on a 3G connection in a train doing 70kph.

Mobile connectivity is the key and with the advent of 4G technology a clinician now has the ability to review MRI scans and high resolution video.

At Great Ormond Street Children’s Hospital we started testing the capability of the iPad to receive very large cardiology MRI scans over Wi-Fi. Typically these images are 500MB to 1GB in size. Their clinicians use a product called Osirix for the complex cardiology MRI. They already have over 350 Apple devices including iPads and wanted to review cardiology MRI from any location. We installed the first enterprise class Apple infrastructure in the UK to manage their cardiology MRI system. The result was 10.5 million images transferred to the new system and positive support from the clinical specialists.

We started researching how large images can be transmitted over 4G and looked at the type of apps that would drive medical imaging forward. A product called Mobile MIM was tested as it was the first FDA approved PACS app.

PET/CT is one of the more complex images where colour and definition are required. In a clinical scenario we would see this as an app where a radiologist would be viewing the high resolution images in the hospital and the consultant would be viewing them on an iPad. It is inevitable that images will become larger, CT and MRI scans are a routine diagnostic tool and new products like pathology PACS are coming on to the market. In the UK the preference is to only review the images that are stored on a hospital server. In practice there is more focus on downloading the image at the time the clinician needs to see it.

We see a compromise approaching, where the clinician receives a downloaded image over 4G and accepts that it will “naturally age” on their iPad. How long the image stays on the iPad is up to the local hospital rules. In practice the clinician may want to view the image for just one day, they would expect to refresh it on an active patient especially if they are being re-scanned.

Remote working

Our R&D is based on asking clinicians what they need. They talk about a concept called “remote eyeballs.” In France they use this technique for remote diagnosis. This is where a clinician in a major
Is information technology worth IT?

Consultants need to see the images to provide an informed judgement. In the UK our clinicians want the ability to remotely diagnose and there is definite success with stroke management using video conferencing.

The next step is to provide a portable video camera for clinicians. Our solution is called a LasarPen™ and we see it as an “on the spot” medical photography solution. At the advanced level we would expect to stream HD video conference quality images through a hospital Wi-Fi from the LasarPen™.

A good example is remote examination where a junior doctor is using the LasarPen to send video images to a consultant who assists with diagnosis. Initially we expect the LasarPen™ to be the first device a patient will see when they are admitted.

Modern Electronic Patient Record apps like Dr Chrono™ have the ability to capture the patients face when they are registered. We see this as the way forward when identifying a patient in UK health care. The LasarPen™ fits in the clinicians pocket and will scan patient wrist bands. It rests on the FlipPad when the clinician is in a ward environment. The FlipPad™ is the first ruggedised iPad case specifically designed for the medical market. It is made from FDA approved materials and uses a new anti-microbial glass.

Trust Appstore

There is a third element to deploying medical apps to our new age app doctors. London teaching hospitals recognized the requirement and helped us define the solution. It is called a “Trust Appstore.”

The concept is to deliver medical apps safely to clinicians. They needed a way to innovate and design apps which could be tested before the apps are released for general use in the hospital. Hospital CIOs wanted central management and enterprise class deployment of all their apps. Bartshealth NHS Trust took on the design challenge and together with FutureNova they intend to foster an environment of safe innovation.

So the birth of the new age app doctor started at Bartshealth. How far do you think it can go?

Mike Casey Case is CEO of Future Labs Group and the Chief Design Officer of FutureNova. He trained as a medical scientist at the RAF Institute of Aviation Medicine and graduated with a Master’s Degree in medical physics. He joined Hewlett-Packard Healthcare Group and was rapidly recognized as a design innovator for the HP Computer Group. He became an award winning health care CIO in NHS hospitals and an accomplished public speaker. Mike owns several patents and trademarks and is a registered UK health care inventor. Currently Mike is advising FutureNova on the design of new medical products that will work with the Apple iPad.

Further Reading

FutureNova is a new company that design advanced medical products. www.futurenova.com
Great Ormond Street Children’s Hospital: www.gosh.nhs.uk
EHI Article: http://www.ehi.co.uk/news/acute-cams/7817/great-ormond-street-bites-into-apple
Bartshealth NHS Trust: www.bartshealth.nhs.uk
An integrated approach to telemonitoring noncommunicable diseases: Best practice from the European Innovation Partnership on Active and Healthy Ageing

ABSTRACT: The European Innovation Partnership on Active and Healthy Ageing (EIP on AHA) has prioritized noncommunicable diseases (NCDs). An innovative integrated health system built around medical systems and strategic partnerships is proposed to combat NCDs. Information and communication technology (ICT) is needed for the implementation of integrated care in a medical systems approach. The Teaching Hospital of Montpellier has set up the clinic and uses IP-Soins® as an ICT tool. Patients with NCDs will be referred to the chronic disease clinic of the hospital by a primary care physician. This paper reviews the complexity of NCDs intertwined with ageing. It gives an overview of the problem. It presents an innovative approach in the implementation of a clinical information system in a “SaaS” (Software as a Service) mode.

Chronic diseases are diseases of long duration and slow progression. Major noncommunicable diseases (NCDs: cardiovascular diseases, cancer, chronic respiratory diseases, diabetes and mental health) represent the predominant health problem of the century. NCD prevention and control are the priority of the World Health Organization, the United Nations and the European Union 2010 Council. The new trend for the management of NCDs is evolving towards integrative, holistic approaches (Bousquet 2011). To tackle them in their totality and reduce their burden and societal impact, NCDs could be considered as a single expression of disease with different risk factors and entities. NCDs require an integrated care model using multidisciplinary and teamwork approaches to provide optimal care on a basis of adequate public health strategies (Harris 2010, Chan 2010).

European Innovation Partnership on Active and Healthy Ageing (EIP on AHA)

NCDs particularly affect elderly patients. Functioning and physical health declines with advancing age and/or NCD co-morbidity (Moussavi 2007). As the general population ages, the number of patients with NCDs is growing with gender differences (Ninot 2006).

Active and Healthy Ageing (AHA) is a major societal challenge common to all European countries and to all populations. Ageing, intertwined with socioeconomic inequalities, is an under-appreciated cause of poverty. AHA should be promoted very early in life.

In the EU, several initiatives are responding to this challenge and consider NCD co-morbidities as key factors. The European Innovation Partnership (EIP) aims to enhance EU competitiveness and to tackle societal challenges through research and innovation. It addresses weaknesses in EU research and innovation (e.g. under-investment, fragmentation and duplication), which considerably complicate the discovery or exploitation of knowledge, and may ultimately prevent the entry of innovation to the market place.

The pilot EIP on AHA will pursue a triple win for Europe (EIP):

- enabling EU citizens to lead healthy, active and independent lives while ageing;
- improving the sustainability and efficiency of social and health care systems;
- boosting and improving the competitiveness of the markets for innovative products and services, responding to the ageing challenge at both EU and global levels, thus creating new opportunities for businesses.

The overarching target of this partnership will be to increase the average healthy lifespan by two years by 2020 (measured by Healthy Life Years (HLY)) (Jagger 2008). Other indicators include unavoidable hospitalizations for NCDs.

