



# IMPROVEMENT STRATEGIES MODEL: FACILITY ORGANIZATION AND MANAGEMENT: INFORMATION SYSTEMS USE

Led by: **BILL & MELINDA**  
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## CORE PRINCIPLES OF FACILITY ORGANIZATION AND MANAGEMENT

Facility organization and management includes: the effective organization of facility operations; deployment of human resources in multidisciplinary teams; routine collection and use of information systems to establish targets, monitor progress, and implement ongoing quality improvement initiatives; and the capability of managers to oversee, support, and enforce these processes.

### TEAM-BASED CARE ORGANIZATION

Team-based care organization refers to groups of providers with diverse training, education, and capabilities.(1) Working together and leveraging their distinct expertise, these teams are designed to provide comprehensive, coordinated, and efficient primary health care to patients.(2) Effective team-based care involves two central components: comprehensive team composition to meet population health needs and strong team culture focused on communication, respect, and trust between team members.

### FACILITY MANAGEMENT CAPABILITY AND LEADERSHIP

Facility management capability and leadership refers to the capabilities of managers and leaders within a facility. Leaders should have relevant skills related to coordination of operations, external/consumer relations, target setting, and human resources.(3) Strong leaders must have or develop particular competencies and personality traits to engage the workforce and manage effectively. Competencies can be defined as the combination of motive, trait, skill, self-image, social role, and body of relevant knowledge.(4) Managers should be properly equipped with the tools, systems, and skills to productively assess the health workforce within a facility and provide supportive supervision.

### INFORMATION SYSTEMS USE

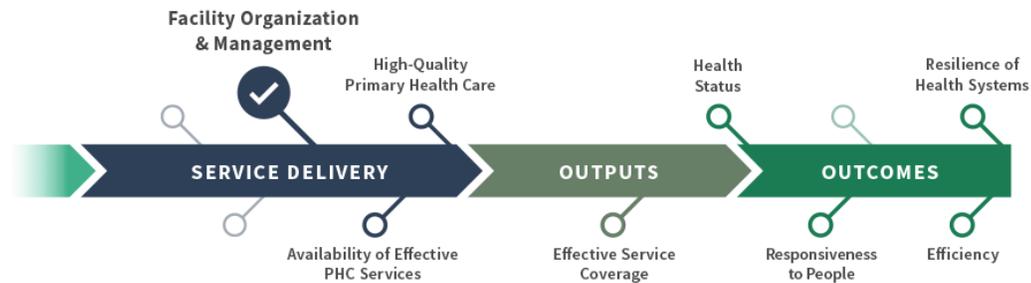
Information systems use is the effective utilization of existing information systems (the infrastructure related to Information Systems is addressed in the Information Systems module within Systems - forthcoming) and the data they produce at the facility level to coordinate care, monitor performance, and drive management. Effective information systems use can support a variety of purposes ranging from priority setting to clinical tasks and education. Information systems should be easy to use with clear expectations of use and systems for monitoring and evaluation and should provide easily accessible information to those who use them.

### PERFORMANCE MEASUREMENT AND MANAGEMENT

Performance measurement and management includes both supportive and continuous supervision of staff as well as the routine establishment of performance targets, monitoring of progress towards these targets, and implementation of quality improvement (QI) initiatives to address identified gaps. These measurement systems should be designed with feedback loops to target results to the end users of the data and should be ensconced in larger continuous QI systems.

## WHAT COULD YOUR COUNTRY ACHIEVE BY FOCUSING ON FACILITY ORGANIZATION AND MANAGEMENT?

Facility organization and management, when done effectively, can contribute to an array of downstream effects. These may include:



## FACILITY ORGANIZATION AND MANAGEMENT: WHAT ARE THE FIRST STEPS?

The four sub-components within Facility Organization and Management (team-based care organization, facility management capabilities and leadership, information systems use, and performance measurement and management) are diverse, addressing elements of workforce, infrastructure, and individual competencies. Consequently, strategies to improve service delivery within facility organization and management are far-reaching, and the best fit for any given context may be highly contingent upon pre-existing structures, systems, and capacities. For instance, improvements in team-based care organization may require the education and integration of a new cadre of providers in one context, while in a second context training for existing team members in respectful teamwork may be needed. Thus, the order in which health systems address sub-components of facility organization and management is dependent upon initial assessments, the magnitude of change needed, and contextual feasibility. The following sequencing of domains is intended to show the interconnectedness of these elements rather than imply a specific pathway that must be followed.

