Proceedings of the 10th Health Informatics in Africa Conference

HELINA'17

PART I
Case Studies and Experience Papers

Integrated Health Information Management Resources for Global Health Care Strategies

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Editorial to the HELINA 2017 proceedings

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The HELINA 2017 Conference

The 10th HELINA (HEaLth INformatics in Africa) conference was organized from 23 to 26 April 2017 in Bujumbura, Burundi. The event was hosted and organized by the Burundi Health Informatics Association (BHIA) which is an independent organisation created to promote the application of Health Informatics in Burundi. BHIA and is a registered member of the International Medical Informatics Association (IMIA) and HELINA.

HELINA is the pan-African health informatics organization which has a tradition of organizing this event that goes back to 1993. Previous HELINA conferences were hosted in Ghana (2015), Nigeria (1993), South Africa (1996 & 2003), Zimbabwe (1999), Mali (2007), Ivory Coast (2009), Cameroon (2011) and Kenya (2013).

HELINA 2017 aimed to focus on the development and implementation of integrated e-Health plans and policies that builds bridges between existing information management silos and propose pathways to close the gaps in African e-Health developments related to infrastructure, e-health enabled human resources, international standards application, legal and ethical frameworks, sustainable funding mechanisms and the use of robust and down-to-earth ICT solutions. Special attention was paid to the role of e-Health in achieving the Sustainable Development Goals (SDG) voted by the UN in September 2015 and more specifically to goal 9, target 9c which aims to "*Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in the least developed countries by 2020"*.

Conference Themes

The call for submissions for HELINA 2017 covered a broad range of health informatics topics with relevance for Africa under the title "Integrated Health Information Management Resources for Global HealthCare Strategies". Academic research papers and case study/experience papers where solicited within the following themes:

- National and Regional e-Health Strategies and Policies
- Health Information Systems Interoperability
- Human capacity building for e-Health
- Sustainable systems implementations
- ICT-solutions for Universal Health Coverage

Submissions of papers that fell outside any of these themes were also acceptable as long as they demonstrated any relevance for the health informatics domain in Africa.

Review process

A first call for papers was published in English and in French and sent out in October 2016 with a deadline for submissions on 15 January 2017. A total of 37 submissions were received in due time for the HELINA 2017 conference. A double blind peer review process was used for evaluating each paper in a first round. All received submissions were anonymized before being submitted to at least 2 reviewers according to their expertise. The reviewers had the option to accept submissions either as full research papers or case study/experience papers. The SPC chairs based their final decision on the acceptance of each submission on the recommendations and comments from reviewers. Accepted submissions were then sent back to the authors for revision according to the reviewers' comments. The final reviewed paper

versions submitted by the authors were checked by the SPC chairs on technical criteria. This review process resulted in the following acceptance rates:
- Full research papers: 38% (n=14)
- Case studies and experience papers: 49% (n=18)
- Rejected or retracted papers: 13% (n=5)

In order to be included in the conference proceedings, an accepted paper had to be presented at the conference.

HELINA 2017 conference content
Conference papers were organized in a number of thematic tracks:

- National and regional e-health strategies and policies (5 papers)
- Data mining and big data analytics (8 papers)
- Capacity building and health informatics education (3 papers)
- Systems interoperability (4 papers)
- Medical devices and telemedicine (3 papers)
- Sustainable health information systems for Africa (6 papers)
- Universal health coverage (3 papers)

The most popular topics were *Data mining and big data analytics*, as well as *Sustainable health information systems for Africa*. Various workshops and panel discussions were also included in the programme. The papers presented at the conference indicated that a lot of good work is being done across Africa in terms of working towards universal health coverage supported by e-health interventions.

Frank Verbeke HELINA 2017 SPC Chair
Nicky Mostert-Phipps HELINA 2017 SPC Co-Chair

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Peer-reviewed and selected under the responsibility of the Scientific Programme Committee

WaidX: a novel telematic platform in Medicine

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3: Associazione Patologi Oltre Frontiera NGO, Milano, Italy
4: Bugando Medical Centre, Oncology Department, Mwanza, Tanzania
5: University of Burundi - University Teaching Hospital of Kamenge - Department of Pathology, Bujumbura, Burundi

Background and Purpose:
The increasing incidence of pathologies like tumors and infections is a significant public health burden in developing Countries.
Providing early diagnosis, treatments, follow-up care has a strong impact on the survival.
Telemedicine is of great utility by allowing for the performance of good level healthcare practices, but sub-Saharan African Countries also suffer a dramatic shortage of appropriate facilities and are victims of digital divide, since they lack of ICT infrastructures and telecommunication resources.

Methods:
In cooperation with Patologi Oltre Frontiera NGO (APOF) and Bugando Medical Centre (Mwanza, Tanzania), we started the development of a novel telemedicine platform named WaidX devoted to close these gaps, enhancing the performance in data transmission and the ICT service continuity.
A telematic link between BMC and IRST Oncologic research Institute in Italy was realized during the pilot phase, then we started a collaboration with Department of Pathology of University Hospital of Bujumbura to fit the model to a different operative setting.
We carried out several experimental sessions to investigate the compatibility of WaidX with the main digital pathology products, introducing concurrent web-conference sessions between remote medical working groups and simultaneous access to a shared medical record software.

Results:
Experimental data show a great improvement in the bandwidth and a strong compensation of transmission defects. All the sanitary applications are positively impacted when carried by WaidX.

Conclusions:
WaidX is a highly innovative general-purpose solution which increases efficiency and efficacy of healthcare practices, reduces the impact of digital divide and supports the know-how improvement in developing Countries.

Keywords: Telemedicine, Telepathology, Digital Divide , Health Informatics,WaidX

Statement on conflicts of interest: Nothing to declare

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Tools for effective Capacity Building for Health and other Priority Sectors in Rwanda

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With the update of its strategic Plan 2014-2019, the National Capacity Building Secretariat (NCBS) of Rwanda has given strategic priority to effectively and efficiently deliver NCBS services. One of the key result areas of NCBS Strategic Plan 2014-2019 is about 'the availability of accurate and reliable capacity building information for decision making' (Verbeke, 2016). In the effort to realize this key result, a Capacity Building Management Information System1 (CBMIS) has been designed with the support of the Belgian Technical Cooperation through its e-health framework contract with the Vrije Universiteit Brussel. With the CBMIS, NCBS will have a powerful instrument to collect all data concerning competencies, skills and capacity of the Rwandan workforce. It is important, therefore, that the CBMIS becomes the single point of access for CB information for all CB stakeholders and that NCBS becomes the official and de facto authority in CB in Rwanda. In order to achieve this goal, NCBS needs (1) the capacity to manage the tool and (2) the capacity to guide and support the private and public sector in capacity development.

Keywords: e-Health, Capacity building, Effective training

1 Manage the CBMIS tool

NCBS has an adequate core CBMIS team on board. Although, to make this tool the single point of access for CB information, the implementation of the CBMIS applications has to be accompanied by an important need for training, estimated at 5 tot 20 agents per Ministry Departments and Agencies (MDA) (Verbeke, 2016). But even if training results in the employees gaining the required competencies, these will not be used on the job unless any non-training causes of performance gaps have been removed (Blanchard, Thacker, 2013). At this moment, there are some environmental factors that need to be aligned to support the new behaviour that training will be focused on (e.g. partial reporting, limited experience with CB theory, reporting issues,...). We therefore emphasize the importance of an organizational analysis in all MDA's to determine how well organizational structures and policies are aligned with the behaviour that is desired to make the CBMIS work.

2 Guide and support the private an public sector in capacity building

NCBS operates as a coordinating agency that assists MDA's with their Capacity Building Plans (CBP) and with the implementation of their CB activities (Verbeke, 2016). Therefore, NCBS has to develop and manage a systematic method for determining what caused performance to be less than expected or

[1] The CBMIS shall comprise the following applications: Capacity Needs assessment, Capacity Building Planning, Capacity Building Provider Management, Capacity Building Trainees Management, Professional Internship Placement Mangement, The National Skills Database, Capacity Building Funding Management (Verbeke, 2016)

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required in an organization, department or agency. We call this a Training Needs Analysis (TNA). The input for this TNA consists of an organizational analysis[2], an operational analysis[3] and a person analysis[4]. The output is the conclusion as whether the performance gaps indicate either training or non-training needs, and in some cases, both. A TNA helps determine whether training can correct the performance problem. In some cases, the TNA indicates that employees lack the necessary knowledge, skills and attitudes (KSA) to do the job. Training can be one of the solutions (cfr. Figure 1). In other cases, employees have the KSAs to do the job, but there are roadblocks that prevent effective performance. These barriers need to be identified and removed (Blanchard, Thacker, 2013). TNA shift a focus on the individual level to a focus on an institutional level. Figure 1 is a visual graph of the process from trigger to solution.

