Designing a theory-based digital audit and feedback dashboard for maternal and child health care providers:

A qualitative study of preferences and needs in Palestine

Kimberly McFadden Frost

Main supervisor: Benedikte Victoria Lindskog

Co-supervisor: Kjersti Mørkrid Blom-Bakke

Department of Community Medicine

Institute of Health and Society

Faculty of Medicine

University of Oslo

November 2019

Thesis submitted as a part of the Master of Philosophy Degree in

International Community Health

2019

Designing a theory-based digital quality improvement dashboard for maternal and child health care providers: A qualitative study of preferences and needs in Palestine

Kimberly McFadden Frost

http://www.duo.uio.no

Trykk: Reprosentralen, Universitet i Oslo

Acknowledgements

I am grateful for the opportunity to work with the eRegistries Initiative team at the Norwegian Institute of Public Health, particularly Kjersti Mørkid Blom-Bakke and Frederik Frøen, who provided significant input throughout this process.

To my colleagues at PNIPH and in the Palestinian Ministry of Health, without whom this study would not have been possible, in particular Taghreed Hijaz who opened many doors and helped me to better understand the context for this work. Thank you.

I would like to especially acknowledge the work being done by the nurses and midwives at antenatal clinics in the West Bank and Gaza. During the time of this study they faced tremendous challenges in terms of instability and conflict, and they not only continued to offer healthcare to the best of their abilities, but also made time to contribute to this study, with the hopes that it would lead to improvements for the women that they serve.

Thank you to my supervisor, Benedikte Victoria Lindskog, for your support and encouragement. Special thanks to my reader, Unni Gopinathan, who provided last minute feedback that was invaluable.

Last but not least, I would like to thank my family without whom this would not have been attainable. To my husband, Mike, this is not my accomplishment alone. Thank you for being a constant voice of wisdom and support throughout my academic journey. And to my children, Megan, Henry, and Eli for supporting and cheering me on to finish my thesis.

Abstract

Audit and feedback to clinical care providers about their performance are important mechanisms for self-reflection and quality improvement in health care provision. Feedback intervention theory (FIT) and the model of actionable feedback (MAF) provide specific recommendations to maximize the impact of audit and feedback, although the evidence in support of these theories has not focused on clinical providers in low-resource settings, such as in health care systems in low- and middle-income countries. The aim off this study is to develop design requirements for the creation of a digital audit and feedback dashboard for maternal health care providers in Palestine, adapted to their needs using a theory-based framework that combines FIT and MAF with a human-centered distributed information design (HCDID) approach. The study relied on FIT and MAF to develop an early version of a digital dashboard, and guidance and questionnaires for in-depth interviews and focus groups discussions to understand the current supervision practice and explore supervision needs. An HCDID approach was used to collect contextual information through in-depth interviews with 18 health care providers; three focus group discussions with 20 healthcare providers and supervisors; observations at three public healthcare clinics; and document and process review. The findings from the interviews, observations and document review were analyzed through the lens of audit and feedback theory to develop the final recommendations for a quality improvement dashboard. This study captures specific observations for the Palestine setting, while also contributing to the overall understanding of audit and feedback, as well as the emerging field of digital health in the global south. Specifically, the recommendations of FIT and MAF were useful in generating a tailored audit and feedback system Palestine, when combined with a contextually-sensitive HCDID process. This approach may have applicability for similar settings.

Table of Contents

List of Figures

List of Tables

List of Abbreviations and Acronyms

A&F	Audit and feedback
ANC	Antenatal care
CISMAC	Center for Intervention Science in Maternal and Child Health
DHIS2	District health information software 2
EMR	Electronic Medical Records
eRegComm	Electronic registry communication interventions
eRegistry	Electronic registry
FIT	Feedback Intervention Theory
HCDID	Human Centered Distributed Information Design
HCP	Health care provider
HMIS	Health management information systems
hRHR	Harmonized reproductive health registry
LMIC	Lower- and middle-income country
MAF	Model of Actionable Feedback
MCH	Maternal and child health
MOH	Ministry of Health
NGO	Non-governmental organization
NIPH	Norwegian Institute of Public Health
Norad	Norwegian Agency for Development Cooperation
NSD	Norwegian Centre for Research Data
PFB	Performance feedback dashboard
PHC	Primary health clinic
PLC	Palestine Legislative Council
PNIPH	Palestinian National Institute of Public Health
RCT	Randomized controlled trial
REK	HELSAM Regional Committee for Health Research Ethics
RMNCH	Reproductive, Maternal, Newborn and Child Health
SFH	Symphysis fundal height
UiO	University of Oslo
UNRWA	United Nations Relief and Works Agency
WHO	World Health Organization

1: INTRODUCTION

Audit and feedback (A&F) mechanisms have been shown to improve health worker performance with regard to quality of care (Ivers et al., 2012) although few studies have been conducted in resource poor settings (Ivers et al., 2014). The recent introduction of a computerized maternal and child registry (MCH eRegistry) at the primary care level in Palestine has opened the opportunity to provide a digital dashboard containing targeted A&F that relies on individual service statistics linked to the care providers, with the overall intention to change clinical behavior and improve quality of care.

The aim of this study is to develop context-sensitive and theory based recommendations for the design of the digital quality improvement dashboard for MCH health care providers in Palestine.

The process for developing audit and feedback interventions includes identifying known best practices; considering intervention components as factors to be manipulated; and applying relevant theory when operationalizing best practices (Ivers at el., 2014). The Feedback Intervention Theory (FIT) (Kluger, & DeNisi, 1996) and the Model of Actionable Feedback (MAF) (Hysong, Best, & Pugh, 2006) were chosen to serve as the theoretical models for our recommendations, and combined with an approach based on human centered distributed information design (HCDID) (Rinkus et al., 2005).

It was important to understand the current audit and feedback practices in Palestine, including how HCPs would perceive and respond to the audit and feedback they receive, in order to develop recommendations for the new software. In order to ensure adequate consideration of contextual factors, and refine and improve on the theory-based recommendations, a draft design of a theory-based dashboard was presented to the potential users of the software through individual interviews; focus group discussions; observations; and conversations. The information they provided led to the final refinement of the dashboard design.

This study is a part of a collaboration between the Norwegian Institute of Public Health (NIPH), the University of Oslo (UiO), the Palestinian Ministry of Health (MOH), and the Palestinian National Institute of Public Health (PNIPH).

1.1 Rationale

In maternal health programs in lower- and middle-income countries (LMICs), data are commonly collected using paper records and registers during clinical visits. Parts of these data are typically tallied by hand and reported monthly to be used for program monitoring and national statistics. The quality of these routine reports can be low (Ndabarora, Chipps, & Uys, 2014) , leading to reliance on periodic surveys in order to more adequately understand the realities of antenatal care in LMICs (Sharma, Leslie, Kundu, & Kruk, 2017).

New innovations in technology globally, such as electronic medical records (EMRs) and electronic health registries (eRegistries), are leading to the replacement of paper records with data captured electronically at the point of care. Since data entry is done electronically during a patient's health visit, a digital record is created which is not only available as part of the patient history for clinical use, but also can be used to produce aggregate statistics for decision-making purposes (Initiative, n.d.; Manca, 2015). These digitized data offer opportunities to enhance quality and continuity of care; inform national level decision-making; increase demand for services; and guide interventions to improve worker performance (World Health Organization, 2019).

The MCH eRegistry

The eRegistries Initiative is a collaboration between NIPH and UiO, with funding from the Norwegian Agency for Development Cooperation (Norad), the European Research Council (ERC) and others (Initiative, n.d.). The initiative seeks to promote the use of technology to collect structured data at the point of care that not only serves clinical needs, but also feed into national indicators; drive decision making at national and program levels; and are available for research purposes (Initiative, n.d.).

As one of the introductory activities of the eRegistries Initiative, an MCH eRegistry was created in the free and open source DHIS2 software (DHIS2, n.d.), using indicators and algorithms based on the WHO Essential Interventions for Reproductive, Maternal, Newborn and Child Health, vetted by reproductive maternal newborn and child health (RMNCH) experts worldwide. This software is made available for adoption by any national MCH program.

The MCH eRegistry in Palestine (hrHR)

The first country to adopt the MCH eRegistry was Palestine as the harmonized Reproductive Health Registry (hRHR), with support from NIPH, Norad and WHO, working closely with the Palestinian National Institute of Public Health (PNIPH) and the Ministry of Health of the State of Palestine (MOH). This is one of several measures taken by the MOH to support health care providers in screening and management of pregnant and postpartum women (Tita, & Sharif, 2013), and to respond to a Lancet report which recommend improvements in monitoring and assessment, particularly emphasizing the need to address accountability and quality of care (Giacaman et al., 2003).

Figure 1. Description of the MCH eRegistry

The MCH eRegistry in Palestine (hRHR):

- Provides **clinical decision support** based on the WHO Essential Interventions for Reproductive, Maternal, Newborn and Child Health and national guidelines;
- Creates **referral** recommendations, with system tools for scheduling and notifying the receiving facility;
- Creates **longitudinal pregnancy records**, clearly alerting care providers of the woman's health history and risks, and preparing delivery units and birth attendants to provide necessary interventions during labor and delivery;
- Generates **working lists** for care providers based on their patient population and areas of responsibility (e.g. a list of high risk patients requiring home visits; a list of pregnant women expected to deliver in the next month, etc.);
- And removes the need for secondary data reporting or manual aggregation, as these same data points generate the necessary indicators for national programs, and **feed into existing national HMIS systems**.

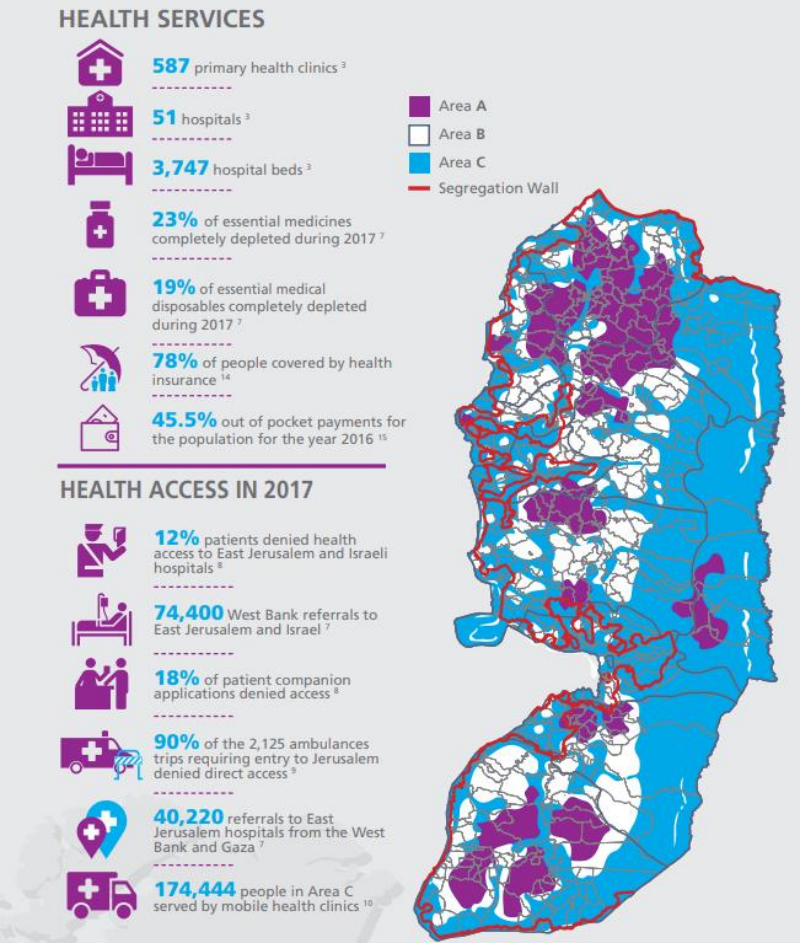
(Frost, 2017)

The national rollout of the MCH eRegistry in Palestine has been coupled with several randomized controlled trials conducted by NIPH with research partners (Norwegian Institute of Public Health, 2017). One of those trials, eRegCom, assesses the impact of feedback and benchmarking of MCH providers for improving quality of care. The research conducted for this paper was conceived as formative research for the eRegCom trial (ISRCTN10520687), in order to design the digital dashboard that would be used as the intervention in that the trial.

1.2 Study Context - Palestine

Palestine, or The Occupied Palestinian Territory, consists of two geographically separated regions, the West Bank and the Gaza Strip. It is estimated that in 2017, 4.95 million people live in the occupied Palestinian territory, with 3.01 million are in the West Bank, 1.94 million in the Gaza Strip. Approximately 40% of Palestinians are 0-14 years of age, indicating a high fertility rate and therefore indicating a high need for strong maternal and child health services (Manenti et al. 2016 as cited in Palestinian Central Bureau of Statistics, 2018).

Figure 2. Healthcare in the West Bank



Right to Health: Palestinian Voices. WHO, 2018.

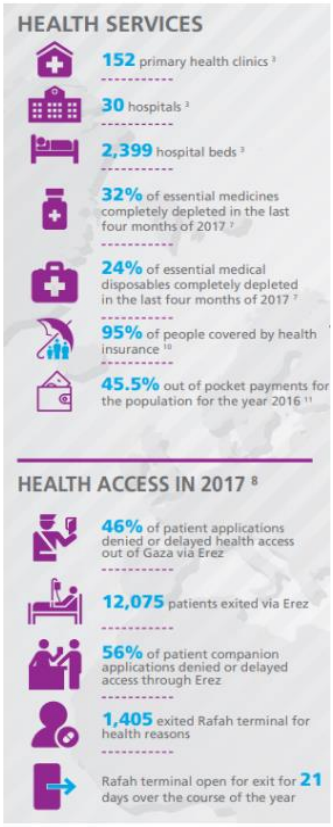
Pregnant women in Palestine are assigned geographically to one of 739 primary health care clinics (PHC), where around 45% (32,691) of pregnant women receive care. Antenatal care is divided between normal and high risk services, both of which are offered through the public health system (Venkateswaran, 2018).

The implementation of the MCH eRegistry in Palestine offers opportunities to improve care for ANC, where political realities increase the difficulties that pregnant women face in accessing health care services (Rahim et al., 2009; Standforth, 2007). Due to restricted movement of patients and care providers these challenges include interruptions to continuity of care; impediments to on-time care seeking; and inconsistencies in visiting the same facility or provider. (Manenti, Ville de Goyet, Reincke, Macdonald, &Donald, 2016, p 10; Kitabayashi, Chiang, Al-Shoaibi, Hirakawa & Aoyama, as cited in Rytter et al. 2006; Wick 2002, Bosmans

et al. 2008, Social and Economic Development Group, Middle East and North Africa Region and World Bank 2011).

Given the challenges that woman face in achieving consistent ANC attendance, it is especially important that the visits that do occur offer high quality care. Previous studies have shown that ANC services in Palestine are characterized by short consultation time; gaps in effective content, and overall dissatisfaction reported by women (Rahim et al. 2009).

Figure 3. Healthcare in Gaza



Right to Health: Palestinian Voices. WHO, 2018.

Some recommendations that Rahim et al. (2009) suggest for improvement of maternal and child health in the occupied Palestinian territory focus on health information: "Strengthen hospital and clinical records to improve accuracy of reporting and accountability and allow for measurement of morbidities and complications" (p. 974), as well as long term goals for the work force:

> "Implement a human-resource plan that addresses the long-term development of local capacity in specialized areas of maternal and child health care, including capacity building abroad or locally for needed cadre, and expand the midwifery cadre and strengthen their pre-service and in-service training"(p. 974).