MACVIA-LR (contre les MAladies Chroniques pour un Vieillissement Actif en Languedoc Roussillon) is an integrated programme led by the President of the Région Languedoc Roussillon in order to fight chronic diseases for AHA. It includes all pillars of the EIP on AHA centred around NCDs (Bousquet 2012).

Integrated care model for the control of NCDs

A worldwide debate on the efficiency of primary health care attempts to re-orientate health systems in all countries, optimizing costs (WHO 2008). Primary health care provides the means of organizing a complete range of care, from home to hospital,
investing resources rationally in the different levels of health. NCDs require an integrated care model using multidisciplinary and teamwork approaches, in which primary care is on the front line, in order to provide optimal care on a basis of adequate public health strategies (Harris 2010, Chan 2010).

Information and communication technology (ICT)
ICT is needed for the implementation of integrated care in a medical systems approach. Although home telemonitoring appears to be a promising approach to patient management, designers of ICT could consider ways of making this technology more effective as well as controlling possible mediating variables, and considering diseases in their totality. Continuous and precise monitoring makes the clinical history of each patient a valuable source of comprehensive information. More user-friendly and efficient ICT platforms are needed to understand and tackle NCDs in their totality over several years using precise constructs which need to be validated (Valderas 2009). The effectiveness of interventions to promote ICT adoption in health care settings remains uncertain (Cagnon 2009), probably since co-morbidities are not included in most plans.

Shared decision-making (SDM)
SDM, the process by which a health care choice is made jointly by the practitioner and the patient, is an essential objective for patient-centred care in an integrated ICT system (Legare 2010). An innovative patient management programme combines ICT and SDM in a multidisciplinary approach. Patients’ values and preferences should dominate decision making (Collins 2010).

An innovative patient management programme could combine ICT, SDM, personalized patient education and an interaction between primary, secondary and tertiary care levels when available and appropriate.

Integrated care, CDSS and ICT
“Integrated care is a concept bringing together inputs, delivery, management and organization of services related to diagnosis, treatment, care, rehabilitation and health promotion. Integration is a means to improve services in relation to access, quality, user satisfaction and efficiency” (Crone 2001). Integrated care is of importance in service provision to the elderly, as elderly patients are often chronically ill and present several co-morbidities.

Clinical Decision Support Systems (CDSS), an interactive decision support system (DSS) computer software specific to the co-morbidity clinic, will assist physicians and other health professionals with decisions in the diagnosis and management of patients. When possible, it will also be linked with the Dossier Pharmaceutique® and, for the Teaching Hospital of Montpellier, IP-Soins® (Figure 1). The Dossier Pharmaceutique® (pharmaceutical dossier, article L.1111-23 Code de la santé publique) aims at the electronic monitoring of patients’ prescriptions by pharmacists. In France, 15,000 – 22,000 pharmacists use the system which makes it possible to track the prescription of medications (article L. 4211-1).

This integrated system will enable continuity of care which is often subdivided into three components:
- continuity of information (though shared records);
- continuity across the secondary–primary care interface (discharge planning from specialist to primary care);
- provider continuity (seeing the same professional each time with value added if there is a therapeutic, trusting relationship).

Hospital-based clinics and links with primary care
The Teaching Hospital of Montpellier has set up a clinic and uses IP-Soins® as an ICT tool. Patients with NCDs will be referred to the chronic disease clinic of the hospital by a primary care physician. After co-morbidity evaluation, the patient will be followed up in primary care.

A mobile chronic disease clinic has been set up using the same examinations in order to screen co-morbidities in remote areas of rural counties in the region.

An asset in the follow-up of chronic diseases, this innovative clinical information system (IPSoins), is operational in SaaS (Software as a Service) mode (Figure 3).

IPSoins is an innovative clinical information system that has been designed by the Teaching Hospital of Montpellier, France.

The IPSoins (the clinical information system) complies with the computerised management of general health care. This system functions in collaboration with the administrative management of the patient.

IPSoins has been designed around the computerized health file DXCARE from the French company MeDaSys, selected in November 2011 after a call for tenders.

In a very complex multifactorial context, the Teaching Hospital of Montpellier deployed its clinical information system in 2012 to 9,000 users in a record time of nine months.

IPSoins can be accessed on a network, enabling a secure and personalized sharing of the collected information.

To date, it can be noted that each month:
- almost 50,000 new reports are entered, most by an integrated digital dictation system;
- near to 80,000 appointments are made outside the hospital;
- approximately 200,000
In order to benefit from the best associated infrastructures and services, The Teaching Hospital of Montpellier has chosen to outsource the data and applications connected to IPSoins to several ultrasecure data centres with spare capacity. The Orange business service, which hosts health care data, has been selected for this purpose. IPSoins is therefore the first clinical information system of this scale in SaaS mode.

Integration of IPSoins with MACVIA-LR

The interoperable ICPs for falls prevention or co-morbidities in NCDs uses DXCare® (MedaSys, and Orange business service, http://www.orange-business.com). Self-questionnaires are embedded in DXCare® using an iPad tablet (Viewontv®, http://www.video.viewon.fr). Coaching is carried out using the resources of Econocom (http://www.econocom.fr). Deployment beyond France will be carried out by Noemalife (http://www.noemalife.com), a European leader in electronic medical records and a partner of MedaSys. Electronic data interchange (EDI) and enterprise service bus (ESB) are carried out using Antares® (enovacom, http://www.enovacom.fr), a software used by the Région Languedoc Roussillon to link different levels of care, stakeholders and citizens and public organizations.

The CDSS will establish a patient care coordination domain defining patient stratification. It will integrate and deliver interoperability across existing ICT tools dedicated to individual chronic diseases. It will use a cloud computing platform capable of protecting the confidentiality of medical data and providing real-time access and data analysis.

A wide variety of information managed and an exceptional collection of data and record acquisition

IPSoins stands out for the quality and diversity of the information that it manages. IPSoins provides hospital health care professionals with one single tool that can be used for all the information it handles: letters, administrative information, requests for/results of tests and imaging, specialist medical files, vocal recordings and videos, databases, etc.

Within the framework of research on chronic pathologies, innovative algorithms and statistical models are being developed, tested and put on the market.

The aim is to explore large amounts of information that are heterogeneous and diverse but combined, in order to search for decision support systems.

Pooling information of different specialities

In its standard catalogue, IPSoins aspires to provide a large number of “career” modules including medical, surgical and psychiatric specialties, obstetrics and follow-up care.

In case of missing elements, uncertainties or specific needs such as the management of a clinical study, an extension module using questionnaires is available. This enables the possibility of qualitative management of chronic diseases.

The computerization of old files are necessary for the follow-up of chronic diseases

This diversity does not only concern recent information: the launch
of IPSoins was accompanied by a big effort to update existing files, whether computerized or still on paper. For certain departments, activity since 1985 is now online: 23 million documents, covering the past 15 years and relating to eight million records and more than 1.6 million patients, have been retrieved from the old systems.

**A system ready for telemedicine**

Constructed by means of Internet technology, IPSoins is secure and readily accessible to the other actors involved in the follow-up of patients suffering from chronic disease.