The trigger for a TNA can be a current performance gap (reactive TNA) or a performance gap that will exist at some point in the future (proactive TNA). An intensive collaboration with development partners will encourage the proactive approach of performance gaps. A good example in the health sector is provided by the Rwandan Health Sector Skills Council who maintains a database (using the OpenAssociation software) of registered and licensed health professionals in Rwanda and their training activities within the context of Continuing Professional Development (CPD). We therefore have at our disposal a sound registration of actual KSAs in the health domain. This makes it possible to determine employee readiness[5] and prepare health professionals for changes in their current jobs.

When TNA shows that training is needed, evaluation of training should be part and parcel of it. It provides evidence of the value of the training activities to the organization, department, NCBS, development partners, … and can be used to guide efforts towards success.

To determine how well the training met its goals, it is advisable to examine reaction, learning, behaviour and organizational results. Reaction outcomes[6] come first and will influence how much can be learned. Learning outcomes[7] influence how much behaviour can change back on the job. Behaviour outcomes[8] are the changes of behaviour on the job that will influence organizational results. Organizational results are the changes in organizational outcomes related to the reason for training in the first place (Blanchard, Thacker, 2013, p.339). NCBS should guide the organizations, departments and agencies within the Ministry of Health and other MDAs in the evaluation process by offering the instruments and instructions. The results can be recorded in the CBMIS.

3 Conclusion

NCBS and the development partners have made great efforts in the area of capacity building for health and other high priority sectors. A solid TNA and evaluation procedure, based on sound scientific research, can contribute to coping with the challenges.

2 Organizational analysis: the examination of an organization's strategy, its goals and objectives, and the systems and practices in place to determine how they affect employee performance (Blanchard, Thacker, 2013, p110)

3 Operational analysis : the examination of specific jobs to determine the requirements, in terms of the tasks required to be carried out and the KSAs required to get the job done (Blanchard, Thacker, 2013, p110)

4 Person analysis : the examination of the employees in the jobs to determine whether they have the required KSA to perform at the expected level (Blanchard, Thacker, 2013, p110)

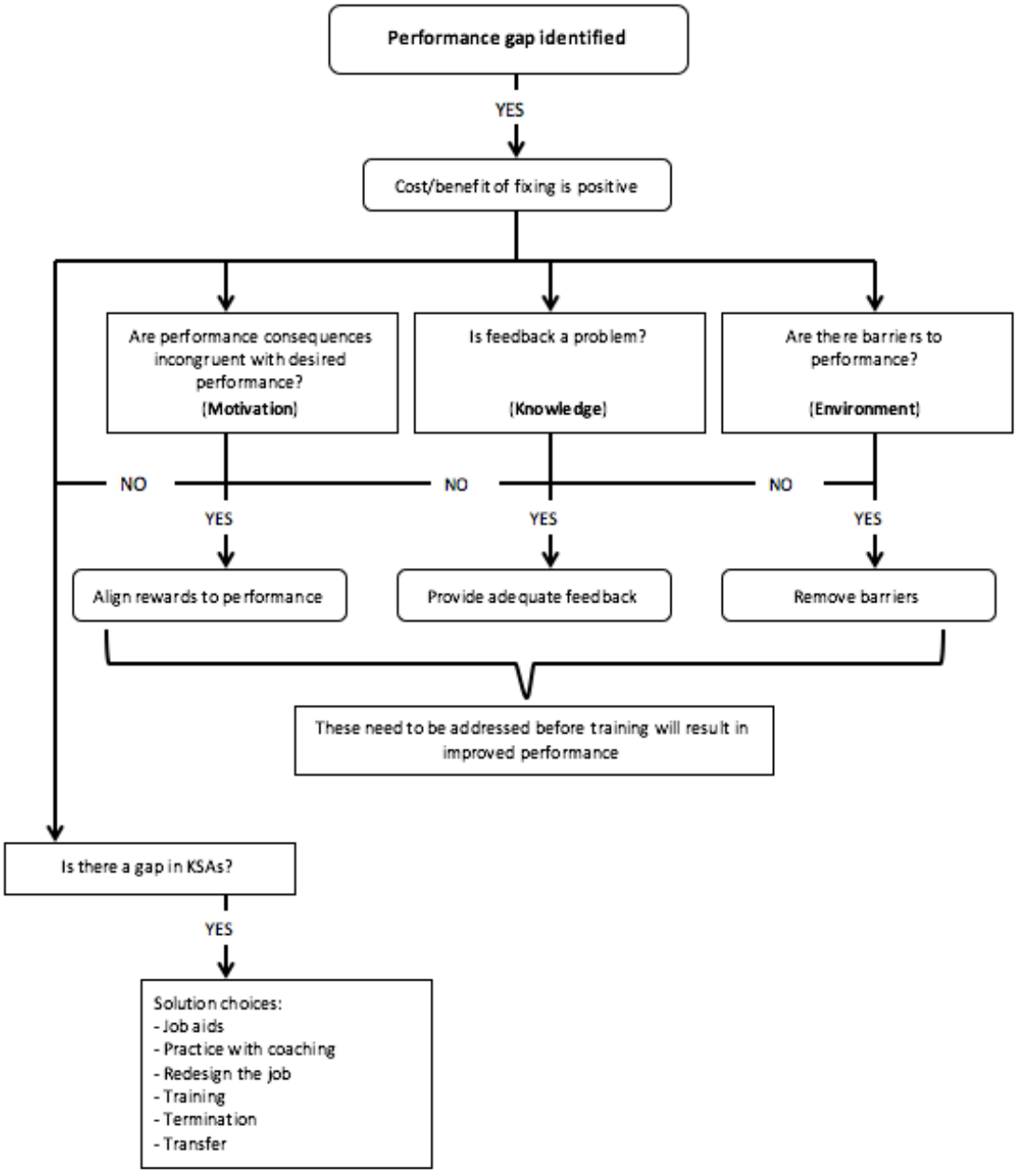
5 Employee readiness : the difference between what is expected in the new job versus what the professional is currently capable of doing (Blanchard, Thracker, 2013, p.142)

6 Reaction outcomes : measures of the trainee's perceptions, emotions and subjective evaluation of the training experience (Blanchard, Thacker, 2013, p.339)

7 Learning outcomes : measures that reflect how well the learning objectives and purpose were achieved (Blanchard, Thacker, 2013, p.340)

8 Behaviour outcomes : measures of the degree to which the learned behaviour has transferred to the job (Blanchard, Thacker, 2013, p. 340)

Figure 1. Model of process when a performance gap is identified



Source: Blachard & Thacker, 2013, p.111

References

Blanchard, P. N. & Thacker, W. J. (2013). Effective Training. Systems, Strategies and Practices

Verbeke, F. (2016). NCBS – Information Management Strategic Plan (IMSP)

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Policies and Procedures on Governance of Data Use to Support Health Information Exchange (HIE) in Low- and Middle-Income Countries (LMIC)

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LMIC are increasingly contemplating electronic health data sharing architectures using the HIE approach. Successful large-scale interoperability depends on effective policies and procedures (P&P) for data sharing [1,2]. We undertook a review of P&P for HIE in LMIC to determine the current state of and identify a potential pathway to successful development and implementation of P&P.

We gathered information on 28 LMIC, including 17 countries in Africa.[1] The use cases and value proposition for HIE vary and appear to reflect country and funder priorities.

Countries' eHealth strategies and HIE approaches generally address high-level governance and partnerships; enterprise architecture; patient identification; standards for interoperability; and privacy and security. In most countries, the data collector or the place where data is physically located is perceived as the "owner" or steward of the data.

While all countries' eHealth strategies featured governance structures, their implementation and maturity vary.
A number of countries have concerns about how data will be reused; policies range from individual-level data remaining at the site where the data was collected to one-way data flow to the national/MoH level but not back down to the point of care for real-time care. This practice was reported for many countries in Africa.
These findings provide a snapshot of HIE efforts in LMIC across the globe, illustrating significant variability in the completeness of and success implementing policies and procedures that support in-country HIE and governance of data use. A global framework for HIE policy and procedures could provide a methodology for accelerating decision-making and implementation.

