# Challenges for E-Health use and Administration Efficiency in the Health Care Sector, an Interdisciplinary Research

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## Abstract

*The intention of this research is to identify whether it is possible to increase the average of life expectancy in Latin America. With this purpose, this work tries to find evidence and proof of information and communication technologies (ICTs) need through the use of e-health devices, in the health care industry, as well as the need of administrative practices improvement for the proper use of budgets in the critical health care areas, such as medicines and medical devices. Therefore, it is necessary to make an interdisciplinary merge of knowledge fields, specifically ICTs and administration, in order to find some options for increasing this average of life expectancy in Latin American countries.*
*This investigation was held through the qualitative research method. It consisted of the compilation, revision and analysis of literature related to ICTs and administration in the health care sector. It was found that in countries, in which the correct use of these two disciplines is implemented, an efficient system of attention and prevention of diseases is attained. Based on these findings, it is considered that the life expectancy in Latin American countries or any other country with similar issues can be improved, by correctly implementing the use of ICTs and good administration practices in the health care area.*

*Keywords: e-health, challenges, ICT, Administration, budget, efficiency.*

## 1. Introduction

The average life expectancy in South America is 75 years, Index Mundi (2019), and the life expectancy in Mexico and Central America is 75 years for both men and women as an average, Statista (2019). The average life expectancy in Europe and The USA is about 82 years, The world Bank Group (2020). As it can be seen, there is a 7-year gap between Latin American countries and The USA and Europ**e,** that difference is due to many circumstances and reasons, but the fact is that people in Latin America do not have the same opportunity of life expectancy.
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It is considered that a possible cause to this is the bad budget administration in the health care sector; as evidence, there is information that the administration expenses are not well managed in Latin America countries as Figure 1 shows. Mexico, as an example, has the highest expenditure in administrative concepts rather than spending more of its budget on the acquisition of medicine or modern medical devices. Evidence of this is the lack of sick people assistance, infant mortality rates, which are among the highest in Latin America; the increasing mortality rate from coronary heart disease even as it is falling in almost every other OECD country; (2014) the obesity rate, which is the second highest in the OECD; and the fact that almost one in six adults is diabetic, Takenga *et.al.* (2014). This evidence shows that in many countries in Latin America, there is a lack of medical assistance, which is due to the lack of budget for medicines and hospital assistance.

Across the 36 countries of the OECD, direct payment by households – out- of-pocket (OOP) accounted for more than 20% of health spending on average, the equivalent to 700 USD per person.
In Latvia and Mexico, this share was 40% or more, while in Grece, Korea, Lithuania and Chile, around a third of all health spending was still accounted for by OOP payments. On the other hand, the figure was closer to 10% of health spending in France, the United States, Luxembourg and the Netherlands (Figure 1), although in the case of the Unites States, this represents more than 1000 USD per person. Switzerland is notable as both a high overall spender on health care, and a country with a significant proportion of this financed directly through household spending.