Through telemedicine, it is possible for private health care professionals to access part of the medical file from a distance when following up on patients with chronic disease. Such is the case for private doctors and for professionals from the medico-social sector. This access is highly secure and already possible from sites outside of the Teaching Hospital of Montpellier. A very finely-tuned, specific and precise management mechanism allows administration of rights satisfying the statutory and legal regulations regarding access to patient data.

**In conclusion**

eHealth is the natural extension of an open and secure clinical information system and an ally for the follow-up of chronic diseases (EIP on AHA).

IPSoins is a natural basis for the many functions in e-Health:
- IPSoins is deployed in SaaS mode and is hosted by a personalized health care data system;
- IPSoins can be adapted to the user. Each user can adapt the system to his/her own views;
- the IPSoins engine has a functional richness allowing it to fulfill many needs;
- thanks to its adaptative software, IPSoins can be extended: specialty files, enquiries, documents for private practice, etc.

The Teaching Hospital of Montpellier provides the complete IPSoins package to its partners, within its territory and to the region.

e-Health is thus developing a new model for hospitals by transforming the relationship between hospitals and private practices and between doctors and patients. Chronic patient habits seem to be different, i.e. much more inclined towards empowerment. These patients use e-health to follow-up on their disease, as well as for education, training and exchange. A recent study conducted by the Massachusetts Institute of Technology (http://digital.mit.edu) shows that no matter what sector an organization belongs to, it will gain between 12% and 26% in efficiency and efficacy when concentrating on the development of digital technology.

**Jean Bousquet** is a full Professor of Pulmonary Medicine at the University of Montpellier, France. He is the coordinator of MeDALL (Mechanisms of the Development of Allergy, a Framework Programme 7 (EU) Integrated Project (2010-15)), past-Chairman of the WHO Global Alliance against Chronic Respiratory Diseases (GARD), the founder of ARIA (Allergic Rhinitis and its Impact on Asthma, in collaboration with the World Health Organization (WHO)) and co-coordinator of Action Plan B3 of the European Innovation Partnership on Active and Healthy Ageing (Action 5: Care Pathways, Integrated Care for Chronic Diseases).

Professor Bousquet has a public health interest in particular as past-Chairman of the WHO GARD. The main activity of GARD is to help include chronic respiratory diseases in the UN Resolution A/RES/64/265. He is leading the Région Languedoc-Roussillon programme on chronic disease for an active and healthy ageing.

Jean Bousquet has edited and authored over 675 peer-reviewed papers posted on Medline. He was the editor of Allergy, the second ranking journal in the field, 2003-2009. His H factor is 90.

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**References**


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Rodolphe Bourret is a hospital director. He is also a trained engineer and has a PhD in physics. He has held various roles in systems information, finance and management within teaching hospitals, local authorities and national committees. He is currently Deputy Director General of the Teaching Hospital of Montpellier. He is also Director of the hospital’s research and innovation unit and a member of the National Commission on Teaching, Research and Innovation.
Can banks offer digital keys for health care?

JOHN CASILLAS
CEO, BOARDTRUST, LLC, GLOBAL HEALTH IT FELLOW, WORLD BANK
AND FORMER SENIOR VICE PRESIDENT OF HIMSS

ABSTRACT: In the quest to implement electronic health care records, health care stakeholders have uncovered an elephant in the room – how to implement patient identity and integrity solutions. Without this, linking the unique records of an individual is impossible. An inaccurate record can be dangerous for prescribing treatment. Yet many consider a unique patient identifier as an unacceptable privacy risk. Medical banking, or the convergence of banking and health IT systems, is spawning new ideas that could impact on this difficult area. This article suggests that new forms of efficiency in payment processing may yield a common, cross-industry technology platform for managing digital identity by banks. Redefining a bank based on core competencies, the article looks at three areas: (1) the “identity theft arms race”; (2) innovations in payment processing; and (3) consumer engagement, and suggests that, as banking and health care systems converge, digital identity may become the new money. This realization may find banks fully engaged in helping health care to overcome the challenge of patient identity and integrity.

In 2001, HIMSS Medical Banking Project outlined a health information technology (IT) strategy linking banking and health care platforms to form new, inter-organizational systems that streamline administrative costs in health care. Commercial banks responded by accelerating investment in treasury management operations, where the idea has driven impact. For example, a world renowned health care system implemented a “medical banking” programme that transformed processing four million payments from paper to electronic. Annual cost savings can be roughly estimated by multiplying volume by two, or USD 8 million per year.

While this business practice is still in its infancy, and ways are emerging to harness the efficiency of electronic payments that circumvent the bank's paper-processing lockbox, the idea of tighter technology linkage between banking and health care IT has spawned new areas of thinking. These areas may be summarized as: (1) integrated health care administrative technologies; (2) “health-wealth” portals that help consumers engage health care and (3) bank-managed “digital keys” for health care. Though distinct, these three emerging capabilities overlap and may be portentous of our health care financial network of the future.

Objective recognition of medical banking ideas appears to be gaining ground. In early 2012, six editors at American Banker searched the US marketplace to find the “biggest ideas” in banking. The creation of a “health-wealth” portal made number one on the list. Later, Treasury & Risk magazine compiled a global listing of the “Top influential people in finance in 2012” where medical banking ideas were again recognized (the author of this article was named in the “heavy hitters” section alongside world renowned billionaire, Warren Buffet).

Of all the ideas that have evolved from the convergence of banking and health care IT, none may drive more impact, and debate, than using bank identity management mechanisms for health care; specifically, digital keys that link a patient with his or her electronic health records. Events like the HIMSS’ Summit for Health Information and Financial Technology (SHIFT), the mHealth Summit, Digital ID World Africa and others, allude to a new global dialogue that suggests we are fast moving towards bank-managed digital identity for consumers, including consumers of health care services. In fact, it would not be surprising if some projects have already connected the dots and have implemented some form of this capability within technology systems.

As our world turns digital the need for identity management has become foundational, and this is true not only in first world countries but in developing areas where mobile finance is making strong inroads (i.e. mPesa, others). A study by Unisys found that

![Figure 1: The relationship between banks and health care stakeholders](image-url)
among global consumers, the most trusted venue for digital identity management is the commercial bank.

As banks redefine their value proposition – a process that has escalated since the 2008 global credit crisis – the notion that “identity is the new money” is resonating. In a digital world, the consumer is a digital “entity” who may or may not be who they say they are. Thus it would not be surprising to find that for many banks who are re-imaging service portfolios, the opportunity to be part of a high margin identity management value chain versus maintaining the status quo of the highly commoditized payments value chain could become compelling.

One aspect of a bank-driven digital key lies in medical identity theft. The numbers are daunting and tantamount to a universal wake-up call. The World Privacy Forum declared in 2006 that medical identity theft is the fastest-growing form of identity theft. In 2010, according to the Ponemon Institute, more than 1.4 million people were victimized by medical identity theft, and the average cost to resolve their cases was approximately USD 20,000. Over half of these report having to pay for medical coverage they did not receive in order to restore their health coverage. In fact, nearly one third indicated their health premiums rose after they were victimized.