Prior to this study, the researchers and implementation team for the eRegComm trial identified specific performance areas that seemed likely to improve the quality of care, and

created potential performance indicators to include in the A&F Dashboard based on national guidelines and official practices documented by the MoH. The themes were:

1. Booking visits
2. Anemia
3. Hypertension
4. Diabetes
5. Attendance
6. Fetal growth
7. Fetal presentation
8. Fetal movement
9. Postpartum and newborn care

1.3 Objectives and Research Questions

Main Objective

The objective of this study is to develop recommendations that will be used to create a digital A&F dashboard that will be added the MCH eRegistry in Palestine. The intention is to develop these recommendations based on appropriate theoretical frameworks, and include an understanding of the necessary contextual factors that will lead to use of the system.

Sub-Objectives

- To identify current evidence-based recommendations for digital A&F in healthcare settings
- To develop an initial A&F dashboard design for Palestine based on these recommendations
- To explore current supervision and feedback practices in public health care clinics offering maternal health care in Palestine
- To understand factors leading to acceptance of feedback among HCPs in Palestine
- To finalize an A&F dashboard design for Palestine based on both the theoretical framework and the contextual information

Aim of the study

To produce quality recommendations that can be successfully used in the system design of the A&F dashboard, which can then be developed in the software and used in the upcoming eRegComm trial.

Research Questions

- What are the specific recommendations from literature concerning audit and feedback to healthcare providers, and are they applicable in Palestine?
- What are the important contextual factors that will lead to acceptance of a digital dashboard for audit and feedback in Palestine?

- *Secondary question:* Does this study's approach to the development of functional requirements for software for HCPs in Palestine provide a reusable model for other resource-constrained settings?

CHAPTER 2: LITERATURE REVIEW

2.1 Audit and Feedback Theory

A&F is a widely used quality improvement intervention where health-care providers can assess and improve the quality of care they provide (Ivers et al. 2012; Hysong et al. 2017). A&F can be defined as any summary of clinical performance over a specified period of time, which is meant to help the care provider improve their performance. (Salam, Lassi, Das, & Bhutta, 2014). The audit component consists of a comparison between the individual's performance and an established metric, whether benchmark or target, and the feedback is the set of recommendations provided to the individual based on the outcomes of that comparison (Ivers et al. 2012).

The use of A&F for healthcare providers is widespread, and may be particularly appealing due to its straightforward approach to behavior change, where information about performance is given to the HCP, which motivates them to improve (Hysong, Kell, Petersen, Campbell, and Trautner, 2017). Still, studies have shown inconsistent impact from A&F. According to Colquhoun et al. (2013), "audit and feedback is one of the most widely used and promising interventions in implementation research, yet also one of the most variably effective" (Abstract). Much has been written about how to make the most of A&F in the healthcare setting.

Unfortunately, most research around A&F has taken place in high income countries with little evidence about the impact in LMICs, or recommendations about how to implement it (Ivers et al, 2014).

The majority of supervision in LMICs takes place at the district level. The district level is the primary unit of health care in most LMICs, and district supervisors have many responsibilities: training; supervision; monitoring of care providers, managing health information systems; and monitoring the district health system (Salam et al., 2014). It has been found that A&F at the district level can increase immunization rates, improve healthcare worker performance and compliance with desired practice. Still, there is a lack of qualitative and contextual information from these studies describing success factors, making generality and reproducibility difficult (Salam et al., 2014)

The most recent Cochrane review for A&F (2012) was the first to attempt to explain the wide variation in A&F effectiveness. A meta-regression analysis found four A&F characteristics associated with effectiveness: 1)The source is a supervisor or colleague; 2) it is delivered more than once; 3) it aims to decrease undesirable behavior as opposed to increase desirable behavior; and 4) it includes explicit targets and action plans.

From the A&F field within psychology, researchers have noted that A&F that does not build on a theoretical framework ignores what has been learned from successful A&F, and will fail to bring about the desired impact (Michie & Abraham, 2004). A&F interventions can be regarded as theory-based when the interventions are supported by theoretical explanations for how these might affect behavior change, and these explanations in turn are derived from empirical research (Hysong et al., 2017). Michie and Abraham (2002) further explain that

> "[i]mproving intervention effectiveness and transferring change techniques from one behaviour to another requires an understanding of the causal processes and mechanisms, that is, the underlying psychological changes that account for observed behaviour change. Without such understanding, the application of behaviour change technologies is likely to be slow, with "wheels" being re-invented rather than re-applied." (p. 30)

These kinds of findings have driven efforts to more systematically develop theoretical frameworks for A&F for healthcare. One of the more significant publications identified three necessary ingredients for the design of an effective A&F approach: "identifying known best practices; considering intervention components as factors to be manipulated and applying relevant theory when operationalizing best practices" (Ivers et al., 2014, p. 2).

In a systematic review of the use of theory in RCT's of audit and feedback, Colquhoun et al (2013) found that only 9% (13) explicitly used a theory to inform development of the A&F intervention. Even among the theory-based A&F interventions, they most commonly relied on two theories with weaknesses when applied to A&F. The mostly commonly used theories were Roger's diffusion of innovations, a behavior change theory that does not specifically reference A&F, and Bandura's Social Cognitive Theory, which had weaknesses with regards to the complex type of behavior change in clinical care providers that A&F is meant to target. The authors argued that Feedback Intervention Theory and Control Theory were

better suited for rigorous analysis, as they are specific A&F theories, and require clear descriptions of mechanisms of action (Colquhoun et al., 2013).

2.1.1 Feedback Intervention Theory

Feedback Intervention Theory (FIT) was first put forward by Kluger and DeNisi (1996) in a meta analysis of feedback interventions from industrial/organizational psychology, and attempts to combine elements of multiple prior cognitive and motivational theories to A&F. FIT seeks to clearly define mechanisms of actions using concepts found in control theory; goal-setting theory; the multiple-cue probability learning paradigm; social cognition and learned helplessness theory (Hysong et al., 2017).

FIT has emerged as a leading theory among researchers, due to its synthesis of various established theories, and its strong emphasis on the design of the feedback interventions themselves, and not just on the recipients of the intervention. (Hysong, Teal, Khan, & Haidet, 2012).

FIT emphasizes the locus of attention of the recipient, and promotes interventions that provide new information that can direct this attention either away from unhelpful behavior, or towards improved behavior. This shift in attention can be most effectively triggered by careful design of the feedback mechanisms; considering the characteristics of the task and the contextual or situational variables at play (Hysong, Teal, Khan, & Haidet, 2012).

There are five assumptions underlying FIT:

Assumption 1: Behavior is regulated by comparing practice with a standard or goal

Humans modify their behavior as they are able to compare themselves to the people around them, or in relation to an accepted goal. When presented with information that shows their behavior is unexpected or outside of the norm, they are presented with the choice to either reject the information, or adjust their level of effort or decision making process in order to perform closer to the expected outcome. It has been shown that people are more likely to attempt to meet the standard than they are to reject the information, particularly when they receive information showing that they are underperforming (Hysong et al. 2017; Kluger and DeNisi 1996).

Assumption 2: Goals or standards are organized hierarchically in three levels

Humans prioritize the relative importance of goals or standards hierarchically in three levels. In the language of FIT, these levels are:

1. Meta-tasks processes. These include feedback that is focused on the self, and can trigger an emotional response.
2. Task motivation processes. These include feedback that drives the recipient to improve specific task details.
3. Task learning processes. These include feedback that motivates the recipient to learn something new in order to complete the task.

The research has shown that A&F will be more successful if it focuses on task motivation and task learning, and avoids triggering emotional responses attached to the first category (Dowdling, Merrill, & Russell, 2018). More on this is described in Assumption 4.

Assumption 3: Attention is limited and therefore only feedback-standard gaps that receive attention actively participate in behavior regulation

Humans have a limited amount of attention, and many potential focal points for that attention. Feedback interventions that are not able to command the attention of the recipient will be ineffective. It is thus a high priority to design A&F in such a way that it routinely draws the attention of the recipient to the most important components (Hysong et al., 2017).

Assumption 4: Attention is normally directed to a moderate level (task motivation processes) of the hierarchy, and not to the ultimate goal of the self or to the detailed components of a task.

Kluger and DeNisi (1996) used assumption 4 to explain several interesting findings during their review of performance feedback:

- Both discouraging and praising feedback reduce the effects of performance feedback, as they tend to draw attention to the self, or meta level of the hierachy.
- Verbal feedback also decreases the effect of performance feedback because verbal feedback draws attention to meta- task processes.
- Computer-based feedback increases the effect because it is likely to draw attention to the task.

- Frequent feedback, particularly coupled with a correct solution with goals increased the feedback effects by directing attention to the task.

Assumption 5: feedback changes the locus of attention, and redirects the receiver's attention either toward or away from the task

Feedback interventions will be most effective if the seek to change the locus of the receivers attention. They can either be directed away from a negative behavior, or towards a beneficial one, but it is by leveraging the attention of the recipient that behavior change occurs (Hyson et al. 2017).

With regard to assumption 5, and the shifting of attention, Kluger and DeNisi propose three factors that determine how effective the feedback information will be:

- Characteristics of the feedback itself - determine the direction towards which attention will likely shift
- The nature of the task - determines how susceptible the task is to attentional shifts
- Situational and personality variables - determine how the feedback recipient chooses to change once the attentional shift occurs

For optimal impact, the feedback intervention should be designed to leverage the five assumptions above, as well as incorporate the feedback intervention characteristics (Kluger and DeNisi (1996),:

- information about how to perform the recommended task correctly;
- illustrating change in performance from the last period of measurement;
- providing information in graphical and written forms, rather than just verbal;
- offering normative recommendations in a neutral tone, rather than discouraging or praising.

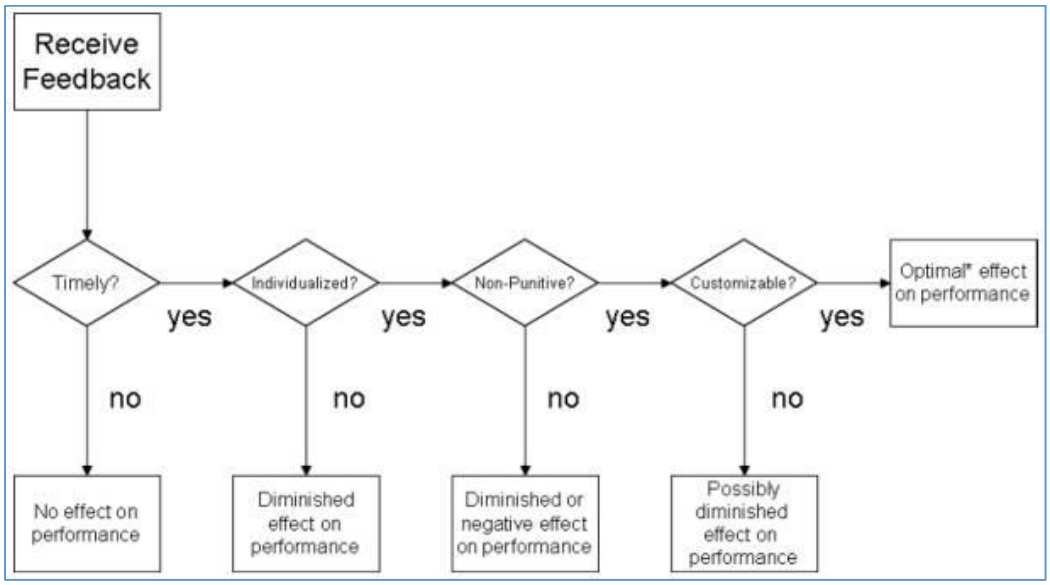
This will help to ensure that the feedback information is associated with task motivation processes, and a likely candidate for capturing attention. A&F interventions that have included the five assumptions and the feedback intervention characteristics have been shown to have an impact on behavior change both inside and outside of healthcare in various studies (Hysong et al, 2017).

2.1.2 Model of Actionable Feedback

In a study that applied FIT specifically to A&F for health care providers, Hysong et al. developed a Model of Actionable Feedback (2006), expanding on FIT to provide concrete guidance about how to design the characteristics of the feedback itself -- the first variable outline in the fifth assumption of FIT, described as "feedback intervention cues." The authors reasoned that of the three variables described by FIT, the easiest to address would be the characteristics of the feedback, as it is often difficult or even impossible to effect the nature of the task, or change the situational or personality variables (Hysong, Teal, Khan, & Haidet, 2012).

Hysong et al. Conducted 102 interviews with clinicians at various health care centers under the Veteran's Affairs department in the United States, using a qualitative approach to ascertain the characteristics of feedback information most likely to induce a change in behavior. Using the information from these interviews, they ranked a series of four characteristics most likely to bring about a shift in attention that will lead to behavior change among health care providers -- namely that feedback should be timely; individualized; non-punitive and customizable.

Fig 3: Model of Actionable Feedback



(Model of Actionable Feedback. Available Open Access under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/2.0)

The ordering in the model is intentional, with the most important characteristics starting at the left. If feedback is not timely (within one month), then it will have no effect on

performance. If it is not specifically aimed at the individual receiving it, not at an aggregate or clinic level, then the effect will be diminished. If the tone of the feedback is punitive, then the effect will not only be diminished, but it may actually have the opposite effect of triggering resistance. In a lesser, but still recommended category, is that the feedback should be customizable -- i.e. that the recipient should have some say about what feedback they receive, making them an active participant in the process. When all four categories are applied to the intervention cues, the feedback will have optimal impact. (Hysong, Best, & Pugh, 2006).

2.2 Human Centered Distributed Information Design (HCDID)

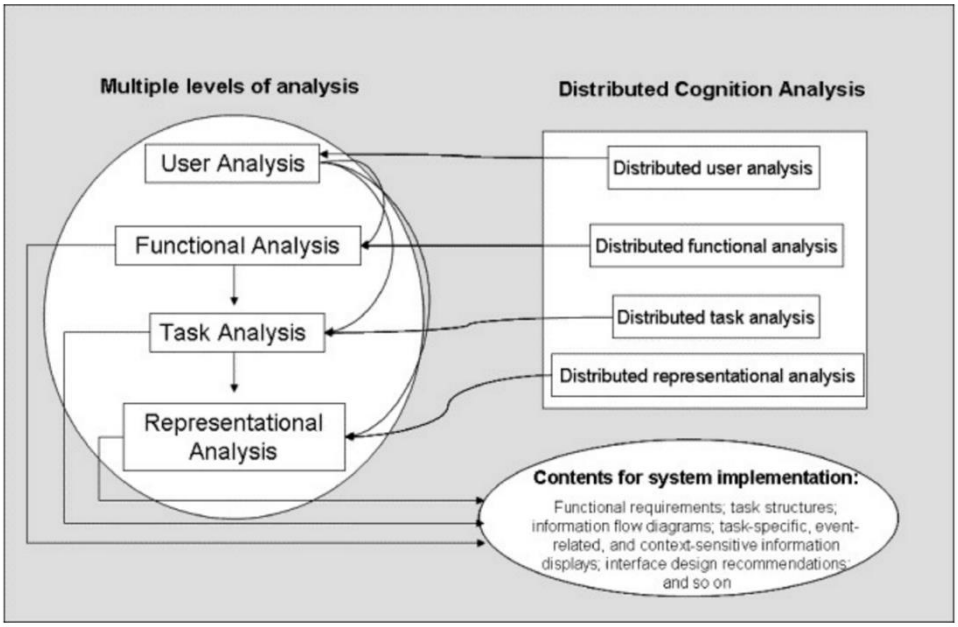
Similar to the FIT and Model of Actionable Feedback theory recommendations of individualization and customization, software design increasingly seeks to incorporate users into the design process, an approach known as "Human Centered Distributed Information Design" (Rinkus et al., 2005). In the health IT setting, it has been observed that most software failures are not due to flawed technology, but rather due to a lack of consideration of the human factors and contextual issues surrounding the use of the technology. "In other words, designing and implementing a health information system is not so much an IT project as a human project about human-centered computing such as usability, workflow, organizational change, medical error, and process re-engineering" (Zhang, 2005, p. 1).

Clinical use of software is a complex setting, and despite the efforts to standardize care practices, the reality is that different clinicians approach their tasks in different ways. To achieve the highest levels of acceptance and usability of a digitized feedback tool, it is important to create the tool in an iterative process, with real users, seeking to understand their needs and workflows, and attempting to match the various ways that users want to use the software.

