1.2 Using Routine Human Resources Information Systems to Manage, Measure, and Monitor the Health Workforce

Dykki Settle[1]
Carl Leitner, Ph.D.[2]
Carol Bales[3]
George Blair[4]

Context

A country's health success begins with a strong health workforce. An effective health workforce is critical for improving countries' health care outcomes and there is a globally recognized need (GUPTA, 2008) to improve health systems' productivity, incentives, management, leadership, and performance management. Many developing countries face daunting obstacles to meeting the health care needs of their people. In particular, countries in sub-Saharan Africa suffer from 24% of the global disease burden, but have only three percent of the global health workforce to provide necessary services.

Strategic decisions on investing in health care staff have often relied on inspired guesswork as "many national information systems are poorly equipped to meet current information demands for policy decisions and are ill-prepared to meet future requirements"(PRINCE MAHIDOL AWARD CONFERENCE, 2010). To ensure that the right health care provider is in the right place with the right skills, these countries require current, accurate data on human resources for health (HRH). A strong human resource information system (HRIS) enables health care leaders to quickly answer the key policy and management questions affecting health care service delivery (RILEY et al., 2007).

[1] IntraHealth International – Capacity*Plus*, United States.

[2] IntraHealth International – Capacity*Plus*, United States.

[3] IntraHealth International – Capacity*Plus*, United States.

[4] IntraHealth International – Capacity*Plus*, United States.

In this paper, we examine the effectiveness of USAID and IntraHealth International's approach to using routine HRIS (MCQUIDE; SETTLE et al., 2009) to strengthen the health workforce in low-resourced settings as called upon in the Kampala Declaration and Agenda for Global Action (WHO, 2008).

Main Objective

The main objective in using a routine HRIS is to use evidence-based decision-making to reduce staffing shortages, attrition, and inequity of deployment. In order to achieve these results, countries must first have the capacity to collect and analyze large quantities of robust data. A further objective is to improve the quality of the health workforce through increasing the ability to manage health worker training and through enhancing the capability of the countries' health professional councils.

These objectives are addressed through establishing and supporting stakeholder leadership groups, strengthening the utilization of existing health workforce information, and the development and implementation of iHRIS,[5] an Open Source suite of HRIS software.

Methodology

USAID's HRIS strengthening projects led by IntraHealth utilize a comprehensive approach to engage stakeholders and jointly develop solutions to meet their needs. The approach recognizes that well-designed computer systems need to be supported and sustained through a wide-ranging program. The approach includes the following five elements[6]:

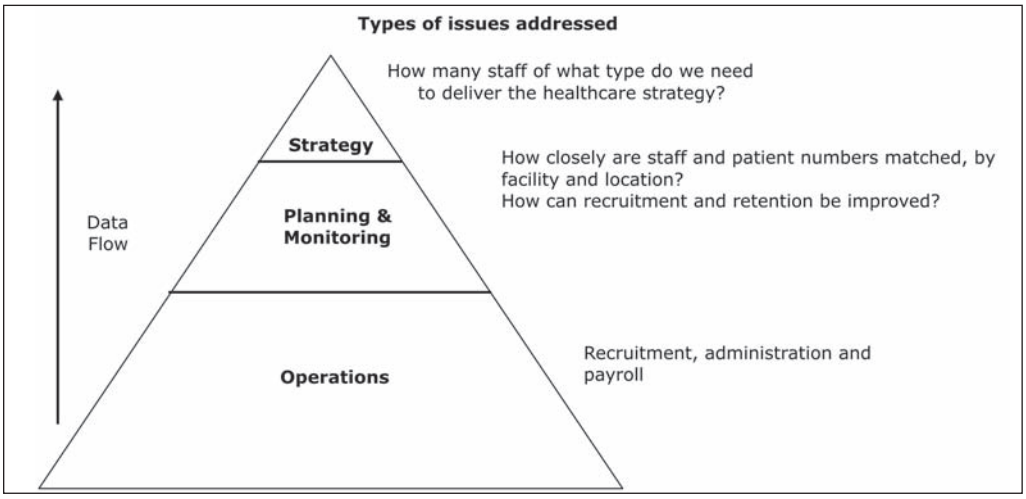
1. Building HRIS leadership using a participatory, inclusive approach that incorporates a thorough assessment of any related systems already in use
2. Improving existing systems as needed to support the HRIS – networks, Internet connectivity, hardware, software, technical support, and electrical supply
3. Developing HRIS software solutions customized to answer the key health workforce policy and management questions identified as critical for that country
4. Supporting managers and decision-makers to effectively use and analyze data for informed and confident decision-making
5. Ensuring sustainability and continuous improvement of the HRIS through training and technical support to build capacity in the country to independently support, use, and improve the HRIS in the future.