Yet the financial fallout of medical identity theft is not the worst part. Authorities suggest that the impacted health care record, if not corrected, could lead to dangerous situations. Imagine reliance on a medical record where the blood type has been changed or where the history of treatments is mixed with the criminal’s ill-gained procedures. This is where digital ID “integrity” comes into full view. Patient identity and integrity are inextricably linked. They go together. And if bank-managed digital identities are in our future it follows that banks could be involved in some form of integrity of records as well.

These facts illuminate a fundamental dialogue that we must engage in as a society. How will we protect our medical identity as the world goes digital? While a global dialogue is already in full swing, it has yet to effectively connect the notion of using banking systems for identity management in health care. Many view banking and health IT as separate. But the medical banking domain is yielding cross-industry innovation that is blurring the lines. Can patient identity and integrity be addressed using finely tuned programmes deployed by banks? Can banks offer digital keys for health care?

Redefining banks

While peering through a window high above the three rivers that converge in Pittsburg, Pennsylvania, I was struck by remarks made by a senior level executive at a major banking concern. At the time, the bank was managing over USD 21 trillion in assets across the world. He began to reflect on the components of a bank and what really makes it tick from a global perspective. The bank, he suggested, provides unique competitive strengths in the area of consumer trust and engagement, privacy and security, persistent
is information technology worth IT?

As we discussed how a bank can redeploy core competencies to drive growth, we quickly concluded that for a bank this size, the best ideas needed to have a large market and scale globally. Building a capability just within the US would not be a fit. When you break down “banking” into core competencies like this, there appears to be a number of reasons to consider banking technology as we implement digital platforms in health care. Here are just three:

Core competency #1 – The identity theft arms race

As electronic health care technology advances there is a need to fully understand a hidden but considerable cost for keeping medical identity private. Consider that the banking industry is locked into an “identity theft arms race” with the criminals. Twenty-four hours a day, 365 days a year, the bad guys are trying to rob the system. Addressing this persistent threat requires significant investment, strong stakeholder engagement among competitors and authorities, futuristic thinking so that emerging threats are envisioned way out in the horizon before they actually become reality, and more. There is no comparative capability within the health care system that mimics this banking resource. We may well ask if we need to reinvent it for health care.

Policy development has morphed around this area. For example, the Obama Administration announced a new “cybersecurity” plan to protect national interests. As commerce moves from paper money exchange to digital transfers, identity and access management is rising in importance. As medical identity theft grows, technologies that have evolved and are now embedded in financial systems to deal with financial identity theft have already cross-pollinated into health care systems, especially in payment channels. It stands to reason that as best practices in identity management in banking are much more evolved, due to the necessity of keeping our money safe, that linkage with health IT is inevitable.

Core competency #2 – Innovations in payment processing

An area that brings together identity and access management in banking and health care is cash management. Medical banking, or the convergence of banking and health care IT, impacts the finances of the enterprise, practice and individual. Accessing this cash flow requires a growing portfolio of trusted identity protocols (i.e., multi-factor authentication, site stamping, etc). The technical development “glidepath” brings banking and health care systems into a mutually valuable inflection point.

Consider that in health care, payments processing is much more involved than transferring funds between the health care stakeholders. Accompanying these funds is a detailed description...
of what the payment is for, and many times what is partially paid or not paid at all. This information helps the enterprise to optimize reimbursement, the physician who is trying to get paid and the patient who wants to know what their portion of the bill is and if it was calculated accurately.

This data is also individually identifiable and highly confidential, presenting a line-by-line description of each medical treatment and its associated cost. When using banking systems for managing payments that have accompanying “explanation of benefits” that go through a lockbox (as many hospitals and large practices do), this data crosses the boundaries of the health care provider and enters the banking system. This is the reason why banks that provide these types of services are impacted by health data protection laws in the US, such as HIPAA, and those in other countries as well.

An axiom in medical banking is that the evolution of health data protection laws will inevitably induce tighter linkage between banking and health IT. This is because the market drives relentlessly towards efficiency; yet to gain this, convergence of cross-industry IT is essential. Thus the compliance regulations impacting both areas converge in payments processing and other financial areas. While there are other avenues for transferring remittance data, such as health data clearinghouses, in the end it all needs to be linked to the payment. This is a function that the bank is uniquely positioned to perform; after all, they are the ones processing the payment.

In the world of electronic transactions, within the US, the payment and its associated remittance advice is carried in an X12 835 transaction. Movement of this transaction in banking systems has been hampered due to a number of reasons, however, as banks seek new ways to better serve the health care industry, movement of both the payment and its associated remittance, called “straight through processing,” has become a focus point. Moving funds alone is a highly commoditized function. By implementing straight through processing in health care, the bank can provide more efficiency to the health care stakeholders, and thus the market drivers speed forward.

The product evolution seems apparent. Banks, through which this data will progressively move, will provide platforms that help their customers to process the data, whether through cash management platforms for the enterprise that streamline workflows, or, online banking platforms that serve up near real time data to the individual so they can manage their health care spending…all instantly portable to a mobile device. Clearly, access into this data stream is controlled using a banking identity and access management mechanism.

It stands to reason that if the banking industry is already highly invested into providing unique identity and access management capability, including the nascent development of “legal entity identifiers” that could improve identity management, health care stakeholders won’t need to reinvent the wheel. Imagine a consumer who establishes a bank account being assigned a lifelong digital key for authorizing access to financial and personal health records. The key could also be deployed into interoperable health care networks to accurately collate electronic records at point of request (online, card swipe, etc). In fact, with the availability of such a resource, health plans could also benefit by developing closer ties with their customers (those paying the premiums) through new “health wealth portals”, as well as creating a compelling channel, governed by the bank’s digital key, that can help consumers to make better health care choices in terms of quality of care, availability of health services and relative cost.

Yes, this is far easier said than done but the point of reflection remains the same – should we engage the banking community for the digital key component? Or should the health care industry redevelop this capability? If so, how will it be paid for on an ongoing basis to keep the criminals continuously at bay? Will a separate effort yield the same, or better, security that we find in banking? How long will it take? Consider that banks are engage in a 24 by 7 fight against the bad guys who want to steal our money. Will the health care world establish this substantial and highly coordinated capability as well? What if we could leap frog this area and turn our collective attention to other difficult tasks, like semantic interoperability amongst disparate systems that enable a true longitudinal record at point of care?

Core competency #3: Consumer engagement
A study conducted by professors at California Lutheran University corroborated another that was done earlier by Digital Insight; both trying to show cost savings of moving banking customers from offline to online banking. Yet the studies revealed something entirely different. The cost savings were slight but the real jewel was that the ROI for online banking customers is three times more than offline customers. Online banking customers typically have larger and more account balances.

Realizing this, banks have developed a multi-pronged approach for moving people from casual users to offline, then online banking, and now, mobile banking. They target the “unbanked” like health care targets the “underserved” (those uninsured or underinsured who fall through the cracks). Doing this is not as easy as one might suspect.

There is a business cost to move consumers from what feels comfortable today to new technologies. For example, there are generational gaps in the use of technology. Some prefer going to a bank branch to speak to a live person. Others prefer an ATM. Still others go online or use a mobile phone. Targeted marketing and consumer segmentation is vital for changing consumer behaviour. Grandma likes sending checks in the mail while the kid brother prefers his iPad. There are also linguistic barriers that must be addressed so that consumers are educated in their own language. Sensitive cultural norms must be recognized. And the list goes on.