An HCDID approach utilizes user observation, document reviews and interviews, in an effort to understand the "the social, cultural, organizational, and cognitive aspects that occur not only within an individual or group of individuals but also occur across individuals" (Rinkus et al., 2005, p. 14).

HCDID produces higher levels of user acceptance, and more efficient coverage of the target use cases, and has been promoted as a core “principle of digital development” by the global digital health community (Digital Principles, ND). The levels of analysis undertaken during the HCDID process include: user analysis, functional analysis, task analysis, and representational analysis (Rinkus et al., 2005)

Fig 4: The human centered distributed information design (HCDID) methodology.



(Rinkus, et al., 2005)

User analysis is the process of identifying and understanding who the users of the software will be, and seeking to understand their “expertise, skills, knowledge bases, educational background, cognitive capacities and limitation, perceptual variations, age related skill, time available for learning and training” (Rinkus, et al., 2005, para 2.1.1). Based on these factors, the design of the system can be built to contain an information structure that matches the context of the users (Zang, 2005, para 2.1.1.)

Task analysis covers the identification of each of the actions and tasks that are meant to be affected by the software, and the information required to impact those tasks. A key intention for task analysis in HCDID is to only include those tasks and information necessary for inclusion in the system. (Rinkus, et al., 2005, para 2.1.3.).

Functional analysis identifies the work hierarchies, goals and requirements within the context of the human system that will be adopting the software. The design of the software should support normal communication channels and work processes through features that optimize their impact (Rinkus, et al., 2005, para 2.1.2).

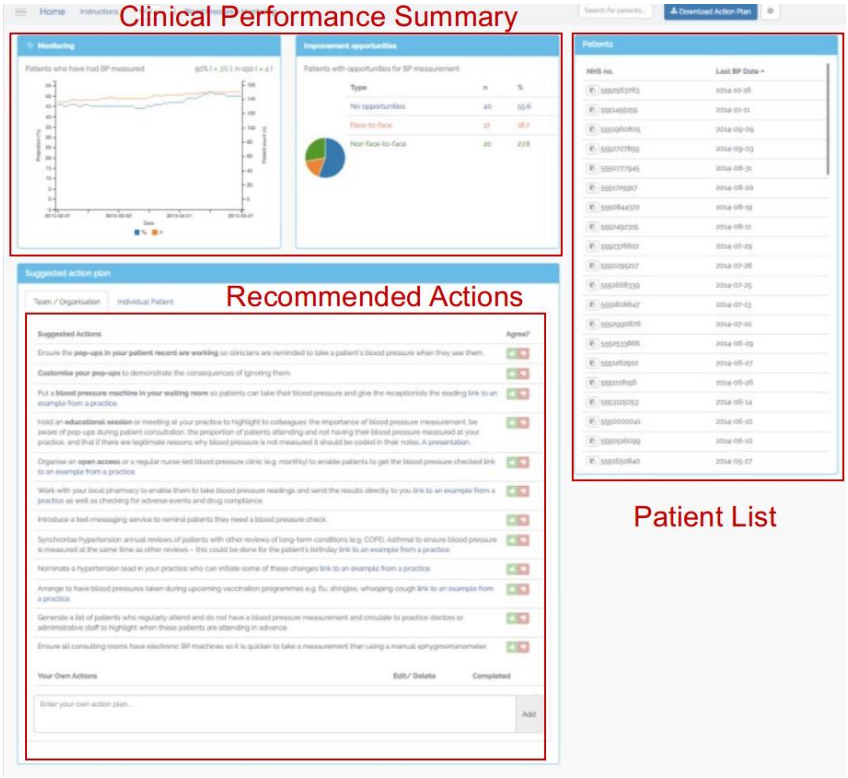
Representational analysis is meant to ensure that the design and experience for the user are tailored to their needs and comfort with software, prioritizing a good user experience over other possible considerations (Rinkus, et al., 2005, para 2.1.4.)

In the literature, I identified two practical applications of the A&F as digital dashboards in the Brown, Balatsoukas, Williams, Sperrin, & Buchan (2016), and Gude et al. (2017) studies, which attempted a user-centered design approach.

The Brown dashboard specficially identified these three digital functionalities, preferred by clinicians, and likely to improve user acceptance and performance:

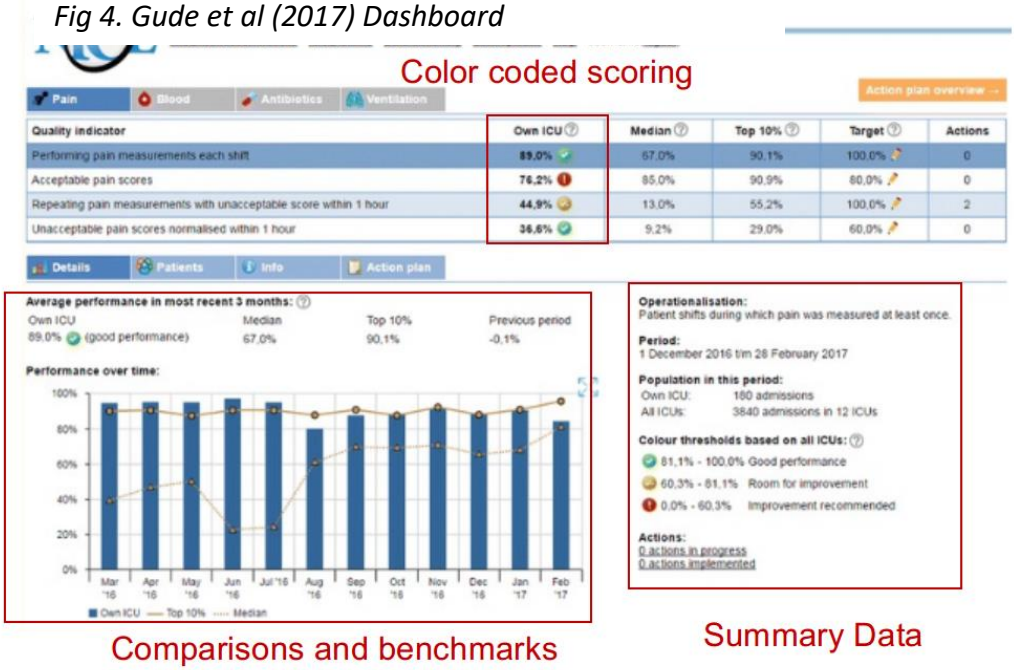
- Summaries of clinical performance
- Patient lists
- Recommended actions

Fig 3. Brown et al. (2016) Dashboard



The Gude dashboard demonstrated a manner of providing comparisons and benchmarks that worked was considered relevant to clinicians, and suggested ways of summarizing and color coding information that clinicians would more likely respond to.

Fig 4. Gude et al (2017) Dashboard



CHAPTER 3: METHODOLOGY

3.1 Study Design

Given that both the A&F and software literature stressed careful design that takes into consideration complex human motivations, a qualitative approach was used for this study. Simple numbers about the incidence and prevalence of completed supervision visits or other quantified methods of feedback are not enough to describe the nuances about why audit and feedback data look the way they do. Likewise, the introduction of new technology always carries a risk that it will "work," but will not be accepted or used. I was also cognizant of the lack of literature regarding the applicability of FIT and MAF in resource-poor settings, and wanted to analyze rich contextual findings that would help ensure that these theories fit the data for Palestine, and not force the data to fit these theories. (Taylor, Bogdan & DeVault, 2015).

A qualitative approach allowed me to explore, understand, and map the current feedback procedures, and health care providers' perceptions of feedback, in order to understand how HCPs in Palestine would react to changes to the recommended system (Yilmaz, 2013). A qualitative approach can provide a level of insight that makes for a rich understanding of the human expectations and desires that play an important role in the effective design of a feedback system; providing a tool for gaining insights into opinions, and motivations on how feedback is conducted; how this feedback is perceived; and how it could be improved (Zhang, 2005).

3.1.1 Review and preparation

The literature review provided strong recommendations for what to include in theoretical terms in the A&F dashboard, but lacked concrete examples about how best to digitize these recommendations, or more specifically, how to tailor them as digital functionality aimed at healthcare providers.

I identified two studies that implemented digital A&F dashboards (Brown et al., 2016; Gude et al., 2017), and reviewed their recommendations and methodologies, including an in depth review of the functionality that they designed. Given that the A&F dashboard would be a new intervention in two ways -- both in terms of the introduction of new technology, and in the introduction of new processes -- it was important to create a draft dashboard that would help illustrate the technology and the concepts for the care providers, in order to obtain

more effective feedback from them during the interviews and discussions. This initial design would be used to drive the conversations and data collection with potential users, giving them something concrete to react to. (Gude et al., 2017). This approach was also recommended by the HCDID framework, discussed below.

In order to prepare for the interviews and discussions, I familiarized myself with the documentation surrounding the MCH eRegistry, including the design and process documents and formative research and the draft protocol for the eRegComm trial. This documentation provided insight into the ongoing work with introducing new technology to the HCPs in Palestine, as well as important context about the numbers and types of users; the services provided at the clinics; the partners on the project; etc.

I also obtained documentation relating to the supervision process, reviewing the frequency, the types of questions asked, learning the hierarchy for reporting, and the geographical distribution of clinics and providers. This allowed me to put together specific questions to ask during the interviews and focus groups that would be relevant and well-adapted to the context.

3.1.2 Interviews, focus groups and observations

Prior to initiating the study with participants in Palestine, I was able to speak with members of the PNIPH and MOH that were familiar with this study and its goals, having worked closely with the NIPH on the ongoing trials. They made it clear that there were differences between the documented processes for supervision and feedback, and the realities on the ground. This difference was attributed to many things -- a lack of resources; differences in personalities; availability of personnel; differences in patient loads; etc.

It was clear that using various methods for obtaining and confirming information about the supervision process would be desirable. Particularly given the hierarchical reality of supervision and reporting in Palestine, which might lead participants to be hesitant to provide information that did not paint them or their supervisors in the best light.

Given this, I used informal interviews, semi-structured interviews, focus groups and observations at health clinics in order to confirm the findings presented in this study.

Semi structured interviews followed the series of questions formulated in the preparation stage, designed to encourage elaboration, while still ensuring that each topic area was

covered. Semi-structured interviews are one of the most common forms of qualitative data collection, and are often used for healthcare research (Jamshed, 2014).

Informal interviews were conducted off the record, when visiting the various sites and at different levels of the health system, including at the ministry of health. These were characterized as open ended conversations that helped to understand the setting, establish rapport and spontaneous information sharing (Cohen, & Crabtree, 2006).

Focus groups were designed to encourage sharing and confirmation among peers. Although Arabic translation was conducted for my participation, a key objective of the focus group was to expand on the information provided individually during the interviews by encouraging peer interaction (Gill, Stewart, Treasure, & Chadwick, 2008). As such, the discussion was interrupted as infrequently as possible.

Observations allowed me to see supervision and feedback in practice, confirming those aspects of supervision and feedback that seemed routine. In qualitative research, observations are used to support the findings from other methods of data collection, and capture nuance that was not explicitly stated or uncovered via other methods (Mays, & Pope, 1995).

The same themes and areas of interest were covered in each method of data collection, and the breakdown of participants would include both supervisors and HCPs. I sought to understand the health care providers' backgrounds; their understanding of data and analysis; their current experience with performance feedback; and their perceptions and acceptance of electronic feedback.

Aside from their expressed preferences, I observed their comfort with technology; their language preferences; the relationship with their supervisors; the pace of their work; and their interactions with patients.

In order to demonstrate situational knowledge, establish relevance to the users, and make the most of the limited time with study participants, it was important to develop a series of questions and topics that were well considered and would provide the most useful feedback. Having pre-defined questions would also help with the language process, since I would often be gathering information through a translator. I worked with PNIPH, NIPH and the MOH to

refine a set of questionnaires, which were first used to guide discussions during an early field trip in April 2017, and then refined for use in July-August 2017.

3.2 Theoretical Framework: Human Centered Distributed Information Design (HCDID)

HCDID served as a conceptual framework for this project, guiding the actions undertaken and ensuring focus on the research question and expected outcomes. HCDID is specifically tailored to gathering requirements for software, and uses many of the qualitative approaches of a more traditional study in very focused ways that helped to group findings and ensure that all aspects of the information needed by the software developers would be covered (Rinkus et al., 2005).

User analysis

Working closely with the PNIPH and the Palestinian MOH, I explored the characteristics of the target users for the PFB Dashboard.

After reviewing the information about the characteristics of the target users, a list of representative sites to visit was created with the PNIPH and MOH, intentionally identifying the range among the user base in terms of size, training, frequency of supervision, and length of time using computers at work (see the Study Site and Study participants sections below).

Task analysis

This qualitative study sought to understand actual practice in the clinic setting, outside of the ideal protocol, and make recommendations about the suitability of the proposed indicators in representing the tasks of the care providers. Data collection and site visits sought to capture information about workarounds, barriers to care, and treatment of patients in not ideal situations.

Functional analysis

It was important to understand the hierarchy of the MCH system from the roles in the Ministry of Health down to the clinicians. This project sought to detail actual practices with regards to supervision, communication between clinics and to higher levels in the hierarchy, and understand relationships between care providers with regards to feedback.

Representational analysis

Health care providers in the study were introduced to the concept of a feedback dashboard to healthcare providers through screenshots and mockups, with verbal explanation. They were given the opportunity to interact with the dashboard, explain their own understanding of how each feature would work, and provide recommendations for improvement.

The HCDID methodology included documenting the findings and an iterative loop where the developers were provided the findings, which were used to create updated screenshots and mockups, and users were presented with these updates for further reaction. The result was a clear breakdown of the user needs for acceptance and usability.

By integrating the HCDID and FIT/MAF models, I sought to identify all of the elements necessary to design an effective and sustainable feedback tool for users at the clinic level. This approach provided a structured framework for my data collection.

3.3 Study sites and participants

Sites

The study took place in primary health care clinics, including high-risk settings, in three districts in the West Bank (Ramallah, Jenin and Bethlehem), and in the Gaza Strip. These districts had used the MCH eRegistry system for approximately one year, without having a feedback component. As these clinics would not be a part of the research trial, there was no risk of contamination, and the clinical providers at these clinics were well-positioned to provide informed feedback about the real-world experience of using an electronic system in these setting, and express preferences for what they would hope to get out of a feedback dashboard.

An additional constraint was the ability to travel in Palestine -- given the checkpoints and ever changing security situation, it was important to ensure that the sites identified could actually be reached during the of the study. This led to some changing of dates for visits, but in the end all previously identified sites were visited.

In order to travel to obtain permission to visit healthcare clinics and talk to HCPs, I worked closely with the MOH to arrange dates, times and locations. Given the restrictions on travel within the West Bank and Gaza, it is likely the case that our site visits were deliberately

selected from areas that are easier to reach, which may have a skewing effect on some of the findings. For example, sites that are less accessible likely receive less supervision and feedback than the clinics that were included.

Participants

Purposive sampling was used to recruit key informants, as it was important to select those that were using the eRegistry system to be able to build on common understanding, while avoiding contaminating the research sample of the following RCT. This is a common method within qualitative research that allows the selection of participants relevant to the study, particularly emphasizing the opportunity to obtain rich contextual information (Mack et al. 2005; Patton, 1999). Other methods; such as convenience, or random sampling were not used because the study had a narrow population that the implementation was intended for.

Staff from the Palestinian National Institute of Public Health (PHIPH) arranged for observations of supervision visits, interviews with health care providers, and focus groups with supervisors. Healthcare providers who matched the inclusion criteria were sought. The inclusion criteria were:

- Healthcare providers in public primary health clinics working in the antenatal clinics
- Doctors, Nurses, Midwives, Community health workers
- MCH supervisors
- Stakeholders in the Ministry of Health working with MCH
- Having experience with supervision visits, and communication with MCH supervisors
- Working with the MCH eRegistry system
- Willing voluntarily to participate in this study with informed consent from the larger project.