[5] Available on: *http://capacityproject.org/hris*

[6] Available on: *http://www.capacityproject.org/hris/process/*

Human resources (HR) management takes place at strategic, planning, and operational levels, as shown in Figure 1. While strategy plays a crucial role, the bulk of activity is operational, which is where most data for information systems are generated and tracked by a routine HRIS.

Figure 1. The Human Resource Pyramid



In a vacuum of low-cost country-adaptable HRIS systems, the iHRIS Suite of routine health workforce information software was developed for countries' health sector leaders in order to provide the ability to manage and assess HR data for problems and to plan and subsequently evaluate effective interventions. Each software product addresses specific human resources for health issue:

- **iHRIS Manage** is a human resources management system that enables an organization to design and manage a comprehensive human resources strategy.
- **iHRIS Qualify** is a training and licensure tracking database that enables a country's licensing or certification authority to track a cadre of health workers from pre-service training through attrition.
- **iHRIS Plan** is workforce planning and modelling software that enables decision-makers to assess their workforce needs for the next several years, project the actual health workforce over the same time, and make effective policy decisions to close the gap between the two. The software models how the current health workforce will change based on known influences and compares that model output to projected workforce demand.

A great attraction of the open source software approach is that anyone can freely download and modify it to meet their country's or organization's specific needs. In turn, any improvements they make to the software code benefits other countries. The benefits offered by this approach are being realized by a number of countries and regional organizations.

Results

The following results indicate the benefits of using a routine HRIS for human resources planning and management, resource allocation, and quality assurance in low-resourced areas. To date, iHRIS Manage has been installed in Botswana, Ghana, Kenya, Rwanda, Southern Sudan, Tanzania, and Uganda. iHRIS Qualify has been installed in Pakistan and Uganda. iHRIS Plan was piloted in Namibia and an existing HR management system was strengthened. A Microsoft Access-based HRIS was implemented in Swaziland.

These results are taken from numerous projects funded by USAID and led by IntraHealth International. USAID's global Capacity Project supported HRIS strengthening in nine countries: Botswana, Kenya, Lesotho, Namibia, Rwanda, Southern Sudan, Swaziland, Tanzania, and Uganda. The Capacity Project ended in September 2009 and a series of follow-on projects – including the USAID global Capacity*Plus* project and several USAID-funded bilateral – are carrying forward HRIS strengthening work. The country-specific bilateral projects continue to support implementation, customization, and use of the software in-country. These include the Capacity Kenya Project, the Namibia HIV Prevention, Care, and Support Program, the Southern African Human Capacity Project, the Tanzania Human Resource Capacity Project, and the Uganda Capacity Project. The Capacity*Plus* project continues to support core software development as well as documentation and dissemination of the software at the global level.

Other results come from independent implementations of the iHRIS software led by the Pakistan Nursing Council and by the Ghana Ministry of Health, with support from West African Health Organization.

Specific results are drawn from an evaluation of the Capacity Project's HRIS strengthening process (DE VRIES et al., 2009) and have been updated by telephone interviews with key local project staff. We would like to thank the following people for their generous contributions: Bakari Bakari, Zanela Bhembe, Dr. Perle Combary, Luke Duncan, Dr. Rafat Jan, Sisi Lukhele, Jennifer Macias, Dr. Pamela McQuide, Martin Namutso, Dr. Kayode Odusote, Dr. Vincent Oketcho, Angela Self, Samwel Wakibi, and Ismail Wadembere.

Systems-strengthening activities frequently have a wide variety of impacts. Detailed below are HRIS strengthening results in stronger strategic planning, routine planning and monitoring, operational effectiveness, and health worker quality assurance. A few

activities in planning and currently underway are highlighted to show the potential of future developments in this area.