Banks have built this capability into their business models. Will the health care stakeholders do the same? Wouldn’t it be easier to add a new service category in online banking – “click here to visit your digital medical home”? Are health care stakeholders able to pay for changing consumer behaviour given other priorities, like clinical excellence?

Of course, before we can realistically walk down the path of a digital home for medical records the user experience must become more robust. Health care records that are located in disparate systems need to be brought together and presented in an inviting, easy to use format. To this point, some say a broad and interoperable system may never happen and that consumers simply need to buy a personal health care record and load it manually or, if available through their health care provider, electronically. Moreover, once this is done, tomorrow’s consumers could monetize their records, selling them in a very controlled way and using an authorized format. However accomplished, whether self-managed, through
an interoperable network or both, integration with a commercial bank is good idea. Funds from the “digital medical home” could be swept into a savings account, as consumers learn to exercise new legal rights around an asset they’ve always had but with far too little control.

Conclusion
The implementation of a digital key for health care is growing in importance for linking records across health care systems. Looking through a different lens – medical banking – one can envision a product development curve that finds banks becoming increasingly involved with patient identity and integrity. If “identity is the new money”, and banking systems continue to integrate technologies to assist health care stakeholders to reduce operating costs, it seems inevitable that a common IT convergence point will be the use of the banking identity management “engine” for digital keys in health care – both in terms of highly tested, criminal-resistant technology, and, widespread promulgation through ongoing investment in changing consumer behaviour from offline to online engagement. Getting two for the price of one may become a viable policy and technology decision in the near term as health care goes digital.

John Casillas is CEO of BoardTrust, LLC, a strategic advisory firm dedicated to advancing the medical banking paradigm. He also serves as the Global Health IT Fellow with the World Bank and was formerly Senior Vice President of HIMSS, a global health IT association and society.

In 2001, Casillas founded The Medical Banking Project, an industry think tank and pioneering authority in the convergence of banking and health care systems, later acquired by HIMSS. He coined the term “medical banking” to denote this emerging area of discipline and founded a series of industry-recognized forums that shaped the agenda in the medical banking industry. CNET's Esther Dyson called the Medical Banking Project one of the “top ten levers” for transforming health care. He is well-published and has been interviewed by CNBC, Wall Street Journal, USA Today, LA Times, Crain's Workforce Management, HFM magazine, Health Leaders and many others. He has provided testimony to the US National Committee on Vital and Health Statistics (NCVHS), advised various agencies at HHS, the US Treasury and several state legislatures. He has served as an EHNAC Commissioner. His honors include being named one of the Top 100 Influential People in Finance by Treasury & Risk Magazine in 2012, Healthcare 100 awarded by the Nashville Business Journal in 2005 and 2006, and in 2001, he received “First Place National Editors Award” by the Association of American Healthcare Administrative Management (AAHAM) for his article entitled “The emerging compliance matrix.” He defined the body of law, published in the Banking Law Journal and LexisNexis’ Treatise on Health Care Law and Health Care Law Monthly that helped to resolve the difficult issue of HIPAA’s impact on banks and financial institutions and is considered a leading expert in this area. He lives in Tennessee, USA.
1) Le rôle des TIC dans la planification de l’hôpital numérique
La structure hospitalière est en pleine mutation, forcée par les tendances actuelles du marché, les nouvelles demandes des différents groupes d’intérêt et un intérêt commun pour l’innovation. Dans le monde entier les dépenses dans le milieu de la santé ne cessent d’augmenter à des niveaux insoutenables. Dans ce contexte, l’efficacité et l’optimisation deviennent les mots clés de ce processus visant à abaisser les coûts et à accroître la qualité de la prestation des soins. L’efficacité et l’optimisation s’obtiennent grâce à l’innovation et l’innovation, à l’ère contemporaine, s’obtient grâce à la puissance des TIC. Cet article explique comment les TIC sont devenues le nouvel outil de mise en forme des milieux hospitaliers et met en lumière l’un des meilleurs exemples de sa mise en œuvre.

2) Comprendre l’EMRAM et son utilisation par les décideurs, les médecins-chefs et leurs équipes
Le modèle d’adoption des dossiers médicaux électroniques (EMRAM)SM mis au point par HIMSS Analytics est universellement reconnu comme modèle de maturation des dossiers médicaux électroniques (EMR) d’un hôpital. De nombreux organismes de santé du monde entier consacrent beaucoup de leur temps et de leurs ressources à améliorer leur culture EMRAM. Pourtant, pour les non-initiés en matière d’informatique médicale, l’intérêt d’EMRAM et les résultats des efforts déployés pour renforcer les capacités EMR sont pratiquement méconnus. Ceci est très préoccupant vu que ces efforts doivent rivaliser avec d’autres secteurs pour les rares ressources disponibles.

Cet article se propose de montrer l’intérêt de la structure EMRAM pour les décideurs et cadres hospitaliers. A cette fin, nous commençons par une description nécessairement brève du processus et des étapes du modèle d’adoption EMR. Nous passons ensuite à des exemples d’utilisation et de présence du modèle dans le monde entier, pour conclure sur les avantages que présente EMRAM pour les diverses audiences de soins de santé.

3) Leçons tirées de la mise en œuvre d’innovations en matière de technologie de l’information dans les pays en développement
Les innovations de l’informatique et ses répercussions sur les soins de santé concernent tout particulièrement les pays en développement, qui ne dépensent qu’une fraction de ce que dépensent les systèmes de santé dans les pays de l’OCDE. Étant donné les problèmes d’accessibilité, de capacité financière et de qualité des services de santé dans les pays en développement, la technologie de l’information peut jouer un rôle significatif en rapprochant les communautés éloignées des systèmes de santé. L’université Aga Khan (AKU) and eHealth Resource Center (eHRC), qui font partie du réseau Aga Khan Development Network (AKDN), œuvrent activement dans les régions en développement de l’Afrique de l’Est, de l’Asie Centrale et de l’Asie du Sud-est et innover actuellement dans le domaine de la technologie de l’information et dans le déploiement des solutions. Les auteurs exploitent les programmes de santé en ligne et les leçons apprises par AKU et eHRC pour adhérer à leurs valeurs fondamentales d’impact, d’accès, de pertinence et de qualité en appliquant ces innovations. Celles-ci peuvent être précieuses pour les systèmes de santé et les centres médicaux universitaires des pays en développement qui veulent tirer le parti maximum des rares ressources disponibles en exploitant la technologie de l’information pour une incidence réelle sur la santé.

4) Programmes d’adhérence aux médicaments basés sur la population: une occasion unique
Le non-respect à la médication est une épidémie mondiale qui cause d’innombrables morts et la responsable du gaspillage inutile de milliards de dollars en soins de santé. Entre 33 à 69 pour cent de toutes les hospitalisations liées aux médicaments aux États-Unis, sont dues à une mauvaise observance du traitement avec une augmentation résultante dans le coût des soins de plus de 100 milliards de dollars par an (Senst, et al, 2001). Dans les régions moins développées du monde, les médicaments méritent une attention additionnelle, étant donné que l’accès aux médicaments ainsi que les médicaments payés de leur propre poche jouent un rôle plus important (Taj et al., 2008).