Those who were not using the MCH eRegistry system and those that were in control clinics for the RCT were excluded from the study.

An MOH staff member identified eligible participants and was the first to approach them speaking in Arabic, seeking their initial acceptance and then through translation, I informed them about the objectives of the study, and sought their informed verbal consent. With the study participants, I described study rationale, their rights, voluntary participation, and

confidentiality measures. These efforts created a relaxed setting in which participants seemed open and willing to answer questions and discuss freely.

Participants from five districts in the West Bank (Ramallah, Jenis, Salfit, Nablus) and the Gaza Strip were included in the study through individual interviews (18), and three focus groups (20). Two focus groups in the West Bank: 5 HCP joined the first and 7 HCP joined the second. One focus group was conducted in Gaza with (11). Supervision was observed in three clinics. In order to explore different experiences of HCPs, maximum variation sampling in the study participants was ensured. HCPs from different districts, supervisors, level of clinics in rural, central, and high risk clinics, years of experience in public MCH clinics were selected.

Data collection continued until saturation level was reached (Fusch, & Ness, 2015) Data saturation is focused on the depth and detail of the findings, rather than the raw number of participants. Saturation is reached when no new concepts are obtained through further qualitative efforts. For this study, saturation was reached with seven (of 10) interviews in the West Bank, and 5 (of 8) interviews in Gaza.

Table 1: Breakdown of Participants

	West Bank	Gaza
Supervision Observation	Ramallah District: • Atara Clinic • Beirzair Clinic • Beronia Clinic	~
Focus Group	**APRIL 2017** MCH District Supervisors (3) MOH Nursing Director (1) MCH Nurse (1) **JUNE 2017** MCH District Supervisors (5) *3 of the 5 participated in the April FG MOH MCH Superivisor (1) Community Health Director (1)	MCH District Supervisors (2) MOH MCH Supervisor (1) Community Health Director (1) Doctors (3) Midwives (2) Nurses (2)

Interviews	Bethlehem District:
	• High Risk Clinic
	  ○ Doctor(1)
	• Level 3 Clinic
	  ○ Doctor (1)
	  ○ Nurse (1)
	Jenin District
	• Level 2 Clinics
	  ○ Nurse (1)
	  ○ Community Health Worker (1)
	Ramallah District
	• High Risk Clinic
		Gaza District:
		• Level 3 Clinics:
		  ○ Doctors (3)
		  ○ Nurses (2)
		  ○ Midwives (3)

	○ Nurse (1) ○ Midwife (1) • Level 3 Clinic ○ Doctor (1) ○ Nurse (1) ○ Community Health Worker (1)	

3.4 Data Collection and Analysis

In-depth interviews and focus groups were conducted with a translator present, from the research team at PNIPH, fluent in Arabic and English, and familiar with the local context and research project. I provided training to the translator ahead of time to familiarize her with qualitative methodology, particularly the need for unprompted and spontaneous responses that accurately describe the situation. Where possible, follow up questions were asked in English, without the need for the translator.

With the study participants, I took time to create an open dialogue; show respect; demonstrate appreciation for their time, and explain the study rationale clearly. These efforts created a relaxed setting in which participants seemed open and willing to answer questions and discuss freely. My field work and participants were selected with purposeful sampling, but all indications are that I was able to obtain a realistic overview of the situation and true opinions of the health care providers.

I spent significant time in better understanding how supervision works; how HCP could and do use data; and how they understand the utility of data to inform their daily practice. Immediately after each interview, I conducted a review with the intent to refine my questions to get a deeper understanding during the next interview, rewording questions that produced little response, and adding context at the beginning that helped establish expectations.

Interview Considerations

The interviews were arranged ahead of time by the research team at PNIPH in the West Bank and Gaza Strip. Interviews were conducted in public health clinics with antenatal care services in both rural and central clinics, and high risk clinic, which enabled me to better understand the different needs large and small clinic have. By interviewing health care providers from a basic obstetric care clinic to complex high risk obstetric clinic, I was able to get a diverse picture of the supervision, feedback, understanding/utilization of data, and priorities at each level of care.

Interviews were conducted during office hours which enabled me to observe the work flow and daily happenings of the clinic, staff and patients. I was introduced to everyone in the clinics as a researcher, and all were welcoming and interested me as a visiting foreigner. I was shown around each of the clinics and was able to have relaxed conversations about their lives and community with people in the clinic before we set up for an interview. A relaxed private atmosphere was established in offices or in the patient exam room.

Interviews lasted between 45 minutes - hour, during which time patients were being seen by other health care providers, or the ANC clinic was finished for the day, so the health care providers were able to give their full attention to the interview.

If a patient was waiting, I tried to be aware of of the stress of the healthcare provider, and end the interview as needed. After the interviews were conducted, as per culture, coffee and tea where provided and the staff of the clinic gathered to all talk together.

Focus Group Considerations

The MCH supervisors in the West Bank were interviewed in a focus group discussion to represent a range of geographical variation, and different experiences in providing supervision to healthcare providers. The MCH supervisors, head doctor, head nurses, director of nursing were also interviewed in a focus group discussion giving another dimension to the study.

In April of 2017, a focus group discussion was arranged in the conference room in PNIPH to talk with MCH Supervisors to discuss their roles and responsibilities as supervisors, how they supervise midwives and nurses. There were three MCH supervisors present and one nurse representing a MCH supervisor, along with a community health supervisor from the ministry of health assisting me and translating. The MCH supervisors and community health supervisor were familiar with each other, and freely talked with each. During the end of the focus group, the director of nursing joined the discussion, and the dynamic shifted. There was open dialog when answering the questions and good contributions from everyone in the group.

When I returned to Palestine in the summer of July 2017, another focus group discussion was arranged in the conference room in PNIPH, the same 3 MCH supervisors returned to participate plus 2 other MCH supervisors attended, also the project lead for the MCH

eRegistry attended. A community health supervisor from the ministry of health assisted me and translated.

Thematic analysis

I carefully reviewed all notes and transcripts to refine the general impression of what participants shared about their preferences and experiences with supervision, feedback, workflow management and data understanding. Careful attention was given to the context in which comments were made, including who else was present, what other work was being done at the time, etc.

Through this process, the themes and observations shared in the findings chapter emerged. These themes were categorized according to FIT and MAF, including the recommendations from the Cochrane review (Ivers et al, 2012) which guided the chapter on Findings, and led to the conclusions drawn in the Discussion and Recommendations chapter.

I relied on Braun and Clarke's approach (2006) to thematic analysis, which outlines six phases:

1. Familiarizing yourself with your data: all semi structured interviews and focus groups were recorded, translated where necessary, and transcribed. I reviewed and reread all transcriptions in comparison to the notes I made during the data collection process, obtaining an overview of frequently mentioned themes. This has been an continuous and immersive process from the beginning of my study.
2. Generating initial codes: I coded the data manually based, as patterns emerged using color coding on hard copies of the transcriptions. While identifying the codes I then matched extracts of my data to the related code, working the data set until collated within a relevant code.
3. Searching for themes: I identified themes relating to roles and responsibilities; flow of information; MCH monthly reports; and other MCH supervision. Due to my specific aim and research questions, I used a theoretical thematic analysis in order to focus on a detailed analysis of specific aspects of the data, but still focusing on rich descriptions and nuances.
4. Reviewing themes: The themes identified were cross referenced to the MAF groupings, and specific recommendations derived from the Cochrane review.

5. Defining and naming themes: Based on the cross-referenced findings, I grouped themes according to their relevance to timeliness, individualization, etc.
6. Producing the report: see Chapter 4

In order to confirm my findings, I reviewed them with participants from PNIPH and the MOH, seeking to find any that seemed like aberrations or out of the norm, as well as ascertain if the findings presented here matched the expected experiences from those most closely associated with the setting.

Data Management

Audio recordings were translated and transcribed from Arabic to English by staff from PNIPH. Those transcriptions were then reviewed for accuracy and then verified by another translator. During the review, I compared all translated output with the audio recording, identifying any gaps for further translation.

Data has been made anonymous by removing all identifiers. Each interview was assigned a random number, and the date and the place of the interview will never be specified in the final report. All physical documents and recordings were kept in a secure locked box. The audio recordings were deleted from the device immediately after transcription, and kept on a password protected server at the FHI.

Ethical clearance

This study was submitted to the evaluation committee at HELSAM Regional Committee for Health Research Ethics (REK), and this project did not fall under REK's jurisdiction for three reasons:

- It is a health systems research project.
- The study does not raise the knowledge regarding health and disease.
- Study participants were not representing a "risk group."

An application was sent to the Norwegian Centre for Research Data (NSD),and was approved (project number 54501).

Ethical clearance was also obtained from the Palestinian Health Research Council for ethical approval, and the study was conducted according to the Helsinki Declaration and the research policies and procedures of Palestinian MOH and the Palestinian National Institute of Public Health (PNIPH).

Palestine is implementing a national wide MCH eRegistry, and the care providers are obliged by the MOH to use the system. Informed consent from care providers was obtained by the larger project. Palestinian ministry of health officials were informed about the study, and were asked to formally endorse the research and make an announcement to all potential participants. All participants were aware of the study prior to participation and invited to offer their experiences at their discretion. Participants could withdraw at any point in the study.

3.5 Reflexivity

Throughout this study I conducted critical reflection to identify any potential prejudices and subjectivities, paying attention to the possibility of interviewer bias of preconceptions and the impact this could have on the credibility of the research outcomes and findings (Roller, 2012, Alvesson & Skoldberg, 2018).

I am nurse by professional background, with more than a decade of working in various specialties and hospitals throughout the United States. I have worked with multiple nursing charting systems and have been part of more than one hospital-wide shift from paper to electronic charting. However, I had never worked with the DHIS2 software used in this project, and had little familiarity with the considerations that go into software design.

My previous nursing experiences have given me a foundation for understanding of the responsibilities, duties, terminology, and workload that any health care provider might encounter, although I recognize that my experience in the United States is quite different from that of a low-resource setting. I have not had knowledge or work experiences in the Palestinian context prior to this study.

I have worked to gain a formative understanding of health care systems in developing countries, and health information management systems, particularly with DHIS2. Being a part of a larger project with NIPH has allowed me to draw on a foundation of knowledge of maternal and child health practices in Palestine, the existing information system in use, and the overall understanding of the aims of the main trial.

Being part of this larger trial has influenced how I formulated my aims, research questions and conducted my field work.

Throughout this study, I have been aware of this influence and subjectivities of the impact this could have on my research. I have worked closely with my supervisors to have reflexive dialogue, and to incorporate systematic reflection throughout my qualitative research. I have kept a reflexive journal to document introspection of my personal possible prejudices and interruptions, and possible bias due the structure of being part of larger trial.

Being new to research, and part of a larger implementation RCT trial, it has taken time for me to understand where my contribution began and ended. Beyond the scope of this thesis, I became involved in the actual implementation of the feedback dashboard, as well as the research component of the main trial. It has taken time for me to make clear distinction to separate my thesis from the needs of the larger project. In order to make this separation, I have relied on a reflexive approach throughout this process, separating the needs, goals and intentions of the implementation aspect of the feedback dashboard from the formative research component which informed the design of the dashboard. Similarly, I have had to separate the needs, goals and intentions of the researchers working on the main trial, and their overall objectives, from my research.

Being part of a larger implementation RCT trial has allowed me to seek routine guidance from experienced researchers, and helped provide structure and a framework to be conduct my field work in a regimented way. Beyond the researchers and implementers at NIPH, I also worked directly with the country staff at the PNIPH, who ultimately made the field research possible.

While they were very important contributors to the research, I have also sought to be reflexive in our collaboration, recognizing that they not only have an interest in the research trial, but also as system owners and administrators tasked with finalizing an electronic health system for MCH that will last beyond the trial period.

I have also sought to be reflective on my role as an outside researcher coming to their country, and what they would be willing to reveal to me as an outsider. I do feel that I was welcomed and supported, and while working in the country office everyday while in Palestine I was able to gain the trust of the people working on the project.

I worked very closely with one person in PNIPH in particular, who is also a staff member at the Ministry of Health in Palestine. She helped set up the interviews in different clinics;

translated during the interviews; and helped arranged transportation and site visits. It was important for me to be reflexive of the role she played and her contribution to my field work. Throughout my fieldwork, I was aware of the other roles this person played in the ministry of health, and PNIPH, and how that could influence my findings. I made clear to her of the need for this research to maintain critical reflection and awareness, and I worked with her ahead of the interviews on ways to keep her voice neutral and objective during the site visits and focus groups. I have carefully listened to the audio recordings, and reviewed the translations and transcription make it clear where her voice ends and begins. This person was also a great asset to my field work, getting me into clinics and speaking with interviewees that I could not have hoped to have done without someone with such close relations to the maternal health program in Palestine.

CHAPTER 4: RESEARCH FINDINGS

The findings in this section are based on the document review conducted in the spring of 2017, and interviews, focus groups and observations described in the methods section, conducted in the West Bank and the Gaza Strip in April and July-Aug 2017. They are divided in four sections: first, initial system design based on the document review; second, current practices for audit and feedback to maternal and child health care providers in ANC clinics; third, provider preferences and their consistency with established theory; and fourth, preferences of HCP with regards to being compared with other clinics.

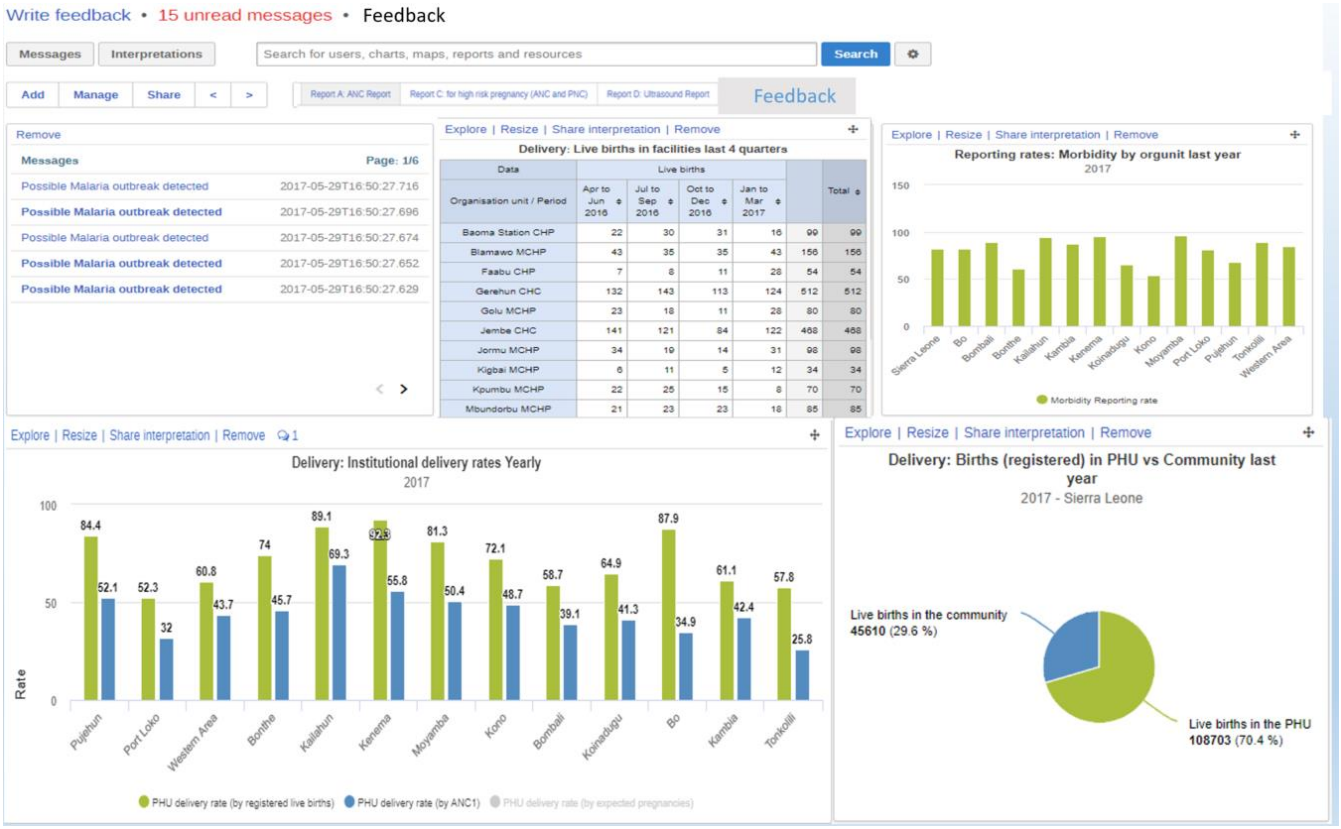
The public clinics providing maternal health care in the West Bank and Gaza are similar, but there are some differences. Despite official policy that the health systems in the two areas are unified, in practice Gaza is isolated from the West Bank due to political realities, with a separate Ministry of Health operating with significant independence. The MCH eRegistry has been implemented as a single system in both regions, attempting to provide equal support for the different practices in care provision and supervision. It was thus important to explore these differences in order to provide recommendations for the feedback dashboard that would be equally applicable to both Gaza and the West Bank.