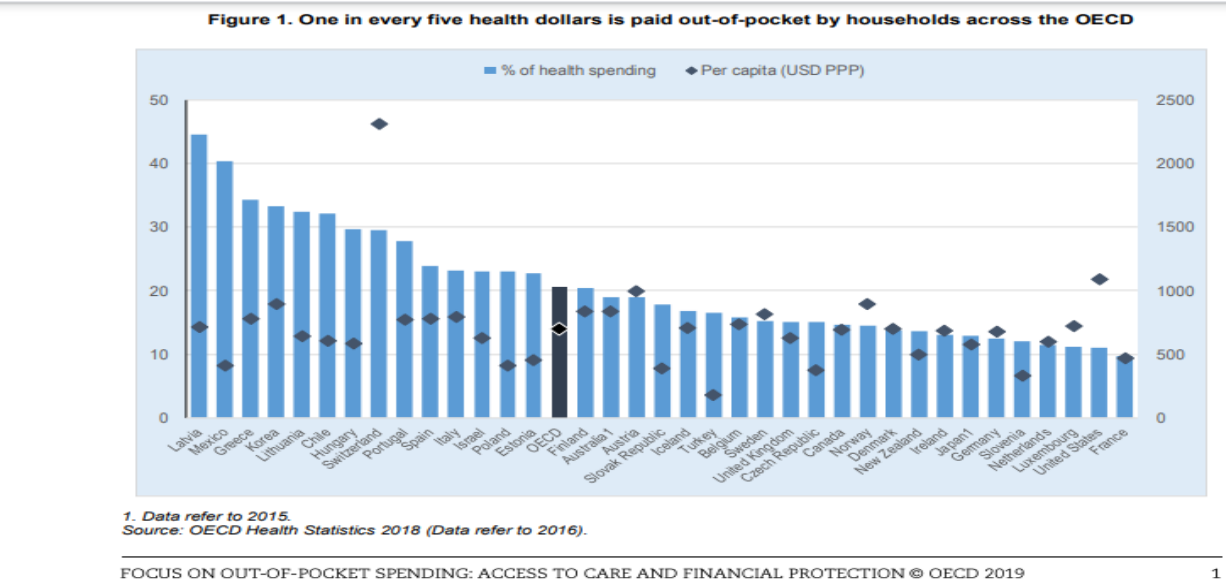


**Figure 1. Out-of-pocket payments are the highest in the OECD**

As a percentage of total health expenditure, 2016
*Note*: The figure shows data that is comparable across countries.
Source: OECD Health Statistics 2018 (Data refer to 2016).

Health care is currently provided by segmented networks, each of them employing its own staff, with no synergies, high duplication and entitlements determined by employment status.

During 2011, a research about e-health requirements in Latin America and the Caribbean was conducted. The experiences described in this publication show the efforts that different countries in the region are making to incorporate ICTs into the health sector. However, they also reveal the relative lack of institutional mechanisms, at national and regional level, to articulate these efforts in a public policy designed to bridge health access gaps, address epidemiological changes and overcome increasing pressure on health expenditure. The present difficulty does not reside in deciding whether to incorporate ICTs or not, but rather in finding the best options and formulating the right strategies to realize their potential in a cost-effective manner. ICTs must be incorporated into public health policies in each of these countries to improve health care, optimize processes and cut costs. Fernandez & Oviedo, (2011).

This paper shows the challenges that any country in Latin America has; for instance, the use of e-health and also the challenges of adopting a good administration control of e-health budgets, having the opportunities to improve health services and public health conditions through the use of e-health and the adoption of good practices of budget control.

## 2. Objective

The aim of this research is to identify, based on the literature revision, the challenges and opportunities to increase the life expectancy in Latin America countries through the merge of two disciplines as ICT and Administration, looking out all the benefits of the use of these two disciplines.

## 3. Research Questions.

- What are the main challenges in Latin American countries, for using e-health as a proper practice in health institutions and for the adoption of good practices in budget administration in the health care sector?

- What health practices are the most important and significant to improve the health services in Latin America through e-health implementation?
- What practices are necessary to correctly manage the health care budget?

## 4. Hypothesis

The merge of ICT and Administration subjects and their use as a common practice, has a positive influence in the health services and the improvement of the current 75-year life expectancy rate in Latin American countries, as Fernandez & Oviedo, (2011) defined in their research.

## 5. Methodology Research

The research method used in this paper is a qualitative method, consisting, in the Documentary Compilation, which is based on the printed manuscripts results of various authors, presenting empirical evidence on the use of e-health in different countries and the benefits they have obtained through the implementation of e-health as a normal practice, and analyzing the effect of a good health care administration budget in different countries, looking at the benefits of this good practice.

## 6. Literature Framework

JMIR (2001) defines that one of the most important discussion topics in the literature these days is about e-health, but few people have come up with a clear definition of this comparatively new term. Barely in use before 1999, this term now seems to serve as a general "buzzword," used to characterize not only "Internet medicine", but also virtually everything related to computers and medicine. The term was apparently first used by industry leaders and marketing people rather than academics. They created and used this term in line with other "e-words" such as e-commerce, e-business, e-solutions, and so on, in an attempt to convey the promises, principles, excitement (and hype) around e-commerce (electronic commerce) to the health arena, and to give an account of the new possibilities the Internet is opening up to the area of health care. Intel, for example, referred to e-health as "a concerted effort undertaken by leaders in health care and hi-tech industries to fully harness the benefits available through convergence of the Internet and health care." Because the Internet created new opportunities and challenges to the traditional health care information technology industry, the use of a new term to address these issues seemed appropriate. These "new" challenges for the health care information technology industry were mainly (1) the capability of consumers to interact with

their systems online (B2C = "business to consumer"); (2) improved possibilities for institution-to-institution transmissions of data (B2B = "business to business"); (3) new possibilities for peer-to-peer communication of consumers (C2C = "consumer to consumer").