References

1. Author. 2013.
2. Author. 2015.

1 Countries reviewed include Angola, Cameroon, Ghana, Guinea, Kenya, Lesotho, Liberia, Malawi, Mozambique, Nigeria, Rwanda, Sierra Leone, Somalia, South Africa, Tanzania, Uganda, and Zimbabwe.

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Merging medical device and clinician generated information for monitoring the burden of diabetes and hypertension in public reference health facilities in DR Congo, Rwanda and Burundi

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Background: Chronic diseases are an increasingly important cause of death in sub-Saharan Africa. This study explores to what extent secondary use of clinical information originating from diagnostic devices and hospital information systems can help to provide evidence related to the burden of diabetes and hypertension in DR Congo, Rwanda and Burundi.

Methods: The reference hospitals of Kisangani, Bukavu, Kigali and Bujumbura implemented open source hospital information management tools (OpenClinic GA) based on international classification systems: ICD-10 and ICPC-2 codes for diagnostic coding and LOINC for recording of laboratory and clinical observations extracted from lab analyzers and blood pressure devices. Clinical and financial data from treatments in the period 2006-2012 were merged into Diagnosis Related Groups (DRGs) and case load, mortality load and financial burden metrics were calculated. Aggregated data were sent to a central data warehouse (Global Health Barometer) using DXF messages.

Results: A total of 89,765 electronic out-patient and 59,434 in-patient records were screened based on care-provider and medical device generated evidence for hypertension and diabetes. A significant growth from 6 to 15 diabetes related admissions a month was seen between 2006 and 2012 also showing a remarkable seasonal variation, with lowest incidences in June and the highest between October and March. In-patient hypertension case load showed a constant growth from 3 to 9 cases a month in the same period with a high mortality rate above 10%.

The overall results show a worrying growth of both chronic diseases in the region with disease related costs expected to increase by 10% (diabetes) to 70% (hypertension) between 2011 and 2015.

Conclusion: The study demonstrates the successful integration of medical device measurements with clinical information for systematic reporting of public health problems to a regional data warehouse. ealth Barometer The problems of diabetes and hypertension grow rapidly in DR Congo, Rwanda and Burundi. Urgent steps must be taken by governments, the international donor community and local hospital boards to deal with this new challenge.

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Interfacing HIS, LIS and laboratory analyzers in Rwanda

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1 Introduction

OpenClinic GA is a Hospital Information System (HIS) which is popular in Africa, where it has been adopted in several countries ranging from Senegal and Mali to Rwanda, Burundi, DR Congo, Tanzania, Ethiopia and others. One of the reasons of its success, besides the reliability and adaptability of the software, is related to it being open-source. HISs are responsible for the information and data management in the hospital, including laboratory tests. However, lab test results and data have often still to be manually entered by human operators. There are many advantages (error reduction, optimized information flow and others) in directly interfacing HISs and laboratory analyzers in order to guarantee interoperability. OpenClinic GA has planned future developments to move in that direction.

Objectives

The objective of this study was to explore the necessary technical and functional requirements and problems and to present them to the OpenClinic GA development team, followed by identifying one or more appropriate interface solutions and implementing them in an early pilot stage in a private clinical laboratory (Bio-Medical Center of Kigali, Rwanda).

Methods

The study started by an initial training and study of relevant software components such as OpenClinic GA on the HIS side and Data Innovations' Instrument Manager or FROID on the lab-middleware side. After this, a functional and technical requirements assessment was done at the Bio-Medical Center of Kigali in Rwanda and a couple of hospitals in the same city. At the same time, an inventory was made of existing lab analyzer equipment in Kigali and their interfacing features. After this assessment, a development and implementation path was drawn for two types of interfaces: one between the OpenClinic GA software and the lab middleware and a second one between the lab middleware and laboratory instruments.

Results

Based on the functional requirements assessment, an interfacing model was designed using Data Innovations' Instrument Manager as the lab middleware solution and the Roche Cobas e411 (an immunology analyzer) as lab analysis modality. This has required configuring the two interfaces mentioned above (OpenClinic GA-middleware and middleware-analyzer), taking into account that OpenClinic GA had never been interfaced with Istrument Manager before and thus there was no dedicated driver. A particularly relevant task has been to perform the code mapping between the different lab test identification systems used by OpenClinic GA, Instrument Manager and the analyzers. Indeed, as mentioned above, the standards (such as LOINC) are not yet universally employed, and any manufacturer adopts its own favored coding system for laboratory tests. It is therefore necessary to provide mappings between the different coding systems to allow the correct flow of information. The testing of the implemented interfaces has taken place in Kigali, and, for a lesser part, in the University Teaching Hospital of Brussels, in Belgium. Both of the developed interfaces have been successfully tested. The interface between OpenClinic GA and Instrument Manager is a generic one, that can be reused without modification for connection other analyzers than the Roche Cobas e41, although appropriate lab test ID mappings will have to be provided for each new lab test that must be handled (depends on the use lab

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equipment). Drivers between the middleware and the lab equipment are provided by Data Innovations. This study has demonstrated however, that proper testing of each of these drivers in a real world environment is necessary to address issues related to different versions of lab equipment firmware, differences in hardware interface ports, co-existence of remote monitoring software etc.

2 Conclusion

Based on the study results, it has been concluded to:

- Adopt middleware-lab equipment networking solutions based on serial-to-ethernet adapters, in order to (i) create uniformity in the communication interface with the analyzers, (ii) optimize the physical connections in the laboratory (a serial cable can be maximum 15 meters long) and (iii) eliminate the connectivity problems with usb-to-serial adapters for modern computers not having a serial port
- As it emerged that not even the major player in the laboratory middleware field (Data Innivations) possess the necessary drivers to interface with all the analyzers in use, it is therefore important to (i) find out the group of middleware that could cover at least the most common analyzers, and develop OpenClinic GA to be able to interface with such group of software, (ii) keep monitoring open-source vendor-agnostic projects such as FROID and (iii) extend the analyzers database to the other locations and laboratories serviced by OpenClinic GA outside Kigali to have the relevant data to later scale up the project according to plans.

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Measuring comprehensiveness of health data registration in Burundian public hospitals

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1 Introduction

Since 2012, electronic hospital information management systems (HIMS) have progressively found their way to Burundian health facilities. Private clinics and the military hospital in Bujumbura have been amongst the earliest adopters. Since 2014, the Ministry of Public Health and Fight against AIDS (MSPLS) with the aid of the Belgian Technical Cooperation, has also initiated a first pilot implementation of the OpenClinic GA HIMS in a series of 4 public health facilities in Bujumbura, Ngozi, Muramvya and Kirundo. Encouraged by the outcomes of this pilot experience, the MSPLS decided to further roll-out the HIMS in 9 more health facilities in Bujumbura, Bubanza, Gitega, Mukenke, Karusi, Cankuzo and Bururi in the period 2016-2018.

The positive impact of HIMS on the management of financial, human and material hospital resources has been demonstrated by a growing number of studies; the same conclusions had also been drawn from the MSPLS pilot implementation in Burundi. However, less evidence is available when it comes to impact measurement on the quality of care. Many reasons for this can be forwarded, such as (i) a lack of well documented baseline information (in paper records), (ii) incomplete registration of clinical information and clinical activity data, (iii) a lack or inconsistent use of health nomenclatures and ontologies, (iv) unavailability of standardized metrics for quality of care or (v) the presence of confounding factors which are hard to isolate. In this study we focused on finding a solution for one of these issues: the development of a number of metrics related to the completeness of clinical registration. Patient data integrity is important in providing timely and appropriate care. Completeness is an important step, with an emphasis on understanding the complex relationships between data fields and their relative importance in delivering care.

Objectives

The purpose of the study was to develop a set of simple metrics that enable to measure the completeness of clinical data registration in hospitals, as a building block for future quality of care measurement in HIMS.

Methods

Using a master dataset of 12,480 de-identified electronic health records from 12 public and 4 private central African health facilities, clinical concept maps were drawn and linked to a statistical analysis of pertinent and necessary data in patient's records. A reference subset of 1,511 patient records selected from the master dataset were manually scored for clinical data completeness. From this exercise, record completeness scores have been calculated for the full master dataset and a small set of simplified, easy to measure primitive metrics with highest predictive value for completeness of health records have been derived.