4.1 Initial system design

Based on the review of the systems identified during the document review, a specific system design mock-up and a series of slides explaining the recommendations from the literature review was created to share with participants during the field visits (see annex 4).

Using the key performance areas identified for improvement in Palestine, the recommendations from FIT and MAF, and the examples from the Brown (2016) and Gude (2017) studies, we developed the following mock-up for Palestine, which was used during the field visits to illustrate concepts and encourage specific feedback. It was clear that the DHIS2 software was not able to fully replicate all of the recommendations from the Brown and Gude studies (e.g. recommended actions; benchmarks; color coded scoring), and would require additional software development. Before committing to the development of new software functionality, it was important to first gather evidence from the users themselves about how they would respond to the functionality that was recommended.

Fig 8. Initial mock-up for Palestine dashboard



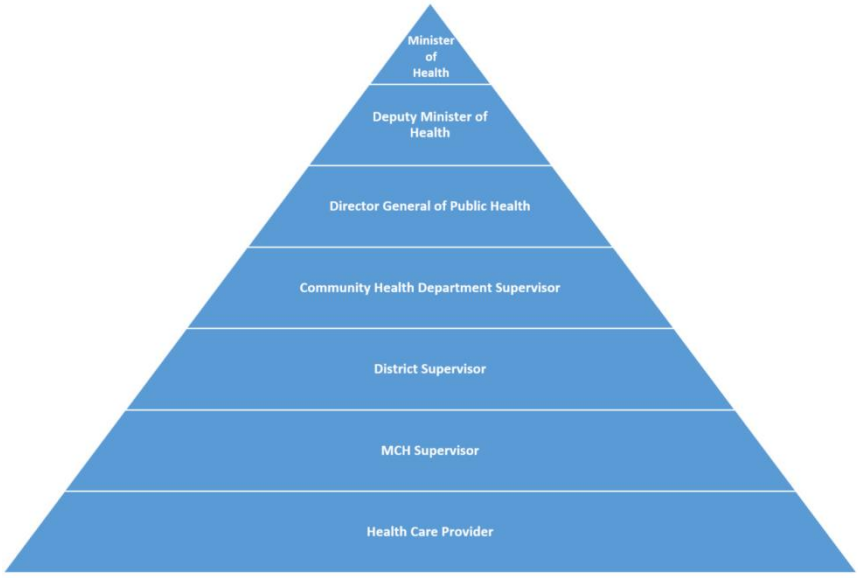
4.2 Current practices for audit and feedback

In Palestine, HCPs working in maternal health receive little information from the Ministries of Health related to their performance. HCPs submit a monthly report containing information required by national maternal health program. These reports are compiled at the end of each month, providing counts to the national programs that are sourced from a series of daily and weekly registers containing descriptive statistics meant to be aggregated into national or program level indicators: numerical counts of patients; diagnoses; services provided; consumption rates of medicines; etc. This reporting mechanism fills a data need from higher levels, and no analysis is conducted at the higher level providing information back to HCPs in the form of constructive performance feedback.

The main mechanism for performance feedback is through supervision visits, conducted by maternal and child health (MCH) supervisors. In both the West Bank and Gaza, MCH supervisors are the link between clinics and the MOH to understand what is happening in the clinics; how healthcare providers are performing; and understanding the context to the monthly reports. They also convey information from the MOH back down to the clinic level.

The following findings describe the purpose of supervision from the perspective of both the MCH supervisors and the HCPS; how supervision is conducted; and how feedback occurs.

Fig 9: Reporting and Supervision Hierarchy in Palestine



4.2.1 Roles and responsibilities of MCH supervisors

The core of MCH supervision is conducted by MCH supervisors based at the district level clinics. These supervisors are generally midwives or nurses, and their oversight responsibilities pertain to midwives, nurses, and health care workers. In this capacity, they conduct a variety of activities that provide opportunity for feedback.

Officially there are separate MCH supervisors for doctors, meant to be performed by practicing clinic doctors. In both the West Bank and Gaza doctors are responsible for ANC, PNC, family planning, and sometimes family medicine. Doctors might have one clinic they work in five days a week, in the level 3-4 clinics, or they travel to different level 1 and 2 clinics throughout the week. Due to the shortage of doctors and their high workload, supervision is fragmented and limited, and doctors often go directly to the district director on an as needed basis for issues and problems they have, and otherwise are aware of the supervision conducted by the nurse or midwife. Doctors are not responsible for completing the monthly clinic data forms or reports. With that understanding in mind, I focused on understanding the roles and responsibilities of MCH supervisors for midwives, nurses, and health care workers.

The MOH in both the West Bank and Gaza mandate that a supervision visit should occur in each clinic once a month, conducted by the MCH supervisors. During these visits, a checklist is to be used (see annex 3), and supervisors are expected to review all MCH registers, and check them against the monthly reports for accuracy; pull 3-10 random charts and evaluate them for proper charting practices; and assess the status of the clinical equipment. The supervision visit should also include a discussion with the lead HCP about how the clinic is doing, and review with them any documentation errors that are identified. The checklist should be completed by the supervisor and submitted to the MOH.

When asking a midwife in Gaza about supervision visits, what they consist of and how often they occurred, she replied:

> *"They visit every month. They come and discuss various things. They check if there are any problems, they try to find a solution for it, whether it is regarding computers, patients, appointments, or anything else, and we discuss it with them. They evaluate the numbers and make statistics for everything."*

A doctor in Gaza described supervision visits during an interview:

> *"It's okay, they come to us and sometimes call us by phone if they want to tell us something or sometimes they call us for a meeting." (…) "Mainly, they come every month for a visit." (…) "They take notes and write down if we have a problem." (…) "But there is not a supervision sheet for doctors, just nurses."*

These comments were representative of supervision practices as described by HCP in both Gaza and the West Bank. The regularity of a monthly supervision visit varied from clinic to clinic and district from district, depending on the location, the size of the district, and the needs of the clinic.

When asking a nurse if she had any challenges with the MCH supervisors:

> *"I like the supervisors. Sometimes they tell me what things I am doing wrong and they tell me I should do this and that or correct this. I have*

no challenges with the MCH supervisors. I wish the supervisor would come every month."

This was a common response when talking with the HCP at the clinics – they liked when the supervisor came to the clinics, and wished they visited more often.

While observing three different clinic supervision visits with an MCH supervisor in April of 2017, I reviewed the clinic records showing when supervision had last occurred. The first clinic had last received supervision in February 2017 and June of 2016. The second clinic's last supervision visit recorded was in 2014, and the third clinic's last supervision visit was April of 2017.

I asked and MCH supervisor about the number of visits she was able to complete in a month. She stated that she tries to do 4-5 a month, although she has a responsibility for more than 50 clinics. When asking another MCH supervisor how many clinics she was able to generally visit in a month:

"It depends, it is not the same. Sometimes 20, sometimes none. According to the clinic and according to our time. In a month we have many meetings…"

When asking another MCH supervisor about the amount of work they have:

"We try to find everything, but there is a lot of work. When I go to a clinic, from the moment I go in to when I get out, it takes maybe at least three hours. From reviewing the registers, the refrigerator, the vaccines, the MCH handbook, the forms and the family planning methods, to checking the lab to see if there is a test or not, to checking for cesarean, post-natal, anemia, or if the mothers are coming or not, the baby. This is a lot of work, and if we want to work true, you will not finish."

It was clear that MCH supervisors were not able to fully comply with the MOH expectations of routine monthly clinics for all ANC sites. Despite the inability to visit every clinic, the MOH expected the monthly checklists to be completed for each clinic,
so there were different methods of obtain the necessary numbers for the checklist. Many of the supervisors and HCPs described having a monthly meeting where HCP's from each

clinic come to the district office and they bring their clinic data, and give feedback on how they are doing and discuss the MOH agenda.

From an MCH supervisor:

> *"In our work, nurses come to the meeting monthly. They come every month and they bring their report with them and I revise it with them. If I find anything not suitable, I ask her why, and she revises it. Sometimes she corrects it directly. Sometimes she needs to go back to the clinic and she call me with the correction… [T]hey bring everything, they submit the reports, and the requirements. Even if they need vaccines they will bring a special form, a request form, and for medication there is a request form. And they bring everything from the clinic according to their needs…They explain about the reports, and discuss problems clinics are having. We do this every month".*

From a nurse:

> *"Every month they* [the nurses] *go to the district office, and they met with the MCH supervisor, the director of the district, and the director of nursing. The supervisors and directors discuss with the HCP's any issues found in the clinics they visited during the month. For example, if they* [the supervisors] *found anything wrong in a clinic, they mention something is wrong in a clinic but they do not say which clinic, they talk about it in general. They discuss these issues to make awareness of the problem, so that others can learn from it and not do it…Every month we have a meeting, after the 10th of the month, because the supervisor must finish their reports, send them to the district and then revise their reports. Once the report has been revised and accepted at the district level, a meeting is set up to inform and discuss the findings in the report.*

The audit aspect of supervision, collecting data and filling out required forms for the ministry, is an essential role that the supervisors have; however, feedback is also a large component of their responsibilities. While talking with supervisors and HCP's, there was high

value placed on being able to give and receive feedback. During the monthly meeting HCP are able to get an understanding of the MOH priorities, issues, and goals for the clinics.

When asked to give an example of what was discussed at the last monthly meeting, a nurse responded:

> *"We did not have the monthly meeting due to an outbreak of measles, we focused on MMR vaccinations for children 8 mo to 1 year…The last meeting they showed us a blanket with the MOH health written on it that should cover the examination tables. They said we should do the dusting every day. We need to follow the children who are late on vaccines, follow up on delayed ANC visits, follow up with the women that have an open file and are due for a visit. We also discussed how the doctors want to evaluate the high-risk patients."*

A health care worker also gave examples of the monthly meeting discussion:

> *"But this month there was no meeting due to the measles outbreak…*[Normally] *they talk about wearing the uniform, timeliness, and cleanliness. They inform us of any new instruction that comes from the ministry. They give training. They give lectures about anything urgent, measles, for example. They discuss how to deal with patients, always smile."*

An MCH supervisor explained that holding monthly meetings is not an ideal solution for every clinic and every district, because having the HCP leave the clinic for a meeting can cause distribution and close a clinic for the day:

> *"In xx district, we have an exception we don't have a monthly meeting because the director refuses to close the clinics, because the public will make a strike. Without the nurse at the clinic will be closed."*

4.2.2 Flow of information

Direct communication between the MCH supervisors and HCPs outside of supervision visits or monthly meetings is another area where feedback is provided.

While discussing concerns in the clinic an MCH supervisor explained that nurses and health workers are in regular contact with their supervisors even if the supervisor are not at the clinics every month to do a full supervision visit:

> *"Maybe they have a problem with the computer or the internet, or no supplements or they have transportation issues,* [so] *they call. They contact me with questions about antenatal care-- if* [the woman] *is considered high risk, and if they should register her or not, and if the HCP wants to transfer the patient to a high-risk clinic."*

During a clinic visit with a supervisor, I observed that the supervisor would answer calls from HCPs, mostly with questions regarding how to do something with the computer system.

When talking with MCH supervisors they discussed how it was important for every clinic and HCP to be aware of new information from the MOH, and how they often made minutes of their meetings and sent them to the clinics for all the HCP to read and sign.

Many supervisors, and HCP in the west bank and Gaza talked about using Facebook and Whatsapp to communicate with each other. One MCH supervisor stated that her district didn't use Facebook or Whatsapp, but used a government phone they had been provided with 300 free text messages. Although not mandated as official policy, this mobile communication was widely praised by HCPs and supervisors alike. As one supervisor put it:

> *"Sometimes when you give a hardcopy, they* [HCP] *say that they saw it, but with Facebook messenger and Whatsapp you know that they saw it…For example…we got a message from the preventive health department saying there was a measles and mumps outbreak and clinics needed to vaccinate. As MCH supervisors, we notified the HCP at the clinics, informed them of the remaining vaccine, and instructed them what they should do. We sent this to all the HCP by message….This helps with the transportation issues. It is easy…and instead of calling everyone, you can just send a message."*

There is also official information that the district and ministry need to get to the clinics which is sent by a Ministry car. When asking a nurse how she received feedback after a supervisor visit, she replied:

> *By the Ministry car… In a usual month, the car comes twice per week, but now since the doctor is the reliever, they come every day. However, if there is any urgent thing they send the car immediately. For example, if there is a lack of vaccinations they send the car with the vaccine immediately.*

4.2.3 MCH Monthly Reports

The MOH expects MCH supervisors to review and correct the monthly reports submitted by the ANC clinics. There are various ways that the MCH supervisors obtain the monthly reports for the MOH: the nurses may bring the reports to the supervisors during the monthly meetings; a supervisor may send a ministry car to collect the reports; a supervisor may visit collect the report during a supervisor visit. In Gaza, the nursing supervisor in charge of each clinic collects the monthly reports and sends them to the correct district supervisor.

4.2.4 Other MCH Supervisor duties

After the implementation of the MCH eRegistry, a new activity has emerged – the supervisors provide basic IT troubleshooting; answer questions about why the system operates the way that it does; and make sure the HCP are correctly documenting clinical care.

In addition to the above activities, MCH supervisors are required to routinely visit the hospitals, where they compile information about birth outcomes (e.g. the number of C-sections; maternal deaths, complications, etc.) for reporting to MOH. These data are not routinely provided to the clinics that perform the antenatal, postnatal or newborn care.

MCH supervisors also distribute MCH handbooks to ANC clinics. These MCH handbooks are meant to be given by the HCPs to every woman during her first ANC visit, and are used throughout the pregnancy to create a handwritten history which the woman takes to the hospital at the time of labor and delivery.

MCH supervisors attend regular meetings with the MOH to discuss national and district levels goals; learn about changes to care guidelines; and report on the needs of HCPs. They lead district meetings with HCPs where they discuss decisions made by the MOH, and

provide instruction on care practices. They provide training for new nurses, and then oversee their assignment to a clinic. They are responsible for staffing, and scheduling of their clinics. They give lectures to pregnant women on breastfeeding, maternal care, supplements, and anemia.

The number of clinics that each MCH supervisor is responsible for varied from district to district, ranging from 16 to 54 clinics, with one to two HCPs at each clinic. There is a wide variance of how the districts are divided; however, the roles and responsibilities are the same for all the MCH supervisors.

One of the differences between the West Bank to Gaza is that in Gaza the clinics have a male nursing supervisor in each clinic. The nursing supervisor is responsible for the clinic staff, creating the duty schedule, organizing the annual leaves, and holding responsibility for the needs or the clinic and staff, including equipment needs. He also collects the monthly reports from the nurses and midwives for each program (ANC, PNC, vaccine, and family planning), then reviews and sends the reports to the appropriate district supervisor. This role does not exist for clinics in the West Bank.