Strategic planning

A costed master plan for improving health services in Uganda was used to obtain a $100 million World Bank loan, for which human resources for health was a major factor. This plan applied the HRH Action Framework[7] and was based on HRIS data received from the Ministry of Health's bi-annual report on HRH, the four health professional councils, and other available HR data. In addition, the national legislation governing pharmacists in Uganda was improved by using information from HRIS reports.

Planning and monitoring

In Uganda, planning and monitoring was improved by showing the relationship between the numbers of nurses educated and those registering with the Nurses and Midwives Council. This illustrated the degree to which the investment in education produced dividends and revealed the scope needed to improve the flow of newly qualified nurses into health care employment and enforce registration requirements.

In Swaziland, the health workforce was increased by 200 posts in the first year of HRIS implementation and 300 in the second, as the HRIS showed the true extent of staff shortages, whereas previous attempts to justify increases in staffing had failed due to lack of evidence. The increase in posts allowed managers to focus on a skill mix review to ensure necessary services were being provided as they were no longer purely focused on increasing overall health worker numbers. By using facility health management information systems' data on patients and services, the chief nursing officer linked nurse staffing numbers to patient activity by using nurse/patient ratios, which allowed for targeted resource allocation and improvement in patient care. Also, turnover peaks in health facilities were investigated by tracking staff that had left the workforce. In many cases, these workers had undergone government-funded training and accordingly should have returned to the workforce upon completion of the training programs.

Operations

At operational levels, district HR staff in Uganda saved time in the recruitment process by checking the standing of applicants with their professional council's web portal. It also

[7] Available on: *http://www.capacityproject.org/framework/*

means that delays in appointing staff or appointing staff before formal notification of their status is received have been eliminated.

Newly recruited staff no longer had to wait three to four months to be paid, which improved staff morale. Money was saved as ghost workers were eliminated, which contrasts with the previous situation when staff who left employment were paid for several months. In Swaziland, a serious staff shortage in a psychiatric hospital was exposed and rectified when the HRIS revealed the true nature of their vacancies. The previous system had wrongly inflated the facility's staffing levels by maintaining on its roster former employees who had left to work elsewhere in the country.

Also in Swaziland, administrative tasks, such as promoting staff by seniority, can now be undertaken at the press of a button, when previously it took many hours of clerical effort. Submissions to integrate externally funded posts into the Ministry of Health establishment were produced rapidly, as the information on staff experience and qualification became available electronically.

The quality of information for national workforce planning in Uganda was improved when health professional councils implemented iHRIS Qualify. This enabled them to eliminate duplicate counting of holders of multiple qualifications and provide more accurate data on the available workforce. Registrants' demographic information was made available in a matter of minutes; previously it took several months to provide such information manually.

Quality assurance

Health care professionals' quality assurance was improved in Uganda as staff no longer began working before the hiring facility received confirmation of their licence to practice. The fraudulent use of professional titles was greatly reduced as the records were instantly accessible, compared with the slowness and sometimes inability to locate paper files previously.

Notably, the Pakistan Nursing Council was the first organization to implement iHRIS Qualify with funding from an unaffiliated project and the support of local developers and the Aga Khan University, with only virtual assistance from IntraHealth provided via audio and video conferencing. The local team also developed a finance module, which is likely to be of interest to other iHRIS Qualify users. Another novel development was online registration which has substantial advantages as it eliminates errors due to poor handwriting and greatly speeds up the registration process.

Future developments

New countries are implementing iHRIS software and existing users are making greater use of its reporting capabilities in their decision-making. In addition, they are improving

the accuracy and timeliness of data through system integration. For instance, Swaziland's HRIS is being linked to the health management information system which will then be linked directly to payroll and to a training module.