*

2 Results

The study resulted in the selection of 4 primitive metrics with statistically significant predictive value ($p<0.01$). Each of these metrics can be measured for out-patient and in-patient encounters:

1. The document density measures the number of clinical documents that have been registered for a single patient encounter. The definition of clinical document is based on the concept of the Contact Transaction Type from the Good Electronic Health Record (GEHR) data model: *any information that relates to a provision of care by clinical staff in contact with a patient will be recorded within the Contact Transaction type. This kind of record entry is also known in the literature as encounter record or progress note. It may often be necessary to define further the type of consultation, the location of the consultation, the type of clinic, or other specific information relating to it.*
2. The information density measures the number of clinical items that have been recorded in each patient encounter. The definition of a clinical items is based on the Health Record Item (HRI) concept in the GEHR data model: *The HRI has been adopted by CEN TC/251 (PT011) as the basic unit of health information within the record. It represents the finest granularity by which an individual piece of information may remain meaningful if viewed in isolation (although complete interpretation may require it to be seen in perspective with other related HRIs - the clinical context). In essence, the HRI is composed of an Item Name, its primary content value, and other associated identifiers, properties and attributes. "Weight - 78 kg" and "Diagnosis - Hypertension" are simple examples.*
3. The reason for encounter density measures the number of reasons for encounter that have been recorded for each individual patient encounter.
4. The diagnostic density measures the number of diagnoses that have been related to each individual patient encounter.

From the manually scored subset of 1,511 health records, it has been possible to calculate target reference values for each of these primitive metrics based on records with a score higher than 80% of completeness with a confidence interval of 95% (table 1)

	Out-patient	In-Patient
Document density	3.04 - 3.17	8.01 - 11.54
Information density	28.11 - 34.91	47.65 - 61.23
Reason for encounter density	1.08 - 1.75	1.00 - 1.92
Diagnostic density	0.97 - 1.44	1.72 - 2.33

Table 1: reference primitive metrics values for >=80% complete health records

3 Discussion

This study produced 4 primitive metrics related to completeness of clinical information registration, which are easy to calculate. They have been integrated in the default OpenClinic GA HIMS package that is being deployed by the Ministry of Health in the public hospitals of Burundi. The metrics are one of the building blocks for the future development of a more comprehensive solution for quality of care monitoring and evaluation. The isolated or individual use of the primitive metrics is insufficient for measuring the quality of clinical services provided in health facilities.

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Informatics in Public Health: Assessing Training Needs

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Background/Problem: With rapid advances in high-throughput biological data, the need for informatics training in life sciences and laboratories has been evident since the mid-1980s. Informatics training can enable public health professionals to develop their skills in order to meet organizational demands and for the improvement of biological data efficiency, such as enhancing data handling, retrieving, analyzing, and interpretation.1 After formal discussions with laboratories and informatics staff, center leadership at the Centers for Disease Control and Prevention realized that there was a need for informatics coordination, collaboration, and competency-based training. To validate this, it was determined that there is limited clarity of staff members' informatics training needs, and how these needs compared to the ever-changing landscape of informatics in industry. And particularly for public health, competency-based instruction increases the ability to address complex and changing demands for fields such as informatics.2

Methods: To identify the center-level informatics training needs, an assessment was conducted throughout the 2012-2013 fiscal year via data provided from a recently conducted Informatics Blue Ribbon Panel, a previous center-wide Informatics Listening Session, and discussion groups with leadership and subject-matter experts. Utilizing the content of the data retrieved from these methods, an evaluation of the literature, public sector informatics staff educational opportunities, and academic programs was conducted to determine alignment.

Results: When reviewing the data from the discussion sessions, informatics training needs were found to be in the areas of analysis, data management, statistics, and software-specific trainings. The literature suggested that there is an increased need for these topics, as it increases productivity and enhances competencies of interdisciplinary staff. The public sector review demonstrated that publicly-funded U.S. federal, state, and local agencies are actively providing informatics training and education to their staff, with courses, workshops, seminars, and conferences focused on similar topics of informatics, programming, and system modeling. Lastly, the review of academic programs provided commonalities in core course topics and electives for informatics education.

Discussion: The topics and recommendations demonstrated through the methods employed suggest that training needs align with the literature, academic program review, and trainings provided to staff in other public sector organizations. By addressing the training needs, the staff are more likely to improve their knowledge in the subject area and manage informatics project more efficiently. Furthermore, the training will provide an opportunity to enhance the core capacity within the center for cutting-edge informatics projects.

References:

[1] Via, A., et al. (2013). Best practices in informatics training for life scientists. *Oxford University Press*, 1-10.

[2] Wright, K. et al. (2000). Competency Development in Public Health Leadership. *American Journal of Public Health, 90*(8):1202-1207

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Empowering data dissemination and use in Tanzania through a stakeholder-centric approach to a District Health Profile (DHP) standardization process

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1 Background

A District Health Profile (DHP) presents key health indicator data from the facility level in a meaningful, aggregated way so as to offer a better understanding of health conditions at the district level. DHPs are used for monitoring disease and service provision trends, planning health interventions, developing public health policy, determining allocation of resources, and empowering communities with increased public health knowledge.

In 2011, the United Republic of Tanzania Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC), in collaboration with RTI International and other development partners, embarked on a mission to develop a standardized DHP template, concurrent with the roll-out of the national health information system, DHIS2, across districts. As part of data dissemination and use strengthening, the DHP template, using DHIS2 data, would be used by all districts to interpret and report on the state of key health indicators.

2 Method

In 2012, a stakeholder-centric DHP standardization process was pursued, involving the key stakeholders—the districts—through all phases of the standardization process. To gain situational awareness, an environmental scan was pursued, investigating historical health profile development and uses (mainly at the regional and project-specific levels) in Tanzania. A review of theTanzania MoHCDGEC Health Sector Strategic Plan III (HSSP III),1 Millennium Development Goals (MDG) child and maternal mortality,2 and infectious disease, as well as Pay-for-Performance(P4P) lists of health indicators too place,3 to identify an initial list of key indicators of public health significance to Tanzania. In the next phase, a requirements-gathering workshop was held to identify stakeholder (district) DHP content requirements (primarily mandatory and optional health indicators for the district) and guidance for the dissemination and frequency of the DHP. Following requirements gathering, a DHP indicator list

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was established, and DHP indicators were interpreted and reported using visualizations developed in DHIS2. In 2013, a DHP development pilot was implemented covering 37 districts (a combination of districts with and without a full year's worth of data in DHIS2) from six regions of Tanzania. The pilot commenced with orientation workshops, supported by MoHCDGEC partners, where districts were trained on the DHP, utilizing DHIS2 to pull content, and the importance of adequate data interpretation to yield a meaningful DHP was emphasized. Feedback was gathered throughout the pilot to improve further the DHP template. In 2014, following the pilot, the DHP template and guidance for development were revised using feedback from the pilot. The most profound revisions were the addition of a summary results table to offer a snapshot of health indicator results and the development of an interactive PDF version of the DHP that encourages districts to interpret their findings in designated sections of the report and also eliminates the time that districts wasted formatting their reports and re-entering data values in duplicate fields throughout the DHP. Additionally, a training of the trainers (ToT) was held with MoHCDGEC partners in preparation for the DHP rollout. The ToT objectives included equipping potential trainers with the adult training theory methodology and also collaboratively developing materials to support the DHP rollout. In 2015, a DHP training package was developed for the rollout, and development began for a health profile web portal, an electronic adaptation of the DHP summary results table.

3 Results

Feedback gathered through phases of requirements gathering, pilot, and ToT, allowed for the design and development of a DHP template owned by the districts. Feedback showed that districts found the DHP template useful for interpretation and understanding of health conditions in their district, and for sharing key findings with others. During the pilot, those districts with a year's worth of data in DHIS2 had shorter DHP compilation times, proving that electronic health data made data interpretation and results generation easier. Districts also found the DHP orientation workshops a good platform to receive training on the DHP, compare their district progress against other districts, and share best practices in health service delivery with other districts.

4 Conclusion

A stakeholder-centric approach to developing a standardized DHP allows districts to take ownership of what they consider important to showcase about the public health condition of their district. It allows districts to advocate for policies and funding to support key areas of their district health system. Compilation of annual DHP reporting is made easier when health indicator data can be accessed and analyzed through a central, electronic national health information system like DHIS2. An interactive DHP template offers districts an organized way to present and interpret results of their health indicator data. A DHP offers a structured platform for districts to tell stories about the health condition within their district. Presenting summary results is helpful as a quick reference to the status of health indicators against targets.