4.3 Reflection on Theory: Model of Actionable Feedback

Following the model of actionable feedback, I explored health care providers' perceptions of the themes timeliness; individualized; non-punitive vs punitive; and customizable feedback in relation to how audit and feedback is currently given to the clinic from MCH supervisors. I looked at how these four themes were perceived and operationalized at the clinic level, and how best to apply them in the new feedback dashboard in order to motivate, and avoid demotivating, health care providers.

4.3.1 Timeliness Feedback

It was important to investigate what "timely" audit and feedback meant in the Palestinian setting, in order better understand HCP expectations for the proposed system.

When supervision visits occur, they give the HCP at the clinic an opportunity to receive real time feedback before the monthly reports are sent to the district level. While observing a supervisor visit of multiple clinics, the supervisor would audit random charts and review the registers. When the supervisor found an error or discrepancy, she would find the HPC in the clinic and show her the mistake. The supervisor talked with the HCP about the error, and

the HCP was able to fix the error; such as, filling in the blank, correcting a discrepancy, or signing in the appropriate place. The supervisor then educated the nurse on the correct way to record the information. The nurse was told that she was able to make the correction and get credit, but the discrepancy would still be in the report that goes to the community department.

When asked about the timeliness of feedback during and after a supervision visit, one nurse replied:

> *Immediately during the visit they give feedback; asking about the children or pregnant women; why they are late for a visit; and why a lab result is late or missing, and they take notes. (…) Within two days after the visit, the supervisor gives the report to the director of the district, and then the district director has two more days to review and make comments, which are then sent back to the clinic. (…)*
> *Some of the comments we received from the last supervision visit were to make sure to write when the doctor visits, and to document the lab results. They wanted to know why we didn't do the lab work, and why we didn't write the results in the file. It is because sometimes we do not have electricity and sometime the lab tech takes time off and there is no one relieving her. Our supervisor made a recommendation in the comments, that the health worker should collect the children and do the lab work for them.*

In Gaza there is daily feedback from the nursing supervisor in the clinic. A nurse gave an example of supervision and feedback at the clinic level:

> *The nursing supervisor in the clinic comes to check the work and how everything is written and organized, (…) he reviews all the cases, the appointments, information, conditions, and so on. (…) There is a daily meeting; for example, today she[1] came and discussed hypertension, and talked with me confidentially with an issue I had. (…) If there is a problem with the computer the nursing supervisor calls the engineer to deal with it.*

[1] The nursing supervisor of the clinic was on leave due to sickness so another nurse in the clinic was talking over his responsibilities, explaining this difference in pronouns in this quote.

During my fieldwork, the concept of feedback included follow up on issues that HCPs reported to their supervisors or the MOH. During interviews, focus groups, and observations, HCP spoke of the lack of iron pills within the clinics over the last months. While speaking to doctors during interviews they spoke of an error in the eRegistry system regarding the ability to chart ultrasound results. The MCH supervisors and community health department supervisor were aware but unable to correct the issue in a timely manner due to circumstances out of their control.

When asking a doctor in Gaza about the support she receives from supervisors, she stated:

> *If they can do something they will do it, but sometimes we feel they cannot do anything because it is above them, for example, there is no inventory. I mean something as simple as tissue papers for the patients; if there are no tissue papers in the center store, how can they bring it? They came for the eRegistry system and asked us if there were any problems, and how we are doing, but the problem is not solved.*

4.3.2 Individualized Feedback

I explored the degree to which HCP receive feedback about their own individual performance, opposed to clinic performance.

The clinics in Palestine usually consist of a small core clinical staff of 1 or 2 midwives or nurses, or healthcare workers that manage the clinic with the help of their district supervisors. The larger clinics are likely to have one doctor that services that clinic 5 days a week; the smaller clinics may have a doctor that comes on certain days of the week; and then there are doctors that float to where they are needed. The clinics divide the services offered (ANC, PNC, vaccination, NBC, primary care) into certain days of the week.

During my observations while following a MCH supervisor, the supervisor would speak with whomever was working the clinic that day, and when the supervisor found a discrepancy, she would notify the HCP working. The discrepancy was addressed as a clinic error and not an individual error. The clinic was meant to correct the issue, not directly the individual.

During my interviews, HCP's discussed how they desired to have more supervisor visits at the clinic to be able to have more personalized feedback. One nurse talked about the possible benefits of personally knowing her supervisor:

The supervision encourages me to do better and to do it in a good way, (…) and if the supervision is done routinely and every month, it is good. Because then you know that someone supervises you and then you do the work properly. If no one comes maybe you do not do good work, but if we see the supervisor as a sister, we will treat her good.

While observing a supervisor during a supervision visit, she educated a nurse on how to properly chart something that she had entered incorrectly. The supervisor told the nurse, that she would arrange some continuing education on the matter. At another clinic, the supervisor spent time working with a nurse that had an issue with the eRegistry system. During these visits there seemed to be mutual respect between the supervisor and HCP's, and the HCP's appreciated this individual feedback from the supervisor and the opportunity to bring up any issues they had in the clinic.

During a focus group with MCH supervisors, they mentioned that they give feedback through annual evaluations of each HCP, although it was not clear how widespread this practice was.

From the community health department, one organizational level higher than the district, individual feedback is focused on the clinics and not on the individuals working in the clinics. During an interview, the community health department director explained one way their department provides feedback to healthcare providers at the clinic level:

We find [the clinics] *that are doing well in ANC coverage and vaccination coverage, and* [the clinics] *that are not doing well. We give the clinics that are doing the best a certificate of thanks and thank them for the work they have done. For those that have very low numbers we will send them a letter stating that they need to improve.*

4.3.3 Punitiveness

I attempted to understand the tone with which feedback is delivered, to get insight into expectations and reactions to punitive vs. non-punitive feedback.

Enquiring about feedback characteristic patterns during a focus group with MCH supervisors, they discussed the measures a supervisor might take for correcting a problem in the clinic:

Sometimes punishment is good, we can transfer the nurse or doctor from one clinic to another. Sometimes writing a letter to the person saying you did something, wrong and

next time do not do it. It can fix the problem for careless nurses or doctors, and it helps to let them know if there is a problem.

These MCH supervisors also discussed how annual evaluations are a method used for assessing performance with associated consequences:

We have a yearly evaluation for all the nurses, and sometimes if there is a problem, the evaluation will be long… Her evaluation will affect her promotion, if they are less than 60% there is to be no promotion or higher position. In general, they are all over 60%, because they are heroes. They have to work with funds, people and administration. They are heroes.

When asking MCH supervisors about positive incentives in place for doing a good job at work, one MCH supervisor stated:

There are no incentives for doing a good job. We give them thanks. We might send them a letter with a thank you for doing a good job. But not money, there are not the funds to give money. But we have to support them at least. But if there is a small mistake they [higher level management] will forget all the good things. (…)

We do not need money, we have money from our salarys, but we need support and thanks. We take our salary, but even our salary is not comparable to the task that we have.

When asking a nurse during an interview about receiving recognition or incentives for doing good work, she stated:

When they [the supervisors] come to the clinic and find everything is well they will say good job, and they might write in the supervisor sheet or in the blue book, thank you! [she points to the mural on the wall] I put this up on the wall for the children and they [the supervisors] thanked me, and put it up on the Facebook group page, and I am very happy because this is my work.

An important aspect and motivation for working in this Palestinian setting is the need to be appreciated. Most health care providers understand the difficulties that face the healthcare system and are only asking for thanks for the job they are doing.

In the same regard, a midwife in Gaza mentioned how there were many obstacles working as an MCH provider with the shortage in staff, and political instability creating no motivation:

> *There is no motivation at all, it is between us and our God. (…) We just want thanks. (…) We just at least want some thanks for the work we do. We asked our supervisor in the ministry about receiving some thanks, because many sectors have thanks, but up to this point, we do not get any thanks.*

> *(…) The primary health care sector, antenatal care sector, and vaccination unit have the heaviest workloads in our ministry, and we expect to have a satisfied motivation*

When asked if good data from her clinic would be enough thanks, she stated:

> *Yes, enough for me, but I need someone to say 'May God give you wellness or health'* [a common Arabic phrase of thanks].

While in Gaza I had various conversations with HCPs and people in the Ministry of Health that were anxious about the future of their jobs. There was a statement made by the government in the West Bank, who is responsible for much of the funding to the Gaza HCPs, that all HCP providers 40 years and older would have to take an early retirement and would receive half their salary. If they continued to work instead of retiring, they would receive no salary. This punitive measure gives insight into the effects political power has on the national healthcare system in Palestine, and the negative tone that governmental actions can set for their healthcare providers.

4.3.4 Customizable feedback

I explored approaches to ensure that HCPs could use personalized data to improve their workflow and decision-making process.

While observing a supervision visit, as the supervisor reviewed the registries she noted that the column for "iron pill given" had been crossed out and multivitamin was hand written above iron pills. The clinic and district had been out of iron tablets, but had multivitamins in stock. In attempts to treat anemia and comply with the required data elements they were customizing their situation by treating and recording something that was meaningful to their situation at the point of care. This is one example of how HCP's are trying to comply with requirements and treatments in less than ideal situations by customizing data elements and

showing their documentation. The supervisor noted this customized data element in her notes to follow up with shortage of iron, but stated that she would not be able to count the amount of multivitamins given instead of iron tablets because it was not a required data element for the MOH.

During an interview with a nurse, I asked a question about the flow of data, and she struggled to understand my question. My ministry of health colleague elaborated:

> *They make a report monthly, but they usually don't compare it with the other month. They don't see it like what you do here [in the electronic dashboard]. It is good for them to see it. (…) It would be good to see, for example, if we have more anemia cases this month and so on…*

Data is sent out, but not returned to the clinic in a useful and meaningful way. When the annual report is completed it is send out as information and possible discussed at the monthly supervision meeting. Many HCPs at the clinics I visited reported that they did not have the ability to customize the indicators and data elements pertinent to what they thought was important, although many HCP's expressed a desire for this capability when the subject was brought up.

4.4 Provider Understanding of Data; Perceptions and Preferences

I explored how these HCP, understand and use data in relation to their work. I collected input from HCP, MCH supervisors through interviews and focus groups, where they analyzed a mock-up of a feedback dashboard containing components and indicators based on literature, theory, and the Palestine MCH protocols.

4.4.1 Perception of data and usage in practice

HCP experience with clinic and healthcare data is in the form of aggregated numbers that they are required to report monthly based on the national program indicators. HCPs have the responsibility to tally specific data points in multiple registry books, which would be done at the end of each day or week, and then compiled into their monthly reports.

While discussing the concept of a feedback dashboard containing her clinic's data during an interview, a nurse commented:

Yes, it will help us a lot!... Not like before when we just hand in the montly report and we don't care after that, but with this new feedback dashboard we will be able to improve our work.

Many HCPs that I interviewed were more aware of data that had a direct relationship to their patients. During many interviews while discussing data and data usage they would bring up the fact that there was a shortage of iron pills in the clinics, and because of that they were seeing an increase of patients with anemia. During an interview in a clinic with an MCH supervisor of doctors:

Sometimes we notice that there is no available iron supplements in the clinic for one month or 40 days, and the anemia increases among the woman. Some of them refuse to pay and buy iron from outside, or sometimes their husbands do not have enough money to buy iron supplements. But when there are iron supplements in the clinic they take it because it is free. The anemia decreases when there is available iron in the clinic, there is no anemia, it decreases.

When asking a midwife in Gaza, if she analyzed data from her clinic, she responded:

We do analyze our data partially for cases of anemia, hypertension, and ultrasound. Some HCP do it and some don't. It is a personal practice.

These statements demonstrate that the data that matters to HCPs has a relationship to their patients' wellbeing, and is related to the actions that the HCP can take to provide adequate care.

During focus groups with MCH supervisors, the conversation surrounding data usage was different from that of HCPs at the clinic level. MCH supervisors had a better overall understanding of how the data related to the district as a whole. One MCH supervisor stated:

We take numbers to see if there is an improvement this month or not…We compare them with other months…I review the monthly reports with the nurses, and show them where we are according to the other districts, and how we are doing with anemia in our district, and show them the percentage.

During a focus group with the director of nurses discussed data from a viewpoint that clinic data reflects performance and quality of care, and an overall picture can be drawn based on this data.

> *The performance indicators, I think are the number of health visits for the prenatal, the coverage from ANC to PNC, and the number of people that visit the clinic. It should go with the protocol, with what is have, and to know if they stick to the protocols or not and why. The numbers speak to the quality of care given to the women. We should give very good indicators (…) We have to make it correct or we will lose the purpose of the data.*

4.4.2 Understanding of percentages

The feedback dashboard is meant to make data relevant and useful for the HCP at the clinic. HCPs are accustomed to interacting with data as raw numbers – the number of open files; the number of women seen; the number of anemia cases, etc. The feedback dashboard would contain indicators – calculated values with a numerator and denominator – which HCPs are not used to seeing in their work setting.

During interviews, I explored how HCP understand the concept of percentages. Initially many HCPs had a difficult time understanding that the percentages would based on how well the clinic performed a specific task (numerator) compared to the number of relevant patients seen (denominator). They did understand the concept of percentages in terms of a good percentage vs a poor percentage, but they expressed concerned that their clinic would have a poor percentage due to circumstances beyond their control.

In an interview, a nurse talked about her concern for having "good" percentages:

> *But in some months there are expected drops in booking, for instance, during Ramadan of Eid sometimes in the whole month we open just 9 files…Another problem could be if a new doctor comes to the clinic, it will take time for people to get used to him and [might not] come again…A new clinic has opened up nearby and it reduces the clinic load…before I used to open 30 files, but now it is about 18 files per month.*

Another nurse discussed her concern about possibly receiving a poor percentage at her clinic when compared to others, due to differing population sizes in the clinic catchment areas:

It is good to compare how my clinic is doing with the other clinic but sometimes the number and booking will be different because of the population of the village.

A midwife in Gaza stated her concern of ranking clinics:

This may lead to frustration among nurses in the clinics. Some clinics have more patients than us so they will always be on the top.

During the same interview, a doctor from the MOH showed a more accurate understanding of how the comparisons would work between clinics:

It is a policy and quality standard. For example, the percentage of women screened for anemia and received treatment, if you have two and both received the treatment then your percentage will be 100%.

Through dialog and discussion the HCP's involved came to understand the indicators in the way that this doctor explained, however, their first response commonly reflected an interpretation of data from a raw count perspective, rather than a percentage.

4.4.3Perception of clinical performance related to percentages

When asking HCPs what they would consider to be a good or appropriate percentage for the different performance indicators, there was a range of expectations based on the program or treatment they were discussing.

Many HCPs said that they had a 100% coverage rate of vaccinations, and that was the expectation within the health care system. However, there were different expectations of the gold standard of the ANC, PNC, and NBC programs coverage rate and key indicators.

When discussing a nurse how she thought her clinic performed she stated:

I think the minimum degree of our clinic is from 70-80% [coverage of pregnant women in ANC clinics]*, and we don't reach the top because the building and the location of the clinic are not in the center of town.*

During the interview, the MOH participant explained:

70-80% [ANC coverage] *is good. If they don't reach the top 10 maybe it is because the clinic is not in the village, and the house are away from the clinic, and therefore some of the women don't come to the clinic because there is no transportation…Some come to the clinic and then go outside to a private clinic, because the ultrasound machine*

might be very good…It depends on the doctor who goes to the clinic, it depends on many things…

They would be happy if their clinic was 70-80%, at least for antenatal care. If you talk about vaccination they will not be happy. They should be 100% on vaccination. But not for antenatal care, because all the women can choose if they come to the clinic. But for vaccination even if you don't come [to the clinic] *they go the house…This is related to disease. For the PNC they have 100%* [coverage] *because it is related to the child. The mother is to bring the new baby for vaccination to the postnatal visit.*

4.4.4 Perception of indicators and usage in practice

The larger research project selected indicators for the draft feedback dashboard based on the Palestinian MCH protocols and WHO recommendations. It was important to explore how HCPs would understand and utilize these indicators in daily practice. Given the adaptive nature of the research trial, the larger team could continue to alter the indicators to something more meaningful to the HCP at the point of care, or create action plans to fill in the gaps, as they learn more about how HCPs react to the indicators.