Several key country and regional adoptions are leveraging the investments made by USAID and taking the iHRIS software beyond its origins:

- The Pakistan Nursing Council invited the iHRIS team to visit Pakistan in May 2010 in order to oversee its official shift from the old system to iHRIS Qualify. The iHRIS team will also meet with local universities and potential funders to demonstrate the software and discuss national support. On a broader level, the team will meet with Aga Khan University to discuss regional support for the software. The Council's high level of commitment to these developments is evident. Even though their funding through the USAID-funded Technical Assistance for Capacity Building in Midwifery, Information and Logistics ended, the Council is an international advocate and has already demonstrated iHRIS Qualify in Afghanistan.
- The West African Health Organization's (WAHO) pilot of iHRIS Manage in Ghana and interest in piloting systems in Nigeria and Liberia is evidence of the wide appeal of the two systems. WAHO's mission is to coordinate regional public health policy and should the pilots receive favorable evaluations there will likely be substantial interest among the organization's 15 national members. In addition, WAHO is translating iHRIS Manage into French which will substantially widen its appeal.
- The implementation of iHRIS in numerous countries represents a powerful critical mass for improving the provision of health care staff through better planning, deployment, and administration. This is being supported by a growing range of local initiatives to educate and train information and communication technology (ICT) staff, which in turn greatly enhances health information systems' sustainability and the resources available for future development.

Discussion and Recommendations

The scale of these achievements is all the more remarkable when the extent of the challenge is taken into account. Introducing ICT into HR, a profession whose practitioners may not be data literate and may prefer face-to-face interaction and the writing of policies and procedures, is a major challenge in any country. This is even greater where staff have had very limited ICT exposure. Furthermore, several years of substantial investment are required by local, in-country senior and middle management before the benefits of better decision-making and more efficient processes are fully realized.

Many lessons have been learned through the course of these strengthening efforts, and recommendations are regularly generated and implemented by stakeholders and project teams alike:

Sustainability and South-to-South cooperation

Sustainability considerations need to be built into all phases of HRIS projects and, whenever feasible, South-to-South cooperation should be encouraged and supported.

Important lessons include achieving early success by basing the choice of pilot sites and early implementers on the strength of local leadership and the availability of resources. For example, in Uganda two of the most challenging districts were selected for district rollout. One of the districts in particular had a long catalog of problems: it had no main electricity supply, it had been just recently established, and it had very few staff. Complicating matters, the head of HR had moved the computer designated for HRIS into his office which had no electricity.

Coordination between a country's various health programs such as HIV and maternity services is essential to avoid duplicate and triplicate data entry and to ensure focused use of resources. In many countries, rather than everyone making use of a common HRIS that tracks training, it is not unusual to find that there are multiple project-driven training databases in operation. To achieve this rationalization entails close cooperation between the different program sponsors. In Tanzania for example, efforts of US, Japanese and Norwegian donors are being harmonized to support a successful national health workforce information system.

Demonstrations of existing systems are particularly important for staff new to computer databases, as they need assistance in visualizing the final product. Spreading good practice and system development of iHRIS Qualify in Uganda was facilitated by a study trip to the Kenya Nursing Association to see it in operation. Carrying forward, the Uganda Nursing and Midwifery Council shared its knowledge with the Pakistan Nursing Council. Similarly, the West Africa Health Organization first learned about iHRIS Qualify from a video of its impact at the Nursing Council of Uganda, contrasted with the previous, paper- based system.

A country's implementation and development team's breadth of experience and background is important. It should consist of ICT developers, managers, and content advisors. These parties should maintain a dialogue with expected system users and other stakeholders to support a participatory and custom-designed development approach. A user group should be formed to supply immediate feedback on usability and software improvements. The group chair should also participate in the senior-level steering group,

which would facilitate the coordination of the work of both groups and the delegation of tasks. The availability of scarce ICT skills should be increased by mentoring and remote training, as well as partnering with regional universities to enhance their programming, administration, and data management skills.

Stakeholder leadership groups and human resources personnel

The engagement of stakeholders and the size of the resources they have available are both critical to the success of the stakeholder leadership group. In Uganda, engagement of stakeholder leadership group members was enhanced by their official agreement on 26 guiding principles that focused on members' relationships and organizations, stressing respect, equality, mutual support, and efficiency.

The Uganda Ministry of Health's HR function needed to be large enough to support innovation and change which was not the case in some of the countries piloting iHRIS. However, Uganda made efforts in this direction by appointing more experienced HR staff and supporting training in strategic and systems thinking approaches along with data analysis.

Retaining key implementation staff, such as the senior HRIS manager and the HRIS specialist, is essential. This should be motivated by awarding a bonus for achieving key milestones and a large project completion bonus. The capacity for managers to provide HRIS training is essential due to frequent staff turnover.