Pour obtenir une meilleure adhésion aux médicaments, les hôpitaux doivent employer des technologies et des stratégies visant à améliorer la qualité de vie des patients, réduire les coûts et les comorbidités et réduire les hospitalisations évitables et les visites aux urgences. Cet article explore ce que nous connaissons sur l’adhésion aux médicaments et l’utilisation des outils informatiques, y compris la santé mobile intégrée, les DSE, la prescription en ligne, les médias sociaux et les rappels de médication.

5) Télémédecine : la voie est ouverte aux soins de santé
La télémedecine s’est considérablement développée récemment,
aussi bien en termes de volume financier qu’en nombre de
personnes desservies. Elle offre encore d’excellentes perspectives
de croissance dans l’avenir, qui sont le fait tant de la situation
épidémiologique que des progrès technologiques. L’arrivée du
téléphone portable dans les zones les plus reculées des pays en
développement, à ses multiples applications dans les
domaines de la santé et des services financiers mobiles, va ouvrir la
télémédecine à de vastes pans de la population mondiale. Toutefois,
pour réaliser ce potentiel, il faudra d’abord relever bien des défis,
surtout dans le domaine des législations.

6) Les médecins de l’ère numérique
Les jeunes médecins d’aujourd’hui reçoivent des iPads lorsqu’ils
commencent leur formation. Ce sont les consultants chevronnés de
demain. La facilité d’assimilation des nouvelles technologies par les
jeunes est bien supérieure, ce qui est heureux car tout pays
bénéficiant d’un système de santé sophistiqué s’expose à des
attentes plus ambitieuses quant aux services, par suite soit du
vieillissement de la population, soit de la sophistication des
traitements. Les médecins doivent être plus mobiles pour s’adapter
avec souplesse aux besoins des patients. En déplacement, ils
doivent pouvoir accéder facilement aux dossiers du patient. Ils sont
appelés à participer à la révolution innovatrice. Nés dans l’ère
numérique, ils sont voués à jouer un rôle clé dans la conception des
applications cliniques et de la technologie des soins de santé. – Ce
sont les médecins de l’ère numérique.

7) Approche intégrée pour la télésurveillance des maladies
non transmissibles. Code de bonne pratique du Partenariat
européen d’innovation sur le vieillissement actif et en bonne
santé
Le Partenariat européen d’innovation sur le vieillissement actif et en
bonne santé (European Innovation Partnership on Active and
Healthy Ageing, EIP on AHA) a privilégié les maladies non
transmissibles (MNT). Un système de santé intégré et novateur
reposant sur des systèmes de médecine et les partenariats
stratégiques est proposé pour lutter contre les MNT. Il convient de
faire appel à la technologie de l’information et de la communication
(TIC) pour instaurer des soins intégrés au sein d’une approche de
médecine des systèmes. L’hôpital universitaire de Montpellier a mis
en place une clinique et utilise IP-Soins® comme outil TIC. Les
patients atteints de MNT seront orientés vers la clinique de
pathologies chroniques de l’hôpital par un médecin généraliste.
L’article examine la complexité des MNT quand elles sont
indissociables du vieillissement et donne une vue d’ensemble des
problèmes. Il présente une approche innovante de la mise en place
d’un système d’information clinique en mode “SaaS” (Software as a
Service).

8) Les banques peuvent-elles offrir des clefs numériques pour
les soins de santé ?
Cherchant à mettre en place un système de dossiers médicaux
electroniques, les intervenants du secteur de la santé ont buté sur
un problème soigneusement occulté, mais qui saute aux yeux :
comment trouver des solutions qui respectent l’identité et l’intégrité
des patients. Sans cela, relier les dossiers uniques d’un individu est
impossible. Un dossier inexact peut être dangereux pour prescrire
un traitement. Pourtant beaucoup considèrent l’identifiant unique du
patient comme un risque inacceptable pour la vie privée. Les
services médico-bancaires, ou la convergence des services
bancaires et des systèmes électroniques de santé, font germer des
idées nouvelles qui risquent de se répercuter sur cette question
épineuse. L’article suggère que de nouvelles formes d’efficacité du
traitement des paiements pourraient permettre d’établir une plate-
forme technologique commune interprofessionnelle permettant aux
banques de gérer les identités numériques. Redéfinissant une
banque basée sur des compétences fondamentales, l’article
examine trois secteurs: (1) la “course aux armes contre les
usurpations d’identité”; (2) les innovations en matière de traitements
des paiements, et (3) l’engagement des consommateurs ; il suggère
que si les systèmes bancaires et les systèmes de santé convergent,
l’identité numérique pourrait devenir la nouvelle monnaie d’échange.
On pourrait alors trouver des banques pleinement résolues à aider
les systèmes de santé à résoudre le problème de l’identité et de
l’intégrité des patients.
1) El papel de las TIC en la programación del hospital digital
La estructura del hospital está experimentando un cambio radical, forzado por las tendencias del mercado actual, las nuevas demandas de diferentes grupos de interés y un interés común para la innovación. El gasto sanitario en todo el mundo sigue aumentando a niveles insostenibles. En este contexto, la eficiencia y la optimización son las palabras claves del proceso destinado a reducir los costos y a aumentar la calidad de los servicios prestados. La eficiencia y la optimización se consiguen a través de la innovación, y la innovación en la era contemporánea se obtiene a través del poder de las TIC. Este artículo habla sobre cómo las TIC se convirtieron en la nueva herramienta de configuración del medio hospitalario y pone de relieve uno de los mejores ejemplos de su aplicación.

2) Comprender el EMRAM y cómo puede ser utilizado por el responsable de la política, el director de informática y sus equipos
El Modelo de Adopción de Historias Clínicas Electrónicas (EMRAM) SM desarrollado por HIMSS Analytics se ha convertido en un modelo de maduración universalmente reconocido de la Historia Clínica Electrónica de un hospital (EMR). Numerosas organizaciones de atención médica en todo el mundo gastan mucho tiempo y recursos para mejorar su situación EMRAM. Sin embargo, para los ajenos a la tecnología de la información sanitaria, el valor de la EMRAM y los resultados de los esfuerzos ligados al avance de las capacidades de EMR son prácticamente desconocidos. Esto es muy preocupante dado que los esfuerzos que se hacen por el EMR compiten con otros sectores por los escasos recursos sanitarios existentes.
El propósito de este artículo es establecer el EMRAM como un marco valioso para los responsables políticos y los directores hospitalarios. Para lograr este fin, comenzamos con una necesariamente breve descripción del proceso de adopción del modelo EMR y sus etapas. Nuestra atención se enfocará en ejemplos de utilización y la presencia del modelo en todo el mundo, antes de terminar con los beneficios del EMRAM para los diversos públicos de salud.