4.4.5 High-risk referral barriers

Many of the indicators focus on the guidelines for referring women to high-risk clinics. During interviews and conversations, health care providers discussed some of the barriers for patients attending the high-risk clinics. Sometimes these barriers can lead to patients leaving the system or not getting appropriate care.

The decision support tool in the eRegistry system auto-generates a recommendation to refer women based the national guidelines; however many health care providers stated that it should still be the doctor's decision if the patient should be referred. During an interview with a doctor, she reflected on the workload burden for high-risk clinics with auto-generated referrals:

If the computer tells you she is a high risk then it is…[But] *no need to refer her, and crowd the high-risk clinic, knowing that nothing can be done.* [For example, the system generated a high risk referral for] *a women with a multiparity pregnancy and the doctor decided not to refer, and it is okay.*

A nurse in same room, added:

Yes, with some cases even after referral the doctor/specialist sends the women back to the clinic saying there is no need for a referral

These HCP's statements reflect the idea that many of the auto generated high-risk referral can be well-managed outside of the high-risk clinics, and strictly adhering to these referral recommendations would congest the high-risk clinics.

During an interview with a doctor in a high-risk clinic, she discussed the lack of communication between the HCP and patients, resulting in patients getting "lost" when being referred. The dashboard was designed to provide the result of indicators focused on relevant pregnancy health outcomes in which health care providers could feasibly focus on specific tasks to improve the outcome, as recommended by FIT.

She might not come here because she doesn't have the money or the time, or she had a lot of children, so she doesn't come. She feels like she can't go back to the clinic where she opened the file because the file isn't in the clinic anymore. If she is not coming, I call her, and she tells me she can not come because she doesn't have money or time… For these cases the doctor must tell her that she can go one time to the high-risk clinic to see what the high-risk doctor recommends and maybe that is enough, and she can return to her clinic after that… [If the patients doesn't want to, or is unable to come to the high risk clinic] *I can refer her back to her old clinic by computer, and I can phone the doctor and tell them she is coming back to your clinic.*

HCPs were concerned that some women do not attend ANC visits due to lack of knowledge regarding the high-risk referral process.

4.4.6 Fundal height measurements

Many indicators focus on fetal growth. Fetal growth is commonly measured by a symphysis fundal height (SFH) measurement, and if there are any discrepancies, the woman should be referred to a doctor for ultrasound. The HCPs specific recommendations in Palestine rely heavily on ultrasound usage rather than SFH – patients receive an ultrasound during nearly every visit.

This doctor illustrates a common sentiment regarding the use of ultrasound in Palestine:

> *The ultrasound is easier than the Sonicaid* [fetal doppler]. *The Sonicaid takes more time than the ultrasound even for a practiced midwife. I see in the ultrasound oligohydramnios* [low levels of amniotic fluid], *polyhydramnios* [high levels of amniotic fluid], *fetal heart, fetal and placenta presentation. Even if everything is good and fundal height is decreased, once I look at everything I will refer to hospital with the full picture. The ultrasound gives us more information than Sonicaid or the fundal height measurement specific recommendations*

This mentality was a common perspective from the nurses, midwives and doctors. When asking a relief nurse if she was confident in taking fundal height measurements, she responded:

> *Yes, using cm…in postnatal we measure it, but in ANC the doctor measures it.*

When talking to a midwife in Gaza about fetal well being, she responded:

> *Because there is ultrasound in the clinic, we will refer to ultrasound. We listen to the fetal heart because we are midwives, and we can measure the fundal height, we are trained.*

During another interview with a doctor when asked about how fundal height measurements were done, she replied:

> *Yes, mostly by ultrasound. But no need to do it* [SFH measurement] *because there is an ultrasound… Here in Gaza in general not every case requires fundal height measurement by a midwife. There is a doctor in every clinic and when the women come in other places she can't really find a doctor every time, but here there's always a doctor, and then there is no need to do it* [SFH].

After asking a doctor in Gaza if nurses or midwives measure the SFH, she stated:

> *They* [midwives and nurses] *are experts. When they refer to me, to check if the fundal level is below or higher than it should be, I take it serious.*

However, in many interviews and conversations, nurses and midwives felt that fetal size was better monitored by the doctors using ultrasound and not by themselves using SFH.

4.5 Provider Relationships With Technology

The MCH eRegistry has been rolled out in a staged way since 2016, with some HCPs having more than a year of experience, and others less than six months, during the time of this research. For many HCPs, the MCH eRegistry required an increase in their comfort levels with regard to regular computer use. The addition of computers and internet at many clinics also brings additional complications concerning the availability of electricty.

4.5.1 Barriers between users and system

A midwife in Gaza illustrated some technical barriers between users and the system. When asked about challenges in the clinic:

> *There are no big challenges except electricity and fuel, it is a big challenge we have, as today they went to another clinic to get fuel for the generator.*

Another midwife clarified the statement:

> *Yes, today there was no work this morning until our arrival at 11:00, that is 3 hours. They missed three hours of their work. Someone had to go to another clinic in another city to get solar for the electric generator…This generator is not only for the computers to work, but it is for everything. We must have the generator in order to have electricity for the clinic and for the patients, for example, we need to have the fans working to make it more comfortable for the patients.*

The clinic was not shut down because the computers where not working, it was closed because without electricity the clinic cannot see patients – without fans in the clinics, it makes it very hard for the HCP and patients to be comfortable. I was quite hot even when the fans where working, and it was stifling when there were no fans.

HCPs in Gaza did say that if the computer system was not working for some reason or the internet was too slow, they would use backup paper charting, and then enter the information later when the computer was working.

> *It was hard to use the computer before, knowing how to enter the data, and how to make a report at the same time. And also, if there was a blackout, sometimes we created a file and suddenly it is gone, of you login to the internet and it is not working or is slow. But when the internet is fast...it will make our work better. They* [the MOH] *will strengthen the network, and will improve the internet…*

> *We are always afraid of electricity cuts, because if that happens the data we insert will be lost, as you know… Yes, it is better now, but still if there is a power blackout it will stop working. Sometimes it will be the case for the whole day, so I will write it down on a paper and the next day I will need to enter it again in the system.*

> *When asked if they liked the electronic system:*
> *Yes, it is really good…We need this kind of system especially in child care…We worked on improving ourselves and own qualities. We take old files to insert it as a practice.*

Even with all the difficulties these HCP face, they wanted to expand the eRegistry system.

One informant had a difficult time transitioning to electronic charting:

> *The situation in Gaza is very special…*[W]*ith these patients, when we deal with these patients that is why I feel like I cannot put myself like this* [facing the computer] *when I am talking with these kinds of patients. That is why I take my things at home and write them at home, because I feel that she is a soul…*

The HCPs reported that transitioning to the electronic system takes time, because it is different than what they are used to. When speaking with a doctor about the new feedback

dashboard, she asked if we could bring a printer so she could print out a hard copy, rather than review the data at the computer.

Many of the HCP are from an older generation before technology became as widespread in Palestine, and for them is a harder transition to use the computerized system.

When asking a mature nurse if she worked with computers at home, she responded:

> *I work on the computer, but when I work on the computer I want my children to help me because they are at the university. I know some skills but I want some help.*

This kind of comment was common, but not the majority. During my visits, I observed many instances of HCPS using Facebook, Whatsapp, and Skype.

4.5.2 Acceptance of the system

Implementing a new work practice for HCPs carries ethical obligations for the research, to ensure that any disruptions will have a mitigated impact on both the quality of care and the workload of the HCPs. When asking an HCP what she thought about the introduction of a feedback dashboard, she responded:

> *It will not be difficult, we just need time, for example yesterday I opened seven new pregnancy files, and scheduled appointments for the coming two weeks…I work until 2 pm and I have to leave early to breastfeed my baby. But in general, I think it is a good idea. It will give us an idea about our work/performance.*

When asked how often she would look at the dashboard, the same HCP responded:

> *Not a problem, we can do this, sure it would be helpful to see this and this will give us an idea of our work.*

During a group discussion, the participants considered many of the challenges they had with the MCH eRegistry not always working properly, and the frustration of not getting what they thought was part of this new electronic system. An informant higher in the organizational level tried to calm the situation:

Please listen people, the lab results issue and the connection is easy...it can easily be done it just requires time. We will benefit from the project and the new advancements. But give us time and give us a chance. The dashboard and the [internet] *connection is a matter of time…Just give us time and you will see things changed and improved. Keep giving us feedback it will help. We also need to take into consideration the cost effectiveness. This is an opportunity that came to us and we need to benefit from it.*

During the same focus group, when talking about aspects of the dashboard, an HCP interrupted to ask how as HCP providers can trust new implementation projects when the HCP don't feel like they see the benefit:

Sorry, but I want to criticize something...each period there is a new program that comes from the MOH and we work on it and we enter data for postnatal and child record, and we don't benefit from it later.

When discussing preferences of graphs, a HCP stated:

It is not me who chooses, I will do what the ministry decides.

During an interview with a doctor in Gaza, she had questions on the system design:

Who will set the targets?...Why have these 6 topics been chosen?…Will it also alert the supervisor?….I would like to ask about how you choose these indicators…

4.6 Action Plans

An important aspect of the feedback dashboard includes a library of messages that populate the "Action Plan" component of the dashboard. These action plans include actions to help HCPs improve practice of care in a tangible way. It was important to understand what actions HCPs already take to improve care.

4.6.1 Patient education

This research indicated that there was significant concern for the patients with anemia. When asking a midwife about the obstacles she faces when treating anemic patients, she responded:

> *These women have problems with side effects from the iron tablets; such as, vomiting, nausea, gastric pain, constipation…. We give education about these side effects in the beginning, but they don't follow the treatment… We do our best to teach them the right way to avoid these side effects and there is a new kind of iron supplement that have less effect on the stomach, but it is more expensive and some women don't have money to buy it.*

Even with improved patient education, there are still barriers to care, such as poverty, that should be accounted for when making action plans. When asked if patients were given written or paper education sheets a midwife respond:

> *Sometimes we give them brochures and educational material from the health education department when we have them, but in all situations, we talk with the patients and answer all their questions.*

4.6.2 Workarounds and culturally grounded practices that make the ANC clinics work

Many clinics do not have a lab, and women are sent elsewhere for common tests to be performed. The results to these tests are most often communicated back to the ANC clinic by the pregnant woman herself, carrying a printout from the lab. A common approach to encourage pregnant women to return lab results to an ANC clinic is to not schedule an ultrasound until this paperwork has been received:

> *Because she loves the ultrasound, so from this way we tried to catch the clients, if you don't do your investigation: CBC, urine tests, we will not do the ultrasound for you. So she immediately brings her investigation to the appointment.*

Some women receive antenatal care at private clinics, but then also show up at the public clinics sometime later in their pregnancy, which can make the reported data seem like there is a problem with full ANC attendance. A midwife explained:

> *Some pregnant women come on the 12th week, but some women come in the 4th month. These women come late around 36 weeks because they think if they do not have an ANC visit at a public government funded clinic, they will not give her baby vaccinations...But they give vaccination even if they don't come to the government/public clinics, but because of tradition they think if they don't come for ANC they will not get* [free] *vaccinations. But the vaccinations are for all, even if the mother doesn't come.*

4.6.3 Interaction and usage of "Action plans"

A project lead from the PNIPH made this recommendation for the action plans:

> *These "action plans" shouldn't be something to take action on every time but it can be more of a reminder of good practice. You would not be checking that yes, I did it, but more that I am giving this a thumbs up because I think it is helpful and a good reminder, and this helps to improve my practice.*

When examples of action plans were shown to some supervisors they were concerned that these draft actions were in English:

> *But the sentences for actions plan is so long! Will it be in Arabic?*

In order for these action plans to be useful, it will be important for them to be translated into simple and straightforward Arabic, so that HCPs can quickly understand them and learn in their native language.

4.6.4 HCP current practices of patient follow up

A proposed component of the feedback dashboard is the ability to produce patient lists that can be directly used to follow up when clinical performance was not optimal. Privacy concerns from the implementation perspective led to this part of the dashboard being removed after I returned from my field work. The decision was to focus the dashboard on

what the healthcare provider did during past visits, and encourage them to improve in upcoming visits, rather than directly guide them to address gaps in specific individuals' patient care.

However, when talking to HCPs a common theme that emerged was that patient privacy was not a concern culturally.

When an informant was asked about how they could follow up with the patient:

> *We live here in the same village and it is easy to contact the women by asking other woman and their relatives and sometimes, other nurses and colleagues, so it is not difficult to reach them…We can reach the women, even without a phone number, they can go to their home…Sometimes we send the name of the women to the school, because many women have children at the school, and by letter given to their child we tell the women to come to the clinic.*

This reflects a cultural acceptance of not being concerned about patient privacy.

4.7 Comparison and Evaluation of Clinics

In this section, perceptions of comparison between clinics and evaluation of clinics are described. Through the implementation of the feedback dashboard, HCPs will have the ability to view how they perform on certain indicators, compared to their neighboring clinics. These indicators are based on the care that they give during a visit. The charting done at the point of care on specific data points will auto generate into; charts, graphs, tables from their clinics and other clinics in the district. I explored current methods of comparison between clinics, perception of clinic comparison, concrete and perceived barriers or comparison.

4.7.1 Current comparison between clinics

It was important to explore current comparison practices to gain perceptive of health provider's views and experiences creating a foundation of understanding.

During a focus group, MCH supervisors discussed how data is presented to health care providers, one MCH supervisor stated:

> *In the meeting when we go over the annual report, we might look at: the percentage of anemia, coverage of ANC, PNC, and NBC of each*

clinic with removed identifying factors. Then we talk about why the percentage is like this; maybe it is due to patients going to the private sector, or there might be an issue in the clinic; such as, not having a doctor in the clinic, or lack of laboratory material. We do this to give them feedback on ways to improve and encourage the nurses to improve.

Anonymous comparison at least annually is being done, however there is also an unofficial comparison between clinic that occurs between clinics. When talking with a supervisor and community supervisor in conversation I asked them if they ranked their clinics they were responsible for. They told me that there has no official document to report that information, but they do it in their head, and they know where most of their clinics stand.

In addition, when asking a nurse how she would increase a lower percentage, she replied:

We are a central clinic, so if a woman is referred here, we give them education. And women ask why they didn't get this information at the other clinic, then they start coming here because they get more care. (…) A lot of women come from other clinics telling us that there is a huge difference between here and other clinics.

Comparison of clinics were happening, however in a vague and unofficial way.

4.7.2 Perception of comparison between clinics

During an interview with a doctor in the West Bank while discussing the idea have being anonymously compared with other clinics, she stated:

This will encourage me to improve my work and to be better. I want to be in the top 10. This would encourage me.

In addition, when discussing comparison between clinics at the supervision and ministry level during a focus group, they had many thoughts:

It is good to have a message that tells me that I am from the top ten, and this motivates us. Something like an electronic game, when you reach a high level it gives you a message of congratulation of reaching/achieving this level.

-I know, but I don't want it to appear like a more formal/official message.

-They are in this study, I don't want this because all people in other clinics will see it and this will make a bias

-They are all female, so they will be jealous. So we take things privately if any mistake, but if someone is doing excellent we will tell everyone that they are doing excellent.

In relation, during a group discussion in Gaza with supervisors, doctors and midwives, when the topic of comparison came up many had strong concerns about being fairly compared:

We should make comparisons with the clinics that have the same environment and conditions and in the same area; such as, Gaza against Gaza.