Keywords: Data interpretation, data dissemination and use, district health profile, DHP, District Health Information System, DHIS, health information systems strengthening, health indicator

References

[1] Ministry of Health and Social Welfare, United Republic of Tanzania (MOHSW). (2015). *Health Sector Strategic Plan III, July 2009–June 2015*. Dar es Salaam, Tanzania: MOHSW. Available at http://ihi.eprints.org/970/1/HealthSectorStrategicPlan.pdf

[2] United Nations. (2012). Millennium Development Goals Indicators. Available at http://mdgs.un.org/unsd/mdg/Host.aspx?Content=Indicators/OfficialList.htm

[3] Ministry of Health and Social Welfare, United Republic of Tanzania (MOHSW). (2011). Pay-for-Performance (P4P) Indicators. Dar es Salaam, Tanzania: MOHSW.

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Computerization of Public Hospitals in Burundi: Processes and Results

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1 Background

In Burundi, the Ministry of Public Health and Fight against AIDS initiated in 2012 with the support of the Belgian Technical Cooperation, a pilot project for implementing an electronic hospital information management solution in a number of public health facilities. The aim was to improve the overall hospital management and hence the quality of patient care.

2 Approach

Four hospitals representing the three levels of the health system (district, province and central) were involved as early as March 2015 in a pilot phase of the project.
From the start, four preliminary activities were identified and dealt with in the four hospitals: (i) the setting up of a steering committee, (ii) assurance of reliable electrical energy; (iii) assurance of a reliable internet connection and (iv) contracting of a computer expert.
An assessment was made of each hospital in order to collect the business needs and define the scope of the project, as perceived by the health facility staff.
As a result from this assessment and after consulting the steering committees, a consensus was reached on the functionalities to be developed and a preference was expressed for open source software.
An external provider was then selected to implement an open source hospital information management system (OpenClinic GA) and provide maintenance for 3 years.

3 Lessons learned

A ramp-up in the use of the application with a significant increase in registration performance in the 4 hospitals has been noted, in addition to:

- A gradual abolition of paper registers;
- A full invoice recovery rate for out-patient consultations and 95% recovery for in-patient admissions over the study period;
- A registration of ICD-10 diagnoses for 31% of the outpatient encounters but only for 5% of the hospital admissions.

But also:

- An overall average cost of € 1,300,000 for this pilot phase (excluding the cost of BTC's ongoing technical assistance);
- Continuing user requests for the development of additional functionalities;
- A weak ownership by the hospitals of the project management aspects.

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4 Discussion

Nearly two years after going live, the results of the computerization pilot phase in Burundi show:

- A satisfactory use of the application;
- Regular updating of the application;
- A high level of user satisfaction;
- Increased production of health services and greater control over revenue;
- Remaining significant electrical energy and human resources challenges;
- A high initial investment cost but which has dropped by almost 50% in the extension phase that was achieved in a later stage.

The most important challenges encountered were the weak setup of the project management, problematic ICT-staff retention and inadequate coverage of increased energy needs.

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Effect of type of place of residence on Insecticide-treated bed nets use: an examination of 2011-2012 DHS data, Cote d'Ivoire

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Background and Purpose: Despite progress in malaria control through the distribution of long-lasting nets (LLINs), Malaria accounts for high morbidity and mortality among children under 5 in Côte d'Ivoire. In 2016, the Multiple Indicator Cluster Survey revealed a 50% utilization rate of LLIN in Côte d'Ivoire. Our study aimed to determine factors associated with bed nets use among children under five in rural and urban context.

Methods: We carried out a cross-sectional study using data from the Demographic and Health Survey conducted in Côte d'Ivoire in 2011-2012. The dependent variable was LLIN utilization. This dependent variable has been put in 2 different contexts: urban and rural. Independent variables were maternal education, wealth index, region, child's age, number of de facto persons in the household, and age of the head of household. The data were analysed using the STATA 14 software.

Results: Determinants of LLIN use in rural context (N= 2,432) included middle wealth index status (adj. OR= 0.65, p=0.012), and number of de facto persons per household ≥11 (adj. OR= 0. 53, p= 0.02). In urban context (N=1,358), determinants of LLIN use net were secondary or higher education of mother (adj. OR=0.56, p=0.02), center region (adj. OR= 2.40, p= 0.002), west region (adj. OR= 2.72, p= 0.016), north region (adj. OR= 2.34, p= 0.005) and number of de facto persons per household ≥11 (adj. OR= 0.372, p= 0.001).

Conclusions: These data suggest that different actions should be taken in the rural and urban environment to increase LLIN utilization.

Keywords: Insecticide-treated bednets, Utilization, Determinants, Cote d'Ivoire

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Epidemiologic aspects of plasmodium falciparum in Cote d'Ivoire and Mali: an analysis of demographic and health surveys

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Background and purpose: Malaria is a disease caused by a parasite of genus plasmodium. Five species of plasmodium (falciparum, vivax, malariae, ovale and knowlesi) can cause malaria. Children less than 5 years are more affected by malaria in Sub-Saharan Africa. The purpose of the study is to describe epidemiologic aspects of plasmodium falciparum in Cote d'Ivoire and Mali.

Methods: We use data of demographic and health survey conducted in Cote d'Ivoire in 2011-2012 and in Mali in 2012-2013. Our study included children less than 5 years. Data were computed using STATA 14.

Results: Overall, 4 513 and 5 646 blood smear tests have been performed in Cote d'Ivoire and Mali respectively. Of these tests, 16.35% (738) and 49.81% (2 812) were positive in Cote d'Ivoire and Mali respectively. Plasmodium falciparum was the predominant species in Cote d'Ivoire (6.28%) and Mali (41.12%). Plasmodium vivax has not been found in both countries. In Cote d'Ivoire, plasmodium falciparum has been mainly found in west and central regions (p=0.0001); in Mali, it has been mostly found in Mopti and Sikasso regions (p=0.0001). In both countries, plasmodium falciparum has been predominantly found in rural area compared to urban (p=0.0001), among children from poor families compared to children from middle and rich families, and among children with anemia compared to children without anemia (p=0.0001).

Conclusion: In Cote d'Ivoire and Mali, plasmodium falciparum was the predominant species. It was mainly found in rural area, among children from poor families, and children with anemia.

Keywords: Key Word: Plasmodium Falciparum ; Epidemiologic aspects; Cote d'Ivoire; Mali

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Factors associated to use of intermittent preventive treatment (IPT) among pregnant women in Benin in 2011-2012

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Background and Purpose: Low coverage of IPT to prevent Malaria in Benin motivates this study which aimed to identify the associated risk factors of taking at least two doses of Sulfadoxine-Pyrimethamine (SP) for IPT in pregnant women in Benin.

Methods: The study involved 5130 women aged 15-49 who had a live birth during the two years preceding the Demographic Health Survey (DHS) 2011-2012 of Benin. Data was analyzed with STATA 14. Two types of analysis (descriptive and analytical) were done. Logistic regression was used at the significance level of 0.05.

Results: The results show that 25.2% were using IPT during pregnancy. Women's mean age was 28 years [95% CI (27.93; 28.33)]; 90% were in union; 69.7% were uneducated; 66.8% had no occupation; 20.1% were richer and 58.7% were in rural areas. Factors associated with use of IPT in the final regression model were: place of consultation, type of health workers met, existence of distance problem, level of well-being and ethnicity.

Conclusion: The results of the study imply that income generating activities, and communication for behavior change among ethnic groups underutilizing IPT may lead to improved IPT coverage.
Key words: IPT, women, associated factors, Benin, malaria prevention

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Factors affecting uptake of intermittent preventive treatment of Malaria among pregnant women in Cameroon

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Background and Purpose: Plasmodium falciparum malaria in pregnancy predisposes to maternal and fetal morbidity through anemia and low birth weight (LBW). Up to 35% of preventable LBW in malaria-endemic areas are attributable to pregnancy-related P. falciparum malaria. In 2002, WHO recommended intermittent preventive treatment (IPT) of malaria with at least two doses of Sulfadoxine-Pyrimethamine (SP) during pregnancy for women living in areas of medium to high malaria transmission. Cameroon adopted IPT as a recommended malaria prevention intervention in 2004. In several endemic countries in Africa inclusive of Cameroon, there has been a downwards trend of IPT uptake over the last five years, with its deleterious repercussion on maternal and newborn health. The objective of the present investigation was to assess the factors that affect IPT uptake among pregnant women in Cameroon.