3) Lecciones de implementación del uso de las innovaciones en tecnología de la información en los países en vías de desarrollo.
La innovación de la tecnología de la información y su impacto en la salud es de particular importancia para los países en vías de desarrollo, que gastan solo una fracción de lo que gastan los sistemas de salud en países de la OCDE. Teniendo en cuenta las cuestiones de accesibilidad, asequibilidad y la calidad de los servicios de salud en los países en vías de desarrollo, la tecnología de la información puede desempeñar un papel importante al acercar las comunidades marginadas a los sistemas de salud. La Universidad Aga Khan (AKU) y eHealth Resource Center (eHCR), que forman parte de la Red de Desarrollo Aga Khan (AKDN), son activos en las regiones en vías de desarrollo de África Oriental, Asia Central y el sudeste de Asia y actualmente están innovando el uso de tecnologías de la información y también la manera en como desplegar las soluciones. Los autores describen los programas eHealth puestos en practica y las lecciones aprendidas por AKU y eHCR para alcanzar sus valores fundamentales de impacto, acceso, pertinencia y calidad mediante la aplicación de estas innovaciones. Estos pueden ser de gran valor para los sistemas de salud y los centros médicos universitarios de los países en vías de desarrollo que quieren aprovechar los escasos recursos disponibles utilizando la tecnología de la información para crear un impacto significativo sobre la salud.

4) Programmes de cumplimiento de la medicación basados en la población : Una ventana de oportunidades
El incumplimiento con los medicamentos es una epidemia global, que causa incontables muertes y miles de millones de dólares que se pierden innecesariamente en la asistencia sanitaria. Entre el 33 y el 69 por ciento de todas las admisiones por medicamentos en los hospitales de Estados Unidos son debidas al pobre cumplimiento con los medicamentos con un aumento resultante en el costo de los cuidados de más $100 billones al año (Senst, et al., 2001). En partes menos avanzadas del mundo, los medicamentos merecen una atención adicional, dado que el acceso a estos tanto como los gastos del propio bolsillo desempeñan un papel más importante (Taj et al, 2008).
Para lograr un mejor cumplimiento con los medicamentos los hospitales deben emplear estrategias y tecnologías integradas multifacéticas para mejorar la calidad de vida del paciente, disminuir costos y comorbilidades y reducir ingresos evitables y visitas a urgencias. Este artículo explora lo que se conoce sobre el cumplimiento con los medicamentos (adherencia a los...
medicamentos) y el uso de herramientas tecnológicas, incluyendo la salud móvil integrada, PCE, receta electrónica, redes sociales y recordatorios de medicamentos.

5) El camino a seguir para la telemedicina en atención sanitaria
La Telemedicina ha mostrado un crecimiento sustancial recientemente tanto en términos de volumen financiero como en número de personas atendidas. También posee perspectivas de crecimiento en el futuro, impulsada por los avances tecnológicos y las condiciones epidemiológicas. La difusión de la telefonía móvil en las partes más remotas de los países en desarrollo, combinada con sus múltiples aplicaciones en la salud y los servicios financieros móviles ampliará la telemedicina y la pondrá al alcance de vastas extensiones de la población mundial. Sin embargo, para realizar este potencial, habrá que abordar ciertos retos, principalmente abordar el entorno legislativo.

6) Médicos de la nueva era
A los médicos residentes de hoy se les están entregando iPads cuando empiezan su educación. Ellos serán los consultores senior del futuro. Su tasa de asimilación de nuevas tecnologías es mucho mayor, lo cual es afortunado, porque todo país con un sistema de salud sofisticado está expuesto a mayores exigencias en el servicio, ya sea a través del aumento de pacientes de más edad o por tratamientos más sofisticados. Los médicos necesitan ser más móviles para tratar a sus pacientes con más flexibilidad. Mientras están en desplazamiento necesitan poder acceder al historial del paciente. Tienen que ser parte de la revolución de la innovación. Nacieron en la era numérica y necesitan ser parte fundamental en el diseño de las aplicaciones clínicas y de la tecnología en salud. – Son “Médicos de la nueva era”

7) Enfoque integrado de telemonitorización para las enfermedades no transmisibles. Una buena práctica de la Asociación europea para la innovación sobre un envejecimiento activo y saludable.
La Asociación Europea para la innovación sobre un envejecimiento activo y saludable (EIP on AHA) ha dado prioridad a las enfermedades no transmisibles (ENT). Se ha propuesto un sistema de salud integrado e innovador en torno a los sistemas de medicina y las alianzas estratégicas para combatir las enfermedades no transmisibles. Las tecnologías de información y comunicación (TIC) se hacen necesarias para la implementación de la atención integrada en un enfoque de medicina de sistemas. El hospital universitario de Montpellier ha puesto en marcha una clínica y utiliza IP-Soins ® como una herramienta de las TIC. Los pacientes con enfermedades no transmisibles se orientaran a la respectiva clínica de la enfermedad crónica del hospital por un médico generalista. Este artículo revisa la complejidad de las enfermedades no transmisibles entrelazadas con el envejecimiento. Da una visión general del problema. Presenta un enfoque innovador en la implementación de un sistema de información clínica en modo "SaaS" (Software as a Service).

8) ¿Pueden los bancos ofrecer claves digitales para la atención médica?
En la búsqueda por implementar los registros electrónicos de salud, los grupos de interés de la salud han descubierto un elefante en la sala que nadie quería ver - cómo poner en práctica la identidad del paciente y las soluciones de integridad. Sin esto; la vinculación de los registros únicos de un individuo sería imposible. Un registro incorrecto puede ser peligroso para la prescripción de un tratamiento. Sin embargo, muchos consideran el identificador único del paciente como un riesgo inaceptable para la privacidad. Medical Banking o la convergencia de los sistemas informáticos bancarios y la salud, trata de engendrar nuevas ideas que podrían afectar a esta difícil área. El artículo sugiere que las nuevas formas de eficiencia en el procesamiento de pagos pueden producir una plataforma común, de tecnología intersectorial para la gestión de la identidad digital por los bancos. Redefiniendo un banco basado en las competencias básicas, el artículo analiza tres áreas: (1) la "carrera armamentista contra el robo de identidad", (2) las innovaciones en el procesamiento de pagos, y (3) el compromiso del consumidor, y sugiere que, dado que los sistemas bancarios y la atención sanitaria convergen, la identidad digital puede convertirse en la nueva moneda. Se podrían entonces encontrar bancos completamente comprometidos en ayudar a la salud para superar el desafío de la identidad y la integridad del paciente.
Bionexo is the center of a community comprised of over 15,000 players of the hospital business. Through our web platform, we integrate hospitals throughout the supply chain sector, focusing on business development and relationships. Established in 2000, in just 10 years, Bionexo was structured in Brazil, becoming the largest marketplace reference to the hospital industry and contributing significantly to the professionalization of the purchasing sector and growth of the healthcare market. The success of this innovative business model has led to Bionexo for Latin America and Europe, where also attained leadership in addition to export technology and implement a new concept in commercial transactions of organizations. Everything happened in a short time, just like businesses are made between the companies that integrate our platforms. This makes Bionexo the largest core of the hospital sector in Brazil. Pioneering and innovation, helping thousands of companies and hospitals.