Information systems use underlies many aspects of facility organization and management. Planning services, allocating resources, accessing patient information, and evaluating performance or management of a health facility and its staff all require robust facility data originating from information systems that are well integrated into the facility and are easy to use. Building on the inputs to establish these information systems, more efficient use of information systems can be championed by facility leaders and managers. Making use of information systems and relevant data, facility leaders - whose skill sets and responsibilities are encompassed by [facility management capability and leadership](#) - can enact necessary reforms or changes in service delivery, monitor change, and foster a facility culture and learning system which values data use for continual improvement. Data on the size and needs of the population should inform the composition and size of [care teams](#) while the culture, goals, and responsibilities within the teams should be guided and facilitated by leadership. Finally, well-designed [performance measurement and management](#) systems should be used to monitor the functioning of all aspects of a facility, including

## FACILITY ORGANIZATION AND MANAGEMENT

team-based care, information systems, and facility leadership, highlighting gaps and subsequently opportunities for continued improvement. Facility managers should have the necessary training and capability to use data to guide improvement.

**What it is****INFORMATION SYSTEMS USE**

What others have done

How to get started

How to succeed

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**WHAT SHOULD I KNOW BEFORE BEGINNING IMPLEMENTATION?**

Health information systems are one of the six WHO health system building blocks: “A well-functioning health information system is one that ensures the production, analysis, dissemination and use of reliable and timely information on health determinants, health system performance and health status”.<sup>(5)</sup> While the physical presence of a health information system and the required inputs are essential (this will be discussed in the Information Systems module - forthcoming), information systems use moves beyond infrastructure and availability of information systems to address how systems are being used to support patients, manage and achieve facility goals, and monitor performance.

**USES FOR INFORMATION SYSTEMS**

The Safety Net Medical Home Initiative implementation guide identifies eight core processes that benefit from effective health information technology use:

- ▶ Defining and understanding each provider’s patient population and key sub-populations (identifying the patient population is discussed in greater detail in the [empanelment](#) module)
- ▶ Defining and tracking care of individual populations and sub-populations
- ▶ Providing patient-specific educational materials
- ▶ Providing individual care reminders
- ▶ Providing an after-visit summary with key information at the end of each visit
- ▶ Maintaining a system of action reports to guide the team’s care management activity and a system of outcomes reports for monitoring processes of care and population outcomes
- ▶ Using technology to optimize communication between patients and their care team, including using a patient panel in the EHR.
- ▶ Scheduling appointments and monitoring access to care (appointment systems are discussed in greater detail in the [timeliness](#) module) (6)

For each, the [guide](#) provides an overview of the process, goals, workflow requirements, health information technology requirements, and suggestions for how to begin without an electronic health record. Although the guide is written for a high-income context, many of the principles discussed in the guide may prove useful in other settings. It is important to note that there are two distinct uses for information systems related to data collection and use. The first is individual-level patient records. Electronic medical records (EMRs) are being increasingly common, though they are often fragmented among vertical programs in low income countries. Secondly, aggregate data - including performance management - is also important for facility and larger health system improvement, monitoring, and

**What it is**

planning. These data are often collected using the District Health Information Software platform, discussed in greater detail in the “technical” section, below.

**What others have done**

Within low and middle-income settings specifically, mobile and electronic health (mHealth and eHealth) have been shown to fulfill myriad functions including:

**How to get started**

- ▶ Data collection
- ▶ Disease surveillance
- ▶ Client health education
- ▶ Provider training and education
- ▶ Supervision and monitoring
- ▶ Diagnostics
- ▶ Telemedicine
- ▶ Registries/vital events tracking
- ▶ Electronic decision making
- ▶ Provider communication
- ▶ Provider planning and scheduling
- ▶ Workforce management
- ▶ Supply chain management
- ▶ Financial transactions

**How to succeed**

## NECESSARY TECHNICAL CAPACITIES

Effective information systems can span a wide range of technological capacity—from simple paper-based forms to basic Excel spreadsheets to advanced electronic medical record systems. Each of these formats comes with specific technical considerations. Although electronic systems may offer more functionality, they also require more infrastructure—including internet or cellular connectivity, consistent supply of electricity, functional electronic hardware, and necessary software—that may not be feasible in all settings. Information safety also becomes an increasingly complex issue with electronic systems, and issues such as data encryption, cloud based storage, and antivirus software must be accounted for when using patient level, identified data. (25) A number of studies have identified consumer concerns regarding data confidentiality for patient-level data, and facility leaders should ensure that providers communicate the confidentiality of eHealth technology to ease patient concerns and increase acceptability. (7) Finally, interoperability of data management systems across facilities and services is an essential functionality to ensure that information systems can effectively collect, analyze, and share critical information. (1) Interoperability allows providers in different departments of a facility and across different levels of a health care system to share data, as appropriate, and should be considered from the outset of information system design.