Methods: Data from 4,038 pregnant women aged 15-45 years were obtained from the Cameroon Demographic and Health Survey (DHS 2011). Multivariate logistic regression was used to assess the level of association between IPT uptake and selected socio-demographic variables. Many other relevant health services variables were not available in the database for inclusion in the analysis.

Results: Only 31% of women received at least two doses of SP during antenatal care (ANC). IPT uptake increased significantly with the level of education ($p<0.0001$), and income status of women ($p<0.001$). ANC within the first two months of pregnancy (OR=1.33; 1.16-1.52) and high number of ANC prior to delivery (OR=2.07; 1.72-2.49) were associated with an increase of IPT uptake. IPT uptake was inversely related to birth order number ($p=0.01$) and varied significantly across regions ($p<0.0001$), being lowest in the South Region (16%) and highest in the West Region (42%). Other sociodemographic variables such as place of residence, mother's age, marital status, size of the household, religion, and source of ANC were not significantly associated with IPT uptake.

Conclusions: A low uptake of IPT was observed in Cameroon. Health promotion activities should be reinforced to encourage early use of ANC services, thus increasing the demand and uptake of IPT.

Keywords: Malaria, Pregnancy, Intermittent preventive treatment, Sulfadoxine-Pyrimethamine, Plasmodium Falciparum

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Vers une nomenclature nationale pour les services de soins de santé au Sénégal?

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1 Introduction

Dans le cadre de la mise en œuvre de la couverture maladie universelle (CMU) au Sénégal, plusieurs acteurs devront échanger des informations par rapport aux soins de santé fournis aux patients. Il s'agit grosso modo des (i) prestataires de soins, (ii) les pharmacies, (iii) les organismes assureurs privés et publics, (iv) l'Agence de la Couverture Maladie Universelle, (iv) les bailleurs de fonds et programmes verticaux et (v) le Ministère de la Santé et de l'Action Sociale (MSAS). A l'heure actuelle et comme dans beaucoup d'autres pays en Afrique sub-Saharienne, il n'existe pas de nomenclature formelle complète et pratique pour l'identification des différentes prestations de soins dans le secteur de la santé au Sénégal. Un projet de texte réglementaire datant de 1995 intitulé 'Nomenclature Générale des Actes Professionnels Médicaux et des Examens et Analyses Laboratoires' n'a jamais été validé par le MSAS et les différentes structures de soins et assurances maladie ont développé leurs propres codifications des prestations de soins, sans coordination nationale.

Objectifs

L'objectif de cette étude est d'explorer dans quelle mesure une nomenclature globale et complète de prestations de soins pourrait être élaboré pour le MSAS au Sénégal. Une telle nomenclature devrait tenir compte des besoins liés à la tarification des prestations de soins et de la gestion de la CMU. Elle devrait, dans la mesure du possible, être basée sur des standards internationaux.

Méthode

Une analyse des besoins a été réalisée à l'aide d'interviews semi-structurés avec les parties prenantes dans le domaine de l'assurance maladie et la couverture maladie universelle. Ceci a été complété par une recherche de la littérature internationale et l'analyse des documents normatifs et réglementaires au Sénégal.

Résultats

Une nomenclature peut être définie comme une 'terminologie commune pour la représentation de concepts d'un domaine'. Dans le cas de cette étude, la communauté visée est celle des acteurs dans le domaine de la santé au Sénégal ou par extension, en Afrique de l'Ouest. La terminologie pourra prendre la forme de libellés si tous les membres de la communauté parlent la même langue, ou de codes si différentes libellés sont utilisés pour exprimer un même concept. Les concepts se limitent aux services de soins, comme les actes médicaux, les médicaments, les examens laboratoires, les examens de radiologie etc.

La raison d'être d'une nomenclature se trouve dans la standardisation de la langue utilisée dans un domaine. Ceci aide à diminuer les ambiguïtés et les redondances linguistiques et de réduire les erreurs sémantiques. La codification des termes permettra le multilinguisme de la nomenclature ainsi que l'internationalisation de la nomenclature si des standards internationaux sont respectés.

Une nomenclature devrait être codifiée et expliquée et traduira des codes uniques par des libellés et définira des critères d'inclusion et/ou d'exclusion pour les codes décrits. Pour des raisons de rapportage et

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de gestion, la codification est idéalement hiérarchique, permettant une agrégation des codes par convergence. Elle devrait également être exhaustive en couvrant les besoins de tous les acteurs et de tous les sous-domaines. Une telle exhaustivité est parfois difficile à réaliser et dans ce cas la nomenclature devrait être extensible, permettant d'y insérer des extensions locales sans perturber la logique ou l'organisation hiérarchique de la nomenclature.

Plusieurs chapitres ou sous-domaines sont à couvrir par la nomenclature des prestations de soins : (i) les consultations et visites, (ii) les autres prestations intellectuelles comme les certificats, rapports d'expertise et avis, (iii) les interventions diagnostiques comme les examens laboratoires, l'imagerie médicale, ECG, EMG et autres, (iv) les interventions thérapeutiques comme la chirurgie, la dialyse ou la physiothérapie, (v) les services pharmaceutiques y compris les médicaments et consommables, (vi) les hospitalisation ou encore (vii) les services de transport médicalisé. L'étude propose de codifier les différents concepts (prestations de soins) par sous-domaine en utilisant des classifications internationales ou nationales là où celles-ci existent. Les classifications internationales candidates proposées pour certains sous-domaines sont les suivantes :

- CPT et ICHI pour les actes médicaux
- NCSP/NOMESCO pour les interventions chirurgicales
- ATC et RxNorm pour les médicaments
- LOINC pour les analyses laboratoires
- CPT et LOINC pour l'imagerie médicale

Pour le chapitre des consultations, visites, prestations intellectuelles, séjours en hospitalisation, repas et pour les transports médicalisés, des codifications nationales sont proposées en absence de standards internationaux. Chaque code de la nomenclature pourra prendre la forme suivante :

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<code préfixe du domaine>.<code de la prestation dans le domaine> [.<extension locale>]
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2 Conclusions

Un projet de nomenclature globale des prestations de soins, basée sur des classifications internationales a été développé pour le Sénégal. Un ou plusieurs ateliers de capitalisation devront encore être organisés pour soumettre la proposition à toutes les parties prenantes dans le secteur de la santé. L'architecture de la nomenclature est générique et dans ce sens elle pourrait s'appliquer également dans d'autres contextes que celui du Sénégal.

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Migration du GESIS vers le DHIS2, l'expérience du Burundi

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1 Background

Dans les pays africains, les systèmes d'information sanitaires de routine (SISR) demeurent la source principale d'information pour la prise de décisions. De ce fait, les SISR se retrouvent exposés à de demandes d'informations nombreuses et diverses. Il en résulte une surcharge importante de travail des prestataires de soins et en définitive une faible qualité des données.

Au Burundi, des registres papiers sont utilisés dans les formations sanitaires pour remplir des canevas de rapportage périodique. Jusqu'en 2014, les données de ces canevas étaient saisies dans une base de donnée « GESIS » et dans différentes autres bases spécifiques (CHANEL, LMIS,...). En conséquence, les données de différentes bases étaient peu comparables.

Dès 2015, le Ministère de la Santé Publique et de Lutte contre le Sida a décidé de migrer vers le District Health Information Software, 2ème version (DHIS2), une plateforme web based. Le DHIS2 est ainsi promu à devenir la principale base de saisie, de collecte, d'analyse, de transmission et d'entrepôt de données.

2 Méthode

La migration vers le DHIS2 a procédé par une série d'étapes:

1. Mise en place d'une équipe technique multidisciplinaire devant porter le projet
2. Elaboration d'un document de projet visant à fédérer dès le départ les énergies des partenaires de santé,
3. Formation d'une équipe de développeurs et de formateurs nationaux,
4. Paramétrage des éléments de données et récupération des données de l'ancien système,
5. Hébergement de la base de données sur un serveur extérieur,
6. Test du système dans 9 sites pilotes
7. Elaboration d'une interface de communication entre le DHIS2 et l'application OpenClinic en développement dans les hôpitaux,
8. Evaluation de l'expérience pilote et extension progressive à l'échelle nationale avec possibilité de s'auto enregistrer pour ceux qui le désirent.