So, how can we define e-health in the academic environment? One JMIR Editorial Board member feels that the term should remain in the realm of the business and marketing sector and should be avoided in scientific medical literature and discourse. However, the term has already entered the scientific literature (today, 76 Medline-indexed articles contain the term "e-health" in the title or abstract). What remains to be done is - in good scholarly tradition - to define as well as possible what we are talking about. However, as another member of the Editorial Board noted, "stamping a definition on something like e-health is somewhat like stamping a definition on 'the Internet': It is defined how it is used - the definition cannot be pinned down, as it is a dynamic environment, constantly moving."
It seems quite clear that e-health encompasses more than a mere technological development. I would define the term and concept as follows:

> *"JMIR(2001), e-health is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology."*

This definition hopefully is broad enough to apply to a dynamic environment such as the Internet and at the same time acknowledges that e-health encompasses more than just "Internet and Medicine".
As such, the "e" in e-health does not only stand for "electronic," but implies several other "e's," which together perhaps best characterize what e-health is all about (or what it *should* be). Last, but not least, all of these have been (or will be) issues addressed in articles published in the Journal of Medical Internet Research.

## 7. Challenges for e-health use in Latin America Countries

Gund *et.al.* (2013) states that the use of information and communication technology (ICT), trough e-Health devices, could be used at home for the health care of premature infants in Sweden. This a challenge, since in Latin American countries this technology has not been used yet. The paper referred, covers results from a

study on the use of e-Health applications designed for neonatal care at home, its results indicate that the use of video conferencing was greatly appreciated by the families and was felt to reduce the need of home visits. Therefore, using a web application for daily collection of data was another potentially useful alternative. The research also mentions that nurses generally adapted well to the use of ICT, despite the fact that motivating some of them was a challenge.

In the case of India, OCDE (2014b), research observes that electronic healthcare has various advantages, such as easy recording, retrieval, and sharing of patient data anytime and anywhere while providing data privacy, whereas many developing countries still rely on traditional paper-based health care systems, that are quite vulnerable to data loss, loss of patients' privacy due to non-secured practices. This would be useful in Latin America, but the challenge is to convince nurses and doctors about the advantages of ICT use in health care sector.

Another significant challenge to improve health care sector in Latin American countries is revised in the research conducted by Amina et.al. (2013), in which they propose that aged patients lack mobility and rely on caregivers for their medication; subsequently treatment is often reactive, based on prescribing medications for known and newly diagnosed conditions. Comprehensive Medical Assessments (CMAs) are available at no cost to residents in aged care and Health Cube has developed an electronic CMA process that underpins the preventative aged care service package, which promises to change aged care treatment through a new model of (general practitioner) GP-patient engagement.

Additionally, as stated by Amina *et. al*. (2013), another challenge is developing information and communication technology (ICT) supporting health communication in PHC (Primary Health Care) that could contribute to increase health literacy and empowerment, which are foundations for enabling people to increase control over their health, as a way to reduce the increasing lifestyle related ill health. However, to increase the likelihood of success of implementing ICT supported health communication, it is essential to conduct a detailed analysis of the setting and context prior to the intervention.