The District Health Information Software (DHIS) is a robust data collection, collation, and dashboard system that can enable facility-level, regional-level, and even cross-country data review and comparisons that can may subsequently inform iterative quality improvement. The current iteration of the DHIS - DHIS2 - is used in many LMIC. The DHIS2 [implementation guide](#) provides recommendations for national health information system implementation as well as details regarding training, integration, and installation of DHIS2.

The Center for Health Market Innovations has compiled a [database](#) of relevant programs related to information communication technology. The applicability of these programs will depend on context.

**What it is****BEHAVIORAL CHANGES**

What others have done

How to get started

How to succeed

Health information system implementation in facilities should be considered with the user in mind. This includes considerations such as provider literacy and capacity to use electronic devices - typically computers. The use of mobile resources for health may further increase efficiency and may have the potential to ease the effects of workforce shortages through telemedicine programs or using mobile decision aids. However, for information systems to be efficient, they must fit with the daily flow of work and have a clear and easy user interface that does not hamper productivity. If information systems are introduced in facilities without adequate training or consideration of how these systems will be integrated into daily work, they may cause confusion and detract from productivity. Facility leaders have an important role in the introduction of health information systems. They must clearly communicate the goals of information systems to staff, provide ample opportunities for training in these systems, and finally utilize appropriate data from these systems to communicate with stakeholders and monitor performance.(8,9) Capacity for data use and choice of indicators and targets is discussed in more detail in the [performance measurement and management](#) module.

During collection of patient-level data, paper-based systems may be faster and more flexible than electronic methods. However, the process for data transfer and analysis is significantly more challenging when using paper-based data records and can often create a significant burden on providers as they require physical data transfer.(10) This tradeoff may present a bottleneck in uptake of electronic records. However, electronic health information systems for both individual and aggregate-level data can help reduce provider burden and create higher quality data, assuming that providers are trained and the system is efficient. MEASURE Evaluation - a USAID funded initiative working to strengthen data use capacity in developing countries - produced a [report](#) on the use of health information systems to ease provider burden.

**SUSTANABILITY**

Finally, particularly for mHealth and eHealth applications, sustainability is an important consideration. Often funding for these programs comes from external donors which may pose a challenge for long-term sustainability.(11)

- ▶ The following costs must be considered for budgeting at the outset of health programs as embedded costs in any program as well as continuing costs after implementation:
- ▶ Capital expenditures for hardware at both the facility level (i.e. computers, phones, wiring) and regional/national level (i.e. central services connectivity hardware)
- ▶ Ongoing maintenance costs for hardware and updating software
- ▶ Costs for data transfer, including bandwidth and SMS reminders
- ▶ Staffing for technical assistance and maintenance and training related to staff turnover
- ▶ Management practices to document, analyze and report data when information systems are not operational, often referred to as “downtime”.

What it is

## WHAT HAS BEEN DONE ELSEWHERE TO IMPROVE INFORMATION SYSTEMS USE?

What others have done

How to get started

How to succeed

### BRAZIL

In light of numerous recommendations that health systems adopt electronic health records (EHRs) and information systems, a study in Brazil explored the impact of the use of information communication technology on women's health.(12) The study evaluated three components of information and communication technology: infrastructure, system implementation, and information use. The study found generally low levels of all three in primary care teams across Brazil; however, the study found an association between quality of care in women's health - as measured by a set of 17 indicators - and infrastructure (printer, television, and computer availability), connectivity (internet, access to smartphones), implementation (EHRs, telehealth, use of records, and use of referral centers), and all aspects of information use (including the presence of various records and risk stratification protocols).

### POPULATION HEALTH AND IMPLEMENTATION TRAINING - MULTIPLE COUNTRIES

The Population Health and Implementation Training (PHIT) Partnerships in Ghana, Mozambique, Rwanda, Tanzania, and Zambia all included health information strengthening initiatives, each implemented with consideration of existing infrastructure and specific population needs and demands.(13) While Mozambique, Ghana, and Tanzania focused on improving quality and existing information systems, Zambia and Rwanda introduced new information systems and tools. Sustainability was considered during implementation plans through robust training and integration of new systems into existing information systems.