3 Leçons apprises

A ce jour il est observé un engouement à l'utilisation du DHIS2 par les responsables aux différents niveaux du système de santé et les différents partenaires de la santé ainsi qu'une intégration progressive des moyens liés à l'utilisation du DHIS2 dans les frais de fonctionnement des différentes structures du Ministère. Une mise en lien automatisée des rapports des hôpitaux via l'application OpenClinic GA a été réalisée et est en phase de déploiement. Nous notons une complétude de données de 90% et une

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promptitude de 81% pour les rapports du mois de Décembre 2016. Il a été constaté qu'une couverture 3G est au minimum nécessaire pour une exploitation aisée du DHIS2.

4 Discussions

Comparée au GESIS, le DHIS2 permet de:

- Disposer en temps réel les données saisies et approuvées au niveau le plus périphérique ;
- Résoudre efficacement le découplage des données hospitalières et des centres de santé ;
- Amorcer l'analyse des données au niveau des producteurs des données dans les structures de santé ;
- Limiter la collecte parallèle des données et résoudre ainsi le problème de leur cohérence;
- Bien préparer les supervisions par les niveaux supérieurs.

Même si l'appui d'experts externes est indispensable au début, une fois mis en place, le système ne semble pas nécessiter d'importantes ressources et peut être facilement approprié par les acteurs locaux. L'hébergement des données auprès des serveurs externes (à l'étranger) reste toutefois un point sensible pour les Etats à faibles moyens.

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Implémentation d'un logiciel de maintenance assistée par ordinateur au Ministère de la Santé et de la Lutte contre le SIDA du Burundi

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[1] Agence Belge de Développement au Burundi – programme PAISS

1 Contexte

Le « Programme d'Appui Institutionnel au Secteur de la Santé au Burundi (PAISS) –Volet 5 : Appui aux infrastructures, équipements et maintenance » est le dernier volet d'un appui programme au secteur de la Santé du Burundi de la Coopération Technique Belge (CTB). Cette intervention vise à relever certains défis du système de santé, entre autres les insuffisances dans les infrastructures et équipements des Formations Sanitaires surtout en ressources énergétiques et l'absence d'une stratégie nationale de maintenance et de moyens adéquats de maintenance. Son objectif global est l'amélioration de la performance du système de santé au Burundi. L'objectif spécifique est l'augmentation en qualité et quantité des prestations de santé au bénéfice de la population par l'amélioration de la gestion et maintenance des infrastructures et équipements.

2 Objectifs

Le Ministère de la Santé et de la Lutte contre le SIDA (MSPLS) du Burundi veut se doter d'un logiciel de maintenance assistée par ordinateur (GMAO) pour améliorer la gestion de son patrimoine. Cette étude comporte une analyse des besoins métiers, l'identification des modules applicatives à implémenter, une description les données à gérer et le choix d'une architecture technologique adaptée.

3 Résultats

Les besoins fonctionnels de la maintenance du patrimoine biomédical du MSPLS a pu être dérivé de l'organisation des structures du MSPLS qui sont compétentes dans cette matière d'un côté et des bonnes pratiques trouvées dans la littérature d'un autre côté. La Direction des Infrastructures Sanitaires et Equipements (DISE) assure la maintenance du patrimoine bâti, du parc automobile et des équipements du MSPLS sur base de demandes ponctuelles et ciblées.

Le patrimoine bâti est réparti sur l'ensemble du territoire burundais. Il est constitué de 539 centres de santé, 43 hôpitaux de district, 36 bureaux de district sanitaire, 18 bureaux provinciaux sanitaires et des bâtiments du niveau central. Les demandes d'interventions ponctuelles, la maintenance curative des bâtiments sont enregistrées au secrétariat de la DISE. Selon l'importance des travaux ou les besoins matériels, ces demandes d'interventions font l'objet de requête de financement auprès de bailleurs et le cas échéant, de bons de commande auprès de fournisseurs. Les interventions sont ensuite mises à l'agenda du service infrastructures en fonction du budget disponible, au cas par cas sans réelle planification à l'avance.

Le parc automobile est constitué de véhicules allant du véhicule 4x4 à l'ambulance. Les interventions périodiques, contrôles techniques et autres interventions sont consignées au service charroi de la DISE

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(pour les véhicules du niveau central) et pour les véhicules des niveaux intermédiaires et périphériques chaque formation sanitaire gère son parc automobile en fonction de ses moyens.

Le parc des équipements est constitué d'équipements biomédicaux, d'équipements ICT et autres. Seuls les équipements nécessitant une maintenance suivie sont considérés.

La gestion des marchés, bons de commande et la planification des interventions est réalisée au sein de la DISE en fonction du budget disponible. La planification des activités est peu développée au sein de la DISE. Elle s'effectue par l'intermédiaire d'un plan d'action annuel.

3.1 Modules applicatives de la GMAO

Le module de l'inventaire est l'élément central d'un système de GMAO, et le premier à élaborer. Il est donc très important d'y inclure tous les champs requis pour une gestion des technologies de la santé efficace. Tout nouveau matériel ajouté à l'inventaire est enregistré dans la base de données du système de GMAO au moyen d'un écran de saisie. Des valeurs implicites préenregistrées sont couramment utilisées pour dresser un inventaire de nouveau matériel, et ce afin d'accélérer la saisie et d'éviter les erreurs humaines. La table qui contient les informations sur le type de matériel, par exemple, inclut des valeurs préenregistrées comme les procédures d'inspection et de maintenance préventive (IPM) adaptées, le niveau de risque et le personnel responsable de chaque type de matériel médical. Il suffit donc de saisir le code d'un nouveau dispositif dans la table du matériel et toutes les valeurs préenregistrées associées à ce code s'ajouteront à l'inventaire. De même, les autres domaines font apparaître les valeurs implicites associées au modèle du matériel, à l'emplacement de l'équipement médical et au numéro d'inventaire, respectivement. Cela permet d'élaborer les modules le plus efficacement possible et de protéger l'intégrité des données.

Le module de la gestion des pièces de rechange s'inscrit dans le prolongement du module de l'inventaire et assure le suivi des pièces de rechange associées au matériel et aide à maintenir le niveau des stocks. Les pièces en stock comprennent les pièces communes à de nombreux dispositifs comme les fusibles, les câbles, les batteries et les composants électroniques de base, ainsi que les pièces plus spécifiques à un modèle particulier comme les circuits imprimés, les sources de courant, les tubes à rayons X et les sondes à ultrasons.

Le module de la maintenance aide l'utilisateur du programme de GMAO à gérer efficacement son calendrier d'entretien. Le système de GMAO s'intègre dans un système de maintenance standard d'un hôpital. Le système de GMAO peut être utilisé pour la maintenance préventive systématique comme pour la maintenance corrective. Pour la maintenance préventive systématique, si les données appropriées ont été entrées, le système informatisé peut calculer le moment où un dispositif aura besoin d'entretien et indiquer les pièces qu'il faudra éventuellement commander, et quand. Le système peut aussi assurer le suivi du processus de maintenance et noter quand il s'achève. Pour la maintenance corrective, lorsqu'un utilisateur de matériel signale un problème lié à un dispositif, le département du génie biomédical peut enregistrer l'anomalie dans le système de GMAO. Le programme générera automatiquement un bon d'intervention et permettra au responsable du système de confier la tâche à un ingénieur ou à un technicien. Le programme GMAO peut fournir des informations concernant la charge de travail, la formation et les compétences de chaque ingénieur pour aider à prendre cette décision. Une fois le travail effectué, le statut du matériel pourra être noté dans le système. Le rang de priorité de la maintenance à effectuer, qu'elle soit préventive ou corrective, peut être fixé compte tenu des risques liés au matériel, de la valeur stratégique pour l'établissement de santé, et de la disponibilité de matériel de secours. Des formulaires de bons d'intervention de maintenance incluant les procédures de maintenance requises peuvent être produits sur support papier ou électronique.

Le module de la gestion des contrats est utilisé pour le suivi de tous les services de maintenance extérieurs. Les principaux facteurs à surveiller sont le coût et la performance du fournisseur et du matériel. Si le matériel médical fait l'objet d'un contrat de garantie, contrat de services complets ou contrat de services d'appui partiels, le fournisseur est tenu d'apporter un appui technique pour le matériel sur une période convenue. Le programme GMAO peut automatiquement générer des alertes à l'intention du fournisseur lorsqu'un dispositif est indiqué comme défectueux ou que le moment est venu d'une procédure d'inspection ou de maintenance préventive. Les termes et les dépenses connexes d'un contrat doivent être enregistrés dans le système à titre de référence.