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Esri is the world leader in GIS technology. Esri software promotes exploring, analyzing and visualizing massive amounts of information according to spatial relationships. Health surveillance systems are used to gather, integrate and analyze health data; interpret disease transmission and spread; and monitor the capabilities of health systems. GIS is a powerful tool for identifying health service needs. Esri software is extensively used by health organizations throughout the world, including the US Centers for Disease Control and Prevention (CDC), the World Health Organization (WHO), 127 national health ministries, and over 400 hospitals.

For more information, contact Christina Bivona-Tellez, CBivona-Tellez@esri.com. www.esri.com/health

DNV Business Assurance, a world leading certification body, is part of the DNV Group; an independent foundation whose purpose is to safeguard life, property and the environment. With over 140 years’ experience in developing safety standards in high risk industries, we work with hospitals, healthcare organizations and other businesses to assure the performance and safety of their organisations, products, processes and facilities through accreditation, certification, verification, assessment and training. Within healthcare we are recognised as a leader in identifying, assessing and managing risk to mitigate harm to patients. Our 1,800 employees worldwide help customers build sustainable business performance and create stakeholder trust.

Ingersoll Rand, the world leader in creating and sustaining safe, comfortable and efficient environments, offers products, services and solutions that allow our customers to create healthcare environments that are an asset to life. We help establish the physical environment as the foundation of all that is done to take better care of patients and staff – optimizing patient outcomes and safety, operational efficiency and patient, physician and staff satisfaction. As a part of Ingersoll Rand, Trane and Ingersoll Rand Security Technologies provide a broad portfolio of energy efficient heating, ventilating and air conditioning systems, mechanical and electronic access control, time and attendance and personnel scheduling systems, architectural hardware, building and contracting services, parts support and advanced controls for health care buildings.

For more information, visit ingersollrand.com/healthcare.
IHF events calendar

2014

IHF

4th IHF Hospital and Healthcare Association Leadership Summit (By invitation only)
Seoul Korea  For more information, contact sheila.amazonwu@ihf-fih.org

2015  IHF 39th World Hospital Congress
6-8 October 2015, Chicago, USA
For more information, contact sheila.amazonwu@ihf-fih.org

2016  IHF 40th World Hospital Congress
Durban, South Africa  For more information, contact sheila.amazonwu@ihf-fih.org

2017  IHF 41st World Hospital Congress
November, Kaohsioung City, Taiwan
For more information, contact sheila.amazonwu@ihf-fih.org

2013

MEMBERS

USA

American Nurses Credentialing Center (ANCC) – National Magnet Conference
2–4 October 2013, Orlando, Florida
For more information: http://www.anccmagnetconference.org/

University HealthSystem Consortium (UHC) – Annual Conference 2013
17–18 October 2013, Hyatt Regency Atlanta
Atlanta, Georgia

LUXEMBOURG

24th EAHM Congress
28–30 November 2013, Kirchberg
For more information www.eahm-luxembourg2013.lu

SWITZERLAND

Congress 2013 H+
7 November 2013, Bern
For more information http://www.hplus-kongress.ch/index_fr.php
KOREA

Healthcare Congress
13–15 November 2013
Grand Hilton Hotel Convention Center, Seoul

GERMANY

German Hospital Day (Deutscher Krankenhaustag)
20–23 November 2013
Düsseldorf (on the occasion of the fair MEDICA)

COLLABORATIVE

ISQua’s 30th International Conference
13–16 October 2013
Edinburgh, Scotland
For more information: http://www.isqua.org/conference/edinburgh-2013

For further details contact: IHF Partnerships and Projects, International Hospital Federation,
151 Route de Loëx, 1233 Berne, Switzerland; E-mail: sheila.anazonwul@ihf-fih.org or visit the IHF website: http://www.ihf-fih.org
What IHF Accomplishes

The IHF is a unique arena in which all major hospital and health care associations are able to address and act upon issues that are of common and mutual concern. The IHF recognizes the essential role of hospitals and health care organisations in providing health care, supporting health services and offering education.

IHF supports the improvement of the health of society.

The IHF is a leading global body representing public and private national hospital and healthcare associations, departments of health and major healthcare authorities, with members from some 100 countries.

Our vision and objectives

The founding philosophy of the IHF is that it is the right of every human being, regardless of geographic, economic, ethnic or social condition, to enjoy the best quality of health care, including access to hospital and health care services. By promoting this value, the IHF supports the improvement of the health of society.

The objective of the IHF is to help international hospitals and healthcare facilities work towards improving the level of the services they deliver to the population regardless of the ability of the population to pay. The IHF recognizes the essential role of hospitals and health care organisations in providing health care, supporting health services and offering education.

The IHF is a unique arena in which all major hospital and health care associations are able to address and act upon issues that are of common and key concern.

What IHF Accomplishes

Projects aimed at supporting and improving delivery of hospital and healthcare services.

Regular and extensive collaboration with governmental and non-governmental organizations in developing health systems.

Creation of “knowledge hubs,” through its international conferences, education programmes, information services, publications and consultations.

In official relations with the World Health Organization (WHO) and the Economic and Social Council of the United Nations (ECOSOC), it is strategically positioned as a bridge between IHF members, the United Nations and the international health community.

As a global facilitator for health care delivery among and between key governmental and non-governmental stakeholder organisations.

What Is the Corporate Partnership Programme?

The IHF Corporate Partnership Programme, launched in 2009, is an opportunity presented to major corporations seeking to join IHF members in working to improve hospital and healthcare performance around the world.

Partnership is open to a limited number of companies who are fully engaged in the global health sector and have a good reputation as providers. Affiliation with this Partnership Programme gives a strong signal to the global community that the Corporate Partner is a major world player in the hospital and healthcare sector.

The Partnership package provides access to hospital and healthcare decision makers from around the world. The Programme provides an exclusive opportunity for relationship building and sharing of ideas and experiences between corporate leaders and executives in the hospital and healthcare sector. Dialogue through this platform will ultimately introduce new ideas and expand knowledge in the healthcare market.

The benefits of the Programme are designed to maximise interaction between actual and potential clients through a “one-stop shop” approach. Opportunity to ultimately create a corporate leadership body, to act as a neutral platform for wide-ranging intra-industry discussions on issues of mutual concern beyond and outside of traditional parameters of marketing and sales, to enhance confidence in commercial relations in the health sector as well as performance and quality of services and life to the community at large.

Becoming a Corporate Partner

Contract Terms

- Payment covers a calendar year period of: 1 January – 31 December
- Payment can be made on annual basis
- Letter of Agreement

The Corporate Partnership is established upon signature of a letter of agreement by representatives of both the International Hospital Federation and an authorised signatory of the Corporate Partner organisation.

Application

For additional information, please contact:
Sheila Anazonwu, Partnerships and Project Manager
IHF Secretariat
151 Route de Loëx, 1233 Bernex, (Geneva) Switzerland
Tel: +41 (0) 22 850 94 22; Fax: +41 (0) 22 757 10 16
E-mail: sheila.anazonwu@ihf-fih.org; Website: www.ihf-fih.org

2013 Corporate Partners
Mark Your Calendar
International Hospital Federation
39th World Hospital Congress

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More information will be forthcoming at www.ihf-fih.org, but for now, save the date!