While the specific intervention strategies differed, there were a few overarching similarities among the countries: flexible approaches to design and ability to refine tools, performance summaries to aid decision makers in allocation of resources and priorities, and use of Ministry of Health information systems to ensure that changes are aligned with national priorities and improve sustainability.(13) Building from these similarities, the authors noted three implementation lessons from the programs:

- ▶ Implementation of new technology should be coupled with stakeholder meetings, data review, and mentoring in the use of data in addition to training for use of new information systems;
- ▶ Health information systems should be designed to be fully integrated with national health information technology; and
- ▶ Mobile phone technology can complement EMRs in rural areas but any interventions using mHealth require initial costs in both infrastructure and capacity building including cellular networks and charging ability.(13)

What it is

What others  
have done

How to get  
started

How to  
succeed

## WHAT QUESTIONS SHOULD BE CONSIDERED TO BEGIN IMPROVEMENTS?

The questions below may be a useful starting place for determining whether information systems use is an appropriate area of focus for a given context and how one might begin to plan and enact reforms:

### **WHAT INFORMATION SYSTEMS DO FACILITIES CURRENTLY USE TO TRACK PATIENT AND FACILITY PERFORMANCE DATA? WHAT ARE THEIR ASSOCIATED STRENGTHS AND WEAKNESSES?**

When identifying the strengths and weaknesses of existing information systems, stakeholders should consider how easy they are to use, interoperability with other systems, and the training and infrastructure needed to use them. The daily users of these systems should be involved in this process. Identifying these strengths and weaknesses can help surface gaps that should be filled by new or updated systems.

### **WHAT IS THE EXISTING INFRASTRUCTURE TO SUPPORT CURRENT AND FUTURE INFORMATION SYSTEMS? DOES EVERYONE WHO WOULD BE RESPONSIBLE FOR RECORDING INFORMATION HAVE ACCESS TO A COMPUTER, AND IS POWER AND INTERNET RELIABLE?**

Robust electronic information systems may not be feasible in all settings. It is important to design information systems with contextual realities in mind.

### **WHAT SORT OF TRAINING OR ORIENTATION IS NEEDED TO ENSURE THAT STAFF CAN EFFECTIVELY USE ANY NEW INFORMATION SYSTEMS?**

Learning new information systems can take time away from patient interactions and may initially cause confusion or inefficiency. To avoid this, it is important for facility leaders to provide adequate training to all staff who will use information systems and check in with staff on the way in which these systems have changed their work.

### **ARE INFORMATION SYSTEMS SUSTAINABLE FROM A FUNDING AND STAFFING PERSPECTIVE?**

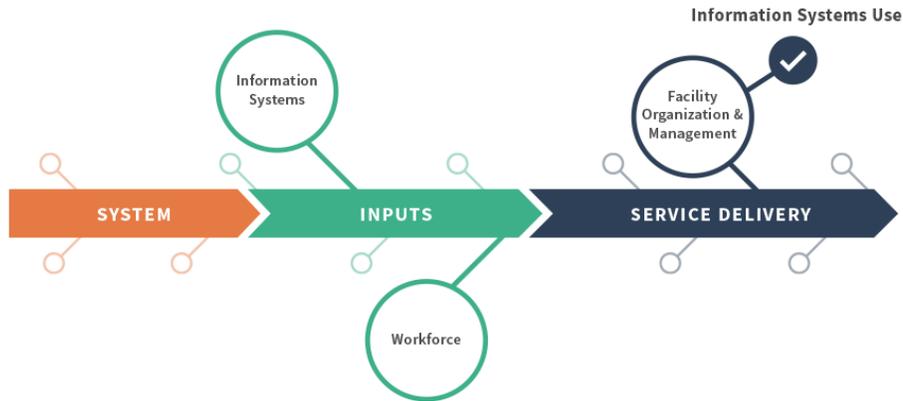
Often funding for information system programs comes from external donors which may pose a challenge for long-term sustainability.<sup>(11)</sup> Facility managers should be sure to consider long-term sustainability from the outset of these programs to ensure that there isn't a lapse in access after initial implementation.

### **HOW WILL DATA FEEDBACK FOR QUALITY CARE IMPROVEMENT BE INTEGRATED INTO THE PLANNED SYSTEMS?**

When developing quality improvement information systems, it is important to consider how the collected information will be analyzed and returned to providers. Without these systems, information systems will not contribute to quality improvement.

## WHAT ELEMENTS SHOULD BE IN PLACE TO SUPPORT EFFECTIVE IMPROVEMENTS?

In order for interventions aimed at improving information systems use to be most successful, the following elements of the PHCPI Conceptual Framework should be in place or pursued simultaneously:



### B3. INFORMATION SYSTEMS

Information systems use, discussed in this module, refers to the utilization of information systems at the facility level. However, information systems use is dependent upon the presence of such systems and the infrastructure that supports them. This includes internet connectivity, hardware, and software.