3.2 Implémentation de la GMAO

Pour l'implémentation de ces modules applicatifs, il a été opté pour une solution avec une base de données centrale, qui est hébergée dans le centre de données du MSPLS à Bujumbura. Le logiciel GMAO proprement dit a été basé sur le module GMAO du système d'information hospitalier OpenClinic GA, qui était déjà en phase de déploiement dans 13 hôpitaux publics du MSPLS. Une seule instance de ce module GMAO est donc installée au niveau central et sera utilisée par les structures centrales et périphériques à travers une interface web accessible l'intranet de la santé ou par internet.

Le principal avantage de cette solution se trouve dans le fait qu'une seule base de données contient à tout moment la totalité des informations par rapport à la maintenance pour le pays. L'application ne devra être maintenue qu'à ce seul endroit central.

Comme principal risque de l'architecture choisie, on peut citer la nécessité d'une connexion intranet ou internet pour avoir accès à la GMAO. Cette connectivité n'est pas garantie en permanence dans chaque structure sanitaire du pays, mais comme la non-disponibilité des données en temps réel ne constitue pas un risque important pour le MSPLS, ce désavantage a été considéré comme acceptable.

4 Conclusions

Le MSPLS s'est doté d'un logiciel GMAO pour améliorer la gestion des inventaires, de la maintenance et de la planification des investissements. Les fonctionnalités du logiciel ont été déterminées par une analyse fonctionnelle et organisationnelle des services du MSPLS compétent dans la matière de la maintenance, complétée par une analyse des bonnes pratiques de maintenance suivant la littérature. Le logiciel GMAO offre une interface web centrale accessible à travers un navigateur via internet ou l'intranet de la santé.

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L'interopérabilité : incontournable pour un accès aux données rapide, facile et à moindre coût

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Dans le domaine sanitaire, l'interopérabilité désigne la capacité des systèmes d'information sanitaire à échanger au-delà des frontières organisationnelles afin de promouvoir une prestation efficace des soins de santé pour les individus et les communautés1. Elle constitue une solution efficace au problème de silos de données identifiés dans la plupart des systèmes d'information sanitaire des pays en développement. Ces silos de données sont dus en partie au grand nombre de programmes sanitaires intervenant dans ces pays et générant chacun ses propres données ainsi qu'à l'absence souvent d'une vision en matière de gestion de l'information sanitaire conjointe pour tous ces programmes.

La définition ci-haut donnée de l'interopérabilité est partagée par le HIMSS2 et désigne largement les capacités d'interopérabilité dont BlueSquare a doté les applications qu'elle développe. En effet, ces dernières sont susceptibles de répondre aux trois niveaux d'interopérabilité reconnus par le HIMSS à savoir une interopérabilité fondamentale, une interopérabilité structurelle et une interopérabilité sémantique selon la nature de l'information à partager.

Chez BlueSquare, l'implémentation d'applications interopérables à tous les niveaux est venue répondre aux besoins identifiés au sein des systèmes de gestion de l'information sanitaire. Actuellement, BlueSquare accompagne ses multiples partenaires du domaine de la santé à la mise en place d'une interopérabilité entre les diverses applications de gestion de l'information sanitaire et DHIS2. Il s'agit par exemple d'applications de gestion du financement de la santé, de collecte de données sur les services de santé fourni, sur la mesure de la qualité des soins et l'opinion des patients ainsi que de tableaux de bord pour la visualisation des résultats. DHIS2 est la principale technologie de gestion de l'information sanitaire déjà adoptée dans plus de 50 pays et organisations sur les cinq continents et constitue également le principal entrepôt de données sanitaires dans ces pays et organisations.

A titre d'exemple, BlueSquare accompagne actuellement le Bénin dans la mise à l'échelle du programme de Financement Basé sur les Résultats (RBF) en mettant à jour la plateforme de gestion du FBR et en la rendant interopérable avec DHIS2. Cette mise à l'échelle pose des défis que BlueSquare aide le Ministère de la santé à relever : processus de vérification des données long et rendu encore plus long par la mise à l'échelle, double collecte des données de routine au niveau des formations sanitaires, fragmentation des données issues des différents programmes de santé et par conséquent une disponibilité limitée des informations nécessaires à la prise de décision.

BlueSquare déploie au Bénin trois applications intégrées et interopérables avec DHIS2 afin de relever ces défis. Les technologies suivantes ont donc été implémentées et/ou mises à jour au Bénin:

1. la plateforme de gestion des données du FBR, OpenRBF, pour l'achat stratégique des services de soins ;
2. l'application Data Collect qui au moyen de tablettes permet de mesurer la qualité des soins et la disponibilité des services de routine ;
3. l'application Data Viz pour la visualisation des résultats des programmes/projets, la visualisation des données à tous les niveaux (formation sanitaire, district, région, national), l'accès aux données brutes.

L'objectif du travail en cours au Bénin vise à doter la Direction de la Programmation et de la Prospective (DPP) au sein du Ministère de la Santé d'une meilleure capacité à réaliser des achats stratégiques de services de soins et par conséquent d'assurer un meilleur suivi et évaluation du projet FBR. Ce travail renforce une dynamique positive d'interopérabilité des systèmes des données au Bénin, le pilotage de la

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DPP, et ouvre la porte vers d'autres interopérabilités comme la base de données des ressources humaines ou les bases de données sur la logistique sanitaire. Il contribue à faire du Bénin une vitrine de l'innovation en termes d'intégration à DHIS2, d'architecture e-health, et de système de données de financement de la santé innovants.

Lors de la conférence, nous parlerons de notre expérience au Bénin, des avantages offerts par l'interopérabilité avec DHIS2, des défis que nous avons eu à relever dans le cadre des pilotes et des mises à l'échelle effectuées au Bénin.

[1] http://www.himss.org/library/interoperability-standards/what-is-interoperability

[2] Healthcare Information and Management Systems Society

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Assessment of health informatics competencies in training of undergraduate healthcare professionals in Rwanda

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Introduction: The concept "health informatics" is a discipline that is as old as healthcare itself. It was born the day a clinician first wrote down some impressions about a patient's illness, and used these to learn how to treat the next patient. Healthcare professionals often lack knowledge of systematically processing data and information which affects the decision-making process. Furthermore, in order to enhance their practices through better use of information resources, healthcare professionals are often asked to use information technologies for which they have poor appreciation and limited skills. Nevertheless, as more health information technologies become part of the health care environment, the need for healthcare professionals with health informatics competencies is growing.

Aim: The aim of the current study is to assess health informatics competencies in existing curricula for training undergraduate health care professionals in Rwanda.

Methods: A descriptive cross – sectional study with a review of document approach was conducted. Using a census method, the study assessed thirty curricula designed for training undergraduate health care professionals in University of Rwanda, College of Medicine and Health Sciences during the academic year 2013 - 2014. The college consists of 5 schools: the School of Medicine and Pharmacy, the School of Health Sciences, the School of Dentistry, the School of Nursing and Midwifery and the School of Public Health. The College of Medicine and Health Sciences has been chosen because it is the only public healthcare professional training facility in Rwanda. Data collection was carried out using a standardized questionnaire designed to assess health informatics competencies in undergraduate level. Data collection was done in October 2014 after the study was granted an explicit authorization from competent authorities. SPSS 21 was used for data coding, processing and analysis. Frequency tables were used to summarize categorical variables. Descriptive statistics were used to describe numerical variables. One-way ANOVA was used to compare means differences across schools and undergraduate programmes.

Results: only 11 out of 23 competences (47.8%) had a score of presence greater than 50% in the assessed curricula. Use of personal application software for documentation, ability to use personal computers, Ability to communicate electronically and basic informatics terminology were the most frequent competencies in curricula and each one accounted for 70% (n=21). Socio-organizational and socio-technical issues and methods of project management and change management were totally absent from the assessed curricula. Weakly represented competences were decision support systems (3.3%), methods for decision support and their application to patient management (3.3%), the principles of medical decision-making (6.7%), and the need for systematic information processing in healthcare (10%). The remaining competencies had a presence score between 10 and 50%. Health informatics competencies in Curricula from the School of Medicine and

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Pharmacy were significantly higher than others ($p<0.001$) and the Bridging program was less likely to contain assessed health informatics competencies ($p<0.05$).

Conclusion: There is a low presence of health informatics competencies in the studied curricula. To insure that healthcare professionals have the knowledge, skills, and attitudes to effectively and efficiently interact with today's health information technologies, more health informatics competencies need to be included and assessed in all undergraduate curricula leading to a healthcare professionals' qualification.

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