The shortage of data entrants in health professional councils, particularly for the smaller professions, is problematic. One strategy to address this problem is for councils to share data entry staff and facilities. This will enable the councils to cope more effectively with staff absence, sickness, and turnover, as well as improve their cost effectiveness.

Finally, project management is an essential discipline that should not be neglected when working with the stakeholder leadership group. This includes a risk assessment highlighting the likelihood and severity of risks, along with mitigating action, supported by the production of Gantt charts, issues, and lessons learned. This may be facilitated by the use of simple project management software.

Data management and use

One often neglected topic is that of common, consistent codes. Without these, data analysis is problematic. National entity codes for districts, towns, hospitals, and universities need to be standardized and this may well involve a cross ministerial initiative. In addition, post and personal codes such as joiners and leavers, position titles, occupation, and nationality also need to be standardized. International codes for job families, such as

the International Labor Organization's ISCO codes, need to be used wherever possible,[8] mapping capability to such standardized codes has already been implemented in iHRIS.

The production of large volumes of information is only valuable if it is readily and widely accessible. For example, the Uganda Ministry of Health's knowledge portal increases the availability of information and reduces the burden on HR staff to respond individually to requests. In the future, professional registers should be available online so that members of the public can readily check the standing of practitioners.

A further consideration is the number and importance of decisions made using the newly produced workforce information. This entails active leadership, change management skill, and effective professional development for key decision-makers in order for reports, graphs, and pie charts produced from the HRIS to be fully utilized. Key decision-makers in Rwanda, Swaziland, and Uganda were impressed by data-driven decision-making workshops that showed the power of integrating existing information from multiple sources such as health care, education, and professional councils. Future events will show how district-level management should use this information.

Monitoring and evaluation of outputs should take the form of counting the number and frequency of reports produced, the numbers of users logged on at any time, and the extent to which paper systems are replaced by HRIS. Outcomes should be evaluated by monitoring the extent to which staff recruitment, retention, and deployment is improved.

Integrated health information systems

Broader health information systems (HIS) provide a wealth of data to assist in planning, policy, and management of the health workforce (WHO/HMN, 2008a). HIS's have been traditionally developed as components to address specific needs. These include clinical information systems such as electronic medical records systems and public health information systems designed for tracking service statistics and disease-burden information.

The functional requirements of each of these information systems are independently well understood and have been validated by use. Our current challenge is in facilitating effective data use. WHO and the Health Metrics Network assert that "once data has been collected and stored, it needs to be processed and compiled in such a way that the data can easily be compared and collated with information drawn from other sources, so that data is not duplicated, mistakes are identified and corrected, and accuracy and confidence levels can be measured" (WHO/HMN, 2008b). In particular, when implementing an HIS in a low-resourced setting (LEITNER; BALES, 2010), one should use common data sets,

[8] International Labour Organization. Available on: *http://www.ilo.int/public/english/bureau/stat/isco/intro3.htm*

interoperable information systems, as well as a standardized data exchange format, such as the growing SDMX-HD[9] standard, to minimize the ICT burden on the system.

As the components of the HIS increasingly interoperate, the benefits of having an integrated HIS are manifold (PAHO/WHO, 2009). For example, from a clinical information system or a disease tracking system, you may learn that certain rural districts have a higher incidence of malaria. When this information is combined with that of the census and HRIS data, it becomes apparent that the number of health workers in these districts is under-represented as a percentage of the national population. Data from an HRIS training module could well indicate that nurses in these districts have received little training in malaria diagnosis and prevention. Conversely, nurses working in areas with lower malaria prevalence, such as in the towns, may have received such training. These data can then be used to inform HR policy and management decisions such as where to prioritize a health worker retention program or where to reallocate training resources.

Conclusion

The extent to which countries are implementing a routine health workforce information system and existing users are investing in improving operational efficiency, data quality, systems linkages, and the use of reports in decision-making, is a testament to the overall value of the HRIS strengthening approach. Future investment in the development of local, regional, and global health workforce information experts and systems will greatly enhance the quality and sustainability of the world's efforts to understand and resolve the global health workforce crisis.

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