### B4. WORKFORCE

A trained workforce is necessary to make use of information systems effectively and efficiently. Facility employees who use information systems should receive appropriate pre- and in-service training. Additionally, it is important that there are clear expectations for who uses information systems and for what purpose to reduce unnecessary burden or duplication of tasks.

### C2.B FACILITY MANAGEMENT CAPABILITY AND LEADERSHIP

Facility managers and/or leaders should ensure that there is a clear vision and purpose for information system use. They should dictate who uses these systems and for what purpose and ensure that everyone receives the necessary training to carry out expected tasks related to information systems. Managers and/or leaders should also have the oversight authority to monitor and advocate for necessary infrastructure to support information system use.

**Suggested citation:** “Facility Organization and Management: Information Systems Use.” *Improvement Strategies*. Primary Health Care Performance Initiative, 2018, <https://improvingphc.org/information-systems-use>. Accessed [insert date].

## REFERENCES - FACILITY ORGANIZATION AND MANAGEMENT: INFORMATION SYSTEMS USE

1. Bitton A, Pesec M, Benotti E, Ratcliffe H, Lewis T, Hirschhorn L, et al. Shaping tiered health care delivery system in accordance with People-Centered Integrated Care Model. In: Deepening Health Reform in China : Building High-Quality and Value-Based Service Delivery. World Bank Group; 2016.
2. Schottenfeld, L; Petersen D; Peikes, D; Ricciardi, R; Burak, H; McNellis R; Genevro J. Creating Patient-Centered Team-Based Primary Care. *Ahrq*. 2016;
3. Tsai TC, Jha AK, Gawande AA, Huckman RS, Bloom N, Sadun R. Hospital board and management practices are strongly related to hospital performance on clinical quality metrics. *Health Aff*. 2015;34(8):1304-11.
4. Boyatzis RE. The Competent Manager: A Model for Effective Performance [Internet]. Wiley; 1982. Available from: <http://www.wiley.com/WileyCDA/WileyTitle/productCd-047109031X.html>
5. WHO. Everybody’s business: strengthening health systems to improve health outcomes: WHO’s framework for action. Production [Internet]. 2007;1-56. Available from: [http://www.who.int/healthsystems/strategy/everybodys\\_business.pdf](http://www.who.int/healthsystems/strategy/everybodys_business.pdf)
6. Homes PM. GUIDE QUALITY IMPROVEMENT STRATEGY PT 2. 2013;
7. Wambugu S, Vilella C. mHealth for Health Information Systems in Low- and Middle-Income Countries: Challenges and Opportunities in Data Quality, Privacy, and Security. 2016.
8. GUIDE Strategies for Guiding PCMH Transformation Message to Readers. 2013.
9. Ross J, Stevenson F, Lau R, Murray E. Factors that influence the implementation of e-health: a systematic review of systematic reviews (an update). *Implement Sci* [Internet]. 2016;11(146). Available from: <http://implementationscience.biomedcentral.com/articles/10.1186/s13012-016-0510-7>
10. USAID/MEASURE. Easing the Data Collection Burden on Healthcare Providers by Strengthening Health Information Systems. 2017; Available from: [https://www.measureevaluation.org/resources/publications/tr-17-211\\_en](https://www.measureevaluation.org/resources/publications/tr-17-211_en)
11. Goel S, Bhatnagar N, Sharma D, Singh A. Bridging the Human Resource Gap in Primary Health Care Delivery Systems of Developing Countries With mHealth: Narrative Literature Review. *JMIR mHealth uHealth*. 2013 Dec;1(2):e25.
12. Matta-Machado ATG, de Lima ÂMLD, de Abreu DMX, Araújo LL, Sobrinho DF, Araújo ÉLS, et al. Is the Use of Information and Communication Technology Associated With Aspects of Women’s Primary Health Care in Brazil? 2017;40(2):S49-59. Available from: <http://insights.ovid.com/crossref?an=00004479-201704001-00006>
13. Mutale W, Chintu N, Amoroso C, Awoonor-Williams K, Phillips J, Baynes C, et al. Improving health information systems for decision making across five sub-Saharan African countries: Implementation strategies from the African Health Initiative. *BMC Health Serv Res* [Internet]. 2013;13(Suppl 2):S9. Available from: <http://bmchealthservres.biomedcentral.com/articles/10.1186/1472-6963-13-S2-S9>