Another challenge for Latin American countries in improving the health care sector is what Caratozzolo & Parlangel, (2008), mention about the “Nomadic patients” people who, mainly for work, move around the world very often. Such people have the right to an effective, safe, fast health-care assistance wherever they are. Some technological devices are currently being experimented, in order to let personal health-related information be portable and easily transferable. However, each of these devices follows an idiosyncratic concept. An explorative study has been

carried out to understand which procedures, if any are currently being used in Italy to manage nomadic patients' data. The goal of this work was to outline a concept of information. Since Diabetes is one of the most serious disease in Latin America, this strategy proposed by Takenga et.al. (2014), is very important based on ICT Tools adaptation. Information and communication technologies (ICT) have great potential to address some of these challenges faced by several countries in providing accessible, cost-effective, and high-quality health care service. This paper presents the Mobil Diab system which is a tele medical approach proposed for the management of long-term diseases. The system applies modern mobile and web technologies which overcome geographical barriers and increase access to health care services. The idea of the system is to involve patients in the therapy process and motivate them for an active participation.

With the purpose of better protect health workers, Yassi et.al. (2011), developed a research regarding a tool that led to developing information and communication technology (ICT) tools. The research conducted also showed the need for better workplace inspections, so a workplace audit tool was also developed to supplement worker questionnaires and the ICT. To improve occupational health and infection control, resulting in an improved web-based health information system to track incidents, exposures, and occupational injury and diseases. As the H1N1 pandemic struck, the online infection control course was adapted and translated into Spanish, as was a novel skill-building learning tool that permits health workers to practice selecting personal protective equipment.

Latin America currently occupies the first places in the world in obesity, which represents one of the main problems of public health of this part of the world. This has aroused the interest and need for technological and scientific community to join to health specialists, to generate strategies to strengthen traditional preventive treatments for weight control. One of these strategies is the development of applications e -health for the Android operating system. Even though, there are some applications available for this purpose, most of them don´t have a backup of health professionals, making unreliable diagnoses and suggestions. To assist in reducing this problem, the most popular Android applications obesity were analyzed, this allowed to establish key features to consider in e-health applications. Such findings were embodied in an application for the monitoring of Obesity, where the obtained results were discussed at the end of the article referred.

## 8. Good practices of Budget Administration, and Challenges

The efficiency of operations in Nederland’s, improved in some areas but certainly not in all. It appears that when budget incentives are aligned with professional

opinions and attitudes, budgetary reforms manage to change institutional performance and thus establish a tight coupling between the budget system and professional conduct. In these situations, budgetary reforms reinforce latent professional attitudes. This applies to the substitution effect between in-house treatment and policlinic care in hospitals and the increase in research productivity in universities

This study is an exploratory examination of the impact budgetary reforms had on cost control, efficiency of operations and manageability of organizations. Given the little amount of information available and the highly aggregated nature of it, Groot, (1999).

India's demographic trends portend moderately rapid ageing of the population. This combined with the limited coverage of pension and health care programs in terms of population, types of risks covered, and benefit levels has led to greater urgency in extending the coverage and reform directions of the current pension and health care programs. This article analyses three pension and health care initiatives in India directed at the workers and their families engaged in the informal sector. The first initiative, India's National Social Assistance Programme (NSAP), undertaken in 1995 provides budget-financed transfers targeted at older persons. It is funded by the Union government but implemented by the state governments. The second initiative, called Swavalamban, was started in 2010, but has been subsumed under Atal Pension Yojana (APY), in the 2015-16 budget. Both are voluntary co-contributory initiatives aimed at providing access to retirement income to low-income individuals (government co-contributing with the individual). Unlike Swavalamban, the APY initiative has provisions for minimum guaranteed pension benefits, with contributions required by the members adjusted accordingly. Effectiveness in increasing enrollment and in sustaining contributions over a longer period will impact on the extent of retirement income security obtained by the members. The third initiative, Rashtriya Swasthya Bima Yojana (RSBY), is insurance-based and aims to provide hospital care to low-income households. The article argues that for improving outcomes of these initiatives, more effective implementation, greater fiscal resources, and an integrated and systemic approach which is aided by technology-enabled platforms such as Aadhaar, will be needed, Asher, Mukul, & Maurya, (2015).

As it can be seen, in India, they are looking for provide, insurance and hospitals, for low income people and the three initiatives presented, are based on a budget stablished by voluntary contribution and fiscal resources, putting systemic approach to comply with their aims,

The Veterans Health Administration (VHA) provides health care for U.S. military veterans. By the early 1990s, the VHA had a reputation for delivering limited, poor-

quality care, which led to health care reforms. By 2000, the VHA had substantially improved in terms of numerous indicators of process quality, and some evidence shows that its overall performance now exceeds that of the rest of U.S. health care. Recently, however, the VHA has started to become a victim of its own success, with increased demands on the system raising concerns from some that access is becoming overly restricted and from others that its annual budget appropriations are becoming excessive. Nonetheless, the apparent turnaround in the VHA's performance offers encouragement that health care that is both financed and provided by the public sector can be an effective organizational form, Adam(2007).

The VHA is an example of a good budget administration since his overall performance exceeds the rest of U.S, health care, based in some evidence of health care activities.

Policy implementation in the context of health systems is generally difficult and the Kenyan health sector situation is not an exception. In 2005, a new health sector strategic plan that outlines the vision and the policy direction of the health sector was launched and during the same year the health sector was allocated a substantial budget increment. On basis of these indications of a willingness to improve the health care system among policy makers, the objective of this study was to assess whether there was a change in policy implementation during 2005 in Kenya. Methodology: Budget allocations and actual expenditures compared to set policy objectives in the Kenyan health sector was studied. Three data sources were used: budget estimates, interviews with key stakeholders in the health sector and government and donor documentation. Results: Budget allocations and actual expenditures in part go against policy objectives. Failures to use a significant proportion of available funds, reallocation of funds between line items and weak procurements systems at the local level and delays in disbursement of funds at the central level create gaps between policy objectives and policy implementation. Some of the discrepancy seems to be due to a mismatch between responsibilities and capabilities at different levels of the system. Conclusion: We found no evidence that the trend of weak policy implementation in the Kenyan health sector was reversed during 2005 but ongoing efforts towards hastening release of funds to the districts might help solving the issue of low absorption capacity at the district level. It is important, however, to work with clear definitions of roles and responsibilities and well-functioning communications between different levels of the system, Glenngård & Maina, (2007).

This is an example that same than Latin America countries, the health care budget is not well managed in Kenia, since their expenditure doesn’t match with objectives of health care services.

Crown et.al. (2017) say that, providing health services with the greatest possible value to patients and society given the constraints imposed by patient characteristics, health care system characteristics, budgets, and so forth relies heavily on the design of structures and processes. Such problems are complex and require a rigorous and systematic approach to identify the best solution. Constrained optimization is a set of methods designed to identify efficiently and systematically the best solution (the optimal solution) to a problem characterized by a number of potential solutions in the presence of identified constraints. This report identifies 1) key concepts and the main steps in building an optimization model; 2) the types of problems for which optimal solutions can be determined in real-world health applications; and 3) the appropriate optimization methods for these problems. We first present a simple graphical model based on the treatment of "regular" and "severe" patients, which maximizes the overall health benefit subject to time and budget constraints. We then relate it back to how optimization is relevant in health services research for addressing present day challenges. We also explain how these mathematical optimization methods relate to simulation methods, to standard health economic analysis techniques, and to the emergent fields of analytics and machine learning in Europe.
This is an example that it's possible comply with the health care services properly no matter if the budget and other facts are constraints.

South Africa has made substantial progress in developing its health care system since 1994. Universal access is a fundamental principle of the Constitution and health sector policies, and health outcomes have improved on aggregate. However, health inequities remain an important challenge today. Focusing on public financial management and the budgeting process for health, South Africa has a clear, well-structured and transparent process to budget formulation from national to provincial governments. But this transparency does not fully transmit on allocation decisions to health from provincial treasuries. In terms of budget execution, up-to-date data reporting systems, strict enforcement of fiscal rules, and well-developed monitoring processes are good budgetary practices. However, despite good aggregate spending levels, there is great disparity in the way provinces execute their budget. Finally, South Africa has well-established monitoring processes. However, the link between performance indicators and the budget process remains limited and could be strengthened. Gmeinder,(2018).
This is a clear example of budget expenditure control through monitoring their proper execution and utilization.

## 9. How the merge of the ICT and Administration disciplines, could help in increasing the average life expectancy in Latin America.

After having presented evidence of the positive effect of e-health use in people with lack of mobility, frequent travelers or premature baby's care at home; having referred to the benefits that the implementation of e-health technology has in preventing or properly and opportunely reacting to a disease or a health problem like obesity to prevent heart attacks; with knowledge that there is no use of these e-health devices in Latin America yet; and having explained the positive effects in the health care sector for the proper administration of budgets, using them for the acquisition of medication or medical devices instead of spending budgets on administrative aspects like Latin American countries do (See figure No.1); making a merge of these two subjects and setting up their use in Latin American countries is possible, in order to increase the average of life expectancy in this part of the world though the adequate use of the e-health devices and the prevention or attack of health problems on time.

## 10. Interdisciplinary focus for the research purpose

Almond and Power, (2018), say that the aim of their research is to explore how the discipline of pattern cutting can be taught, investigated and practiced through innovative, interdisciplinary approaches. Interdisciplinarity involves the combining of two or more academic disciplines into one activity (for instance in this enquiry, pattern cutting is merged with disciplines such as health and engineering). The study discusses how interdisciplinary can break rules, which involve going against a set of regulations that direct a practice or method within an area of activity. This mutinous concept can make pattern cutting appear more exciting and creative to the student and often leads to them exploring different concepts and approaches. The research was based on secondary sources gathered from a review of research papers presented at The Second International Conference for Creative Pattern Cutting, held at University of Huddersfield, 24 and 25 February 2016. This conference was purposively selected due to its discipline relevance and international representation and was unique to the authors because they organized and chaired the event. To date, this has been the sole global platform to disseminate research in pattern cutting and the approach is described as a methodology of conference organization, using content analysis and interviews with the individual authors of selected papers. It focuses on works that considered new ways to pattern cut by effectively implementing interdisciplinary activity into its practice. The findings discuss how the disorderly methods impacted on the student's experiences. Ultimately this supports the development of original, novel and innovative pedagogical approaches to pattern cutting practice and has the potential to enrich the fashion industry, encouraging pattern cutters to develop essential skills to cross discipline boundaries.

Interdisciplinary research via multi- or cross-disciplinary teams, where multi-disciplinarity is understood as an informal juxtaposition of insights from two or more disciplines, and cross-disciplinarity includes some level of knowledge integration among two or more disciplines. This requires a minimum of common knowledge in order to communicate the members of the team. We would like to suggest that multidisciplinary team are related via insights and opinions (Doxa) while cross-disciplinary teams are also related via knowledge (Episteme), Callaos (2017).

Rope (2020), considers the interdisciplinary communication as an outcome of interaction in a Trans disciplinary Research (TR) setting can take on different forms that comprise various and differing types of knowledge. This includes 1) declarative knowledge (episteme) which is about the current state of the system, and can take the form of new testable hypothesis, or contributions to theory 2) transformative knowledge (praxisor poïesis), which considers what the innovation should achieve and could be embodied in new products, services or policy insights and 3) transformational knowledge (phironēsis).

## 11. Conclusion

After the analysis of the literature related to the research topic in a multidisciplinary research, it is considered that the proposition is demonstrated, because all the evidence presented, for the use of e-health devices, which represent opportunities to improve the health care services, as well as the improvement in budget administration control in the health care sector; then the merge of the two disciplines mentioned, (ICT) Information and Communication Technology and Administration, have a positivity effect in average life expectancy of Latin America countries of 75 years; if these disciplines are adopted. As a good budge control example, there is the case of Veterans Health Administration (VHA), which has a high quality process of budget administration and control, demonstrating a very good performance that exceeds the performance of the rest of U.S. health care fund and budgets, as well as the use of ICT, trough e-Health devices that could be used at home health care of premature infants, like in Sweden. This is also a good example of challenge for Latin America countries that could be tackled for these countries, having the opportunity for increase the expectancy of life from 75 years to 82 years like USA and Europe; by merging this two subjects, Administration and ICT through e-health devices, and adopting them as a normal practice, to prevent any kind of disease and having the medicines and medical devices necessary to give attention to all sick population, so to increase the average life expectancy in Latin America countries.

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