During the same focus group discussion in Gaza, another response was made encouraged about the idea of clinic comparison:

It will create a competition between clinics…it is perfect

During an interview with a midwife in Gaza, when asked if being compared to other clinics would give her motivation to work more and to improve, she responded:

I think ranking clinics is more beneficial for supervisors than for me. For instance if my percentage is 80%, it is obvious I need to work on the 20%. (…) The goal is to reach 100%, so if in booking I don't reach 100%, I should myself work more to reach my target, even if I know the top ten or the lowest 10. This means nothing to me; the percentage of our clinic is the important one.

This midwife's motivation was focused on improving her work and her clinic, and not how other clinics were performing. In addition, a doctor's thoughts on clinics being compared:

Why not. However, I think clinics should be classified according to central clinics and same level clinics, and similar services; such as, clinics with labs vs clinics without labs.

With the varied responses from HCP's, the concept of being compared could create a competition, which some were encouraged by, and others concerned about the effects this competition could have on the moral of the staff.

4.7.3 Concrete barriers vs perceived barriers of comparison

When discussing the concept of comparing clinics many HCP's brought up concerns of barriers, some concreate and some perceived.

Concerns arose during an interview with a HCP when discussing possible actions that could be taken to improve a low percentage. She focused on possible reasons for a low percentage in the clinics:

> *We have a laboratory in our clinic, but sometimes there is no material available for some of the tests, and sometimes some of the women don not come to the clinic and do not do the requested tests. Especially during Ramadan, during the last week or 10 days they are busy preparing for Eid. Also (the percentages could be low) when there is a shortage of iron supplements in the clinic, we might not inform the women of the importance of doing their laboratory test, or sometimes when the women are feeling fine they don't come for an examination.*

Many of the reasons she focused on are issues that are out of her control to change.

A doctor in Gaza during an interview stated her concerns of being fairly compared with percentages:

> *But when I work with just 3 cases in the month at a small clinic, it is not the same as when I work with 1000 cases at a large clinic. So I see it is not fair to use percentages not the numbers.*

During an interview, a nurse in Gaza stated her concerns about barriers in the system that could affect her performance score:

> *There is no connection between the laboratories and the clinics, and we still are using the hard copies of the lab results, and the women get the hard copy (from the lab) and they give it to the doctor. (…) For instance my clinic is not just performing tests for ANC, it is also doing tests for patients from other near by clinics.(…) We have an overload in the lab; for example some of my patients could not get the results for a CBC and urine analysis in the same day. They will ask the patient*

to come later on or tomorrow, and maybe the patient won't come back.

When discussing how clinics will be compared, a midwife in Gaza was concerned about having the data reflect the whole clinic and not how she did as an individual:

Yes, I understand, but it is not my problem, the problem is with the other staff.

She didn't want to be pulled down due to other HCP work ethics. She was very interested in understanding how she would be compared to make sure it would be fair.

A doctor in Gaza, talked about her concerns in being compared with other clinics, she stated:

We have an extreme shortage of staff, 10 years ago there were about 5-6 physicians and specialist in this clinic, and that was common for many clinics, but now there are 2 doctors for this clinic, and the two are not working together every day, as one of us works in another clinic to cover. And the numbers of clients have also increased with time. This is very difficult, so sometimes we cannot register all the things on the system, we will miss some data due to overload. (…) There is not overload in all the clinics, some clinics have time to do all things without overload. We also have problems with electricity and Wi- Fi increasing the workload, but we expect it to be better in the near future.

This generally represented the HCPs concerns about being unfairly compared with other sites, due to factors outside their control, such as patient load.

The findings are interpreted and discussed in the next chapter, in relation to the themes of MAF.

CHAPTER 5: DISCUSSION AND RECOMMENDATIONS

This study investigated the application of FIT and MAF to the design of an A&F dashboard for MCH providers in Palestine. Data collection focused on understanding how HCPs in Palestine currently receive supervision and feedback, and how they perceive and would be likely respond to feedback that is timely, individualized, non-punitive and customizable. Given that the proposed intervention would be a digital dashboard, significant findings also included HCPs' relationship to technology, data interpretation, and other factors that would lead to user acceptance. The discussion in this chapter is divided by these themes, where the implication of the findings are considered, and specific recommendations made for the software that will be developed.

A secondary objective of this study was to assess the utility of combining FIT/MAF with HCDID, as a novel approach to designing A&F digital tools in low-resource settings. Observations on this approach are discussed in the methodological considerations chapter.

5.1 Timeliness and Frequency

In this study timely audit and feedback was found not be to consistent for various reasons: high caseloads, many responsibilities, limited number of supervisors, etc. Given the inconsistency with supervision, critical issues in performance are unlikely to be addressed in a timely manner. Specific action to improve clinical performance is limited to recommendations made by the MCH supervisor, when available, meaning that even simple improvements are likely to take longer than necessary.

These findings matched MAF, where timeliness is considered a necessity in order for actual improvements to be triggered by feedback. Given the separation in time between performance and feedback in the current system, it is understandable why improvements are not being consistently observed as a result of feedback.

Many study participants expressed a desire to have more consistent and regular feedback, and seemed happy with the idea that this feedback could be delivered electronically. These statements were reinforced by observing their utilization of text messages and phone calls for feedback and support. The fact that these existing technological approaches to feedback have arisen naturally provides some evidence that the feedback dashboard could also be accepted.

5.1.1 Recommendations for the system

The new digital system has the opportunity to be viewed as a bridge between supervision visits, providing feedback during times when the supervisor cannot come. For it to be accepted by the HCPs as an improvement, it is vital for the dashboard to be consistently updated with timely information, and available to HCPs when they have time between other duties. If the dashboard remains static for too long, without regular updates, it seems likely that HCPs will quickly revert to their existing channels of feedback. Efforts should be made to ensure that the dashboard is regularly updated from the outset of its introduction.

Even though existing supervision visits are not timely in every clinic, the study found that HCPs appreciate the connection that they have with their supervisor. It will be important for that connection to continue, and to create a synergy between the digital and human feedback that HCPs receive. The feedback dashboard should be used to reinforce the relationship between HCP and supervisor, perhaps by prompting phone calls or text messages, or reminding them to report concerns to the district.

5.2 Individualized and Source

Individualization refers to feedback about their own individual performance, and not at the team, clinic, or facility level (Hysong, Best, & Pugh 2006). Feedback currently provided to HCPs in Palestine is not individually focused, but rather tailored to the clinic. When a chart audit or report audit is conducted during a supervision visit, the supervisor does not regularly check to identify who made a mistake in documentation. The focus is on improving documentation generally for the clinic, and HCPs are reminded of the standardized expectations. Likewise, feedback given in monthly meetings is focused on how the clinic could improve, not on how an individual provider can make changes.

One of the big differences that will be introduced with the new feedback dashboard will be the analysis of recent clinical data to produce recommendations for their own improvement. The closest experience HCPs have with this kind of feedback comes from supervision visits conducted with the MOH checklist, where the supervisor selects a series of recent charts

and reporting forms to spot check for accuracy. The feedback that HCP are used to receiving as a result of this activity is more related to completeness of their recording efforts, rather than synthesizing the data to explore opportunities for improvement.

HCPs are more familiar with the idea that data can be useful for providing quality care for individual patients. They were motivated to look at data in areas where they believed that this would help them to provide services to patients.

Aside from the unfamiliarity with the concept of data analysis for feedback, there is a lack of skill with regard to reading charts and graphs, or interpreting indicators presented as fractions. HCPs are familiar with reporting counts and reviewing raw data, but many seemed unclear about how to interpret a numerator and denominator, or how percentages are useful when comparing between clinics of different sizes. There is also a prevalent expectation, reinforced by MOH mandate, that 100% adherence to some guidelines (e.g. vaccination coverage) should be the norm, and scores below this level would not be received well.

Despite the recommendations from the literature that strongly encourage granular feedback at the level of the individual (Hysong et al., 2006), participants in the study did not express a preference for feedback below the clinic level. Given the small size of most clinics, personal responsibility is already seen to be tied to clinic performance, where it is often clear to the supervisor and the HCPs who at the clinic is responsible for which care activity. Some of the discussion around punitive feedback provides additional evidence that care providers may not react well to more identifiable feedback, for fear of negative consequences. HCPs appreciate having a relationship with the supervisor, which is individual, and it is unclear if a focus on individual feedback beyond this relationship would be accepted or desired.

This finding was not unique to Palestine, as a 2012 study that sought to apply MAF to an antibiotic program in a NICU in New York also found that given the shared responsibilities for patients between various clinicians, HCPs did not want to receive individualized feedback that might inaccurately reflect the role that they played in providing care (Patel et al., 2012)

5.2.1 Recommendations for the system

Despite the recommendations of the literature, it seems unlikely that tailoring feedback to the individual will be well-accepted at the beginning. Given that all existing practices and reporting tools in Palestine focus on the clinic as the lowest unit of analysis, and taking into consideration the fears expressed by users, the first version of the feedback dashboard should likewise utilize the clinic as the level of feedback. This decision can be revisited as HCP become more familiar with the process of audit and feedback, and a choice to move down to individual level feedback should be based on additional efforts to understand preferences from HCPs and their supervisors.

Given the unfamiliarity amongst HCPs with the type of individualized feedback offered through the dashboard, it will be important to offer comprehensive training that enables the HCP to interpret and understand the data that are presented to them. Likewise, the tools in the dashboard should be as simple and understandable as possible. The use of color coding; icons; and other user friendly options should be employed. Care should be taken to provide all findings and recommendations in the language that is most likely to be understood for each indicator or action message, which will nearly always be Arabic. A section containing well-written frequently asked questions (FAQ) should be provided that is always available as a reminder about how interpret any given result. One opportunity to explore is for the feedback dashboard tools to attempt to mimic patient-level data findings that HCPs are more familiar with, leveraging their existing knowledge to introduce the new approach.

It will be important to continue hearing from HCPs once the dashboard is introduced, to verify that the trainings were effective, and that they are correctly using and interpreting the dashboards. Regular effort should be taken after rollout to ask specific questions regarding the users' understanding of the information that is being provided, and changes to the tools should be expected, based on user requests and preferences. This approach matches the considerations of an adaptive research design (McDaniel, Lanham, & Anderson, 2009) as well as the recommendations of HCDID.

5.3 Punitiveness and undesirable behavior

Similar to other studies (Hassan-Bitar, & Narrainen, 2011), we found that feedback to HCPs in Palestine lacks emphasis on performance improvement, and there are few formalized punitive components. HCPs are not typically singled out for poor performance, and even at the clinic level, MCH supervisors seemed to broadly believe that everyone was trying their best, and any gaps in performance were based on the constraints that the HCPs operate under. Where poor performance of an individual was identified, it is handled by a letter to the person who needs to improve, and in some rare cases, results in a transfer between facilities. The most standardized method in which HCPs receive negative feedback is during the annual review process, when a performance score below 60% would result in a lack of promotion. However, it seems that this approach is rarely used.

Although not tied to the supervision process, in Gaza there were strong feelings of being treated unfairly and punished. The political policies which were resulting in forced retirement created an atmosphere of fear, demotivation, anger and frustration. Perhaps unsurprisingly, given the real challenges that they face, HCPs hoped for more positive statements of encouragement during the feedback and supervision process. There were multiple requests for recognition that they are working in difficult circumstances, and they are motivated when they receive acknowledgement and positive reinforcement for a job well done. Receiving positive feedback was consistently referred to as an incentive that would work for HCPs.

When discussing the comparative nature of the proposed dashboard, where clinics would receive a ranking, and information about how they perform compared to other clinics in the district, many HCP expressed concerns. The initial reaction of many participants was that the system would fail to take into consideration the special circumstances of their clinic when making this comparison. A lack of understanding of percentages, and how they would help control for differences in sizes between clinics, was apparent. HCPs raised concerns about how the system would handle a reduction in patients during holiday periods; a fear that clinics serving larger populations would consistently score higher; and questioned how the rankings would take into consideration a lack of resources (e.g. unavailable medicines, or a lack of equipment). There was also a concern that HCPs would be punished for making a

judgement call that was not in keeping with the system's recommendation (e.g. choosing not to refer a woman to a high risk clinic).

These findings were mostly expected, based on the MAF, which encourages positive feedback and recommends that all feedback be offered in a non-punitive, non-threatening manner. Although some studies have recommended the use of comparators (Brehaut, et al., 2016), the literature is not consistent on this point, and recent research has cast doubt on its usefulness (Brown et al., 2019).

5.3.1 Recommendations for the system

All feedback in the dashboard should be presented in a neutral or positive tone, avoiding the meta-task process level associated with emotions (Dowdling, et al 2018). HCPs should see the tool to be working on their behalf to help improve care at their clinic, rather than as a method of receiving a grade or being singled out for failure.

In order for HCPs to respond well to the feedback dashboard, the previous recommendations about training and user experience are paramount. HCPs must fully understand the comparative metrics that are used, and trust that they reflect reality and take into consideration the unique context of their clinic. The previously recommended FAQs should specifically address the concerns that HCPs voiced about differences in size, etc.

Beyond attempting to convince HCPs that the comparisons are valid, the system should be routinely assessed in the early stages to verify that the metrics that are used are meaningful. If a clinic is consistently scoring below average for reasons beyond their control, the feedback dashboard will likely not have the desired impact on quality improvement.

5.4 Customizable Feedback and Explicit Targets and Action Plans

HCPs in Palestine are generally not experienced with digital tools for data analysis, and did not provide many recommendations with regard to customizability. The existing reporting and charting forms are designed at the MOH level, and are treated as an expected standard, meaning that there is no existing culture of flexibility with regards to data usage or

reporting. When describing the dashboard and asking about customizability, HCP did not express a desire for the system to be configurable based on their personal interests.

That said, it was clear through some of the discussions that HCPs expect a degree of customizability with regard to patient care. In general, HCP considered the recommended clinical care managements in the current MCH eRegistry to be flexible -- for example, there was a general acceptance of the idea that a high risk referral recommendation does not always need to result in an actual referral. Instead, clinicians should be free to make their best judgement call. These preferences were raised in the context of the punitive and comparison discussions, and there was a clear concern that the indicators in the feedback dashboard would be unable to accommodate these clinical judgement calls.

HCPs did request one feature that was not currently under consideration for the feedback dashboard – the ability to generate lists of patients, by name, that require follow up, or where a clinical management had not been performed.

The literature recommendations on customizability describe the ability of the system to be flexible to the care provider's needs, providing tools that can be used to explore data of interest that may not be provided as the default. This theme, however, is also placed as a lower recommendation than the previous themes discussed. It is not seen as a pre-requisite, but an enhancer (Hysong, Teal, Khan, & Haidet, 2012). The findings in Palestine showed several areas where customizability should be considered.

5.4.1 Recommendations for the system

The ability of the feedback dashboard to take into account clinical judgement is a real concern. The decision was already made in the MCH eRegistry to allow HCP to ignore a recommended management by responding "no," and providing a note. However, the key performance indicators rely only on structured data within the system, not free form notes, so when an HCP chooses to not follow a recommended management, it is simply recorded as non-adherence and will be counted as such in the feedback indicators. Given this technological constraint, it is vital to convey to HCPs that there is no expectation of 100%

adherence to all managements. This should be included in the training curriculum, the FAQs, and periodically reinforced in the action messages.

Given the lack of experience among Palestine's HCPs with regards to data analysis, it is unlikely that customizable data analysis tools would be widely used, or that their inclusion would increase user acceptance. Instead, it should be conveyed to users that the dashboard will be periodically updated over time, based on their feedback. A simple voting process could be added to action messages, allowing HCPs to give a "thumbs up" or "thumbs down," and leave a note about the message itself (Brown et al., 2016). Users should be encouraged to make recommendations for improvement of the layout, look and feel, and content of the feedback dashboard. Using the adaptive research process, these recommendations should be routinely reviewed and adopted wherever possible. The inclusion of patient lists is an early recommendation that should be considered, although this will likely need to be balanced with privacy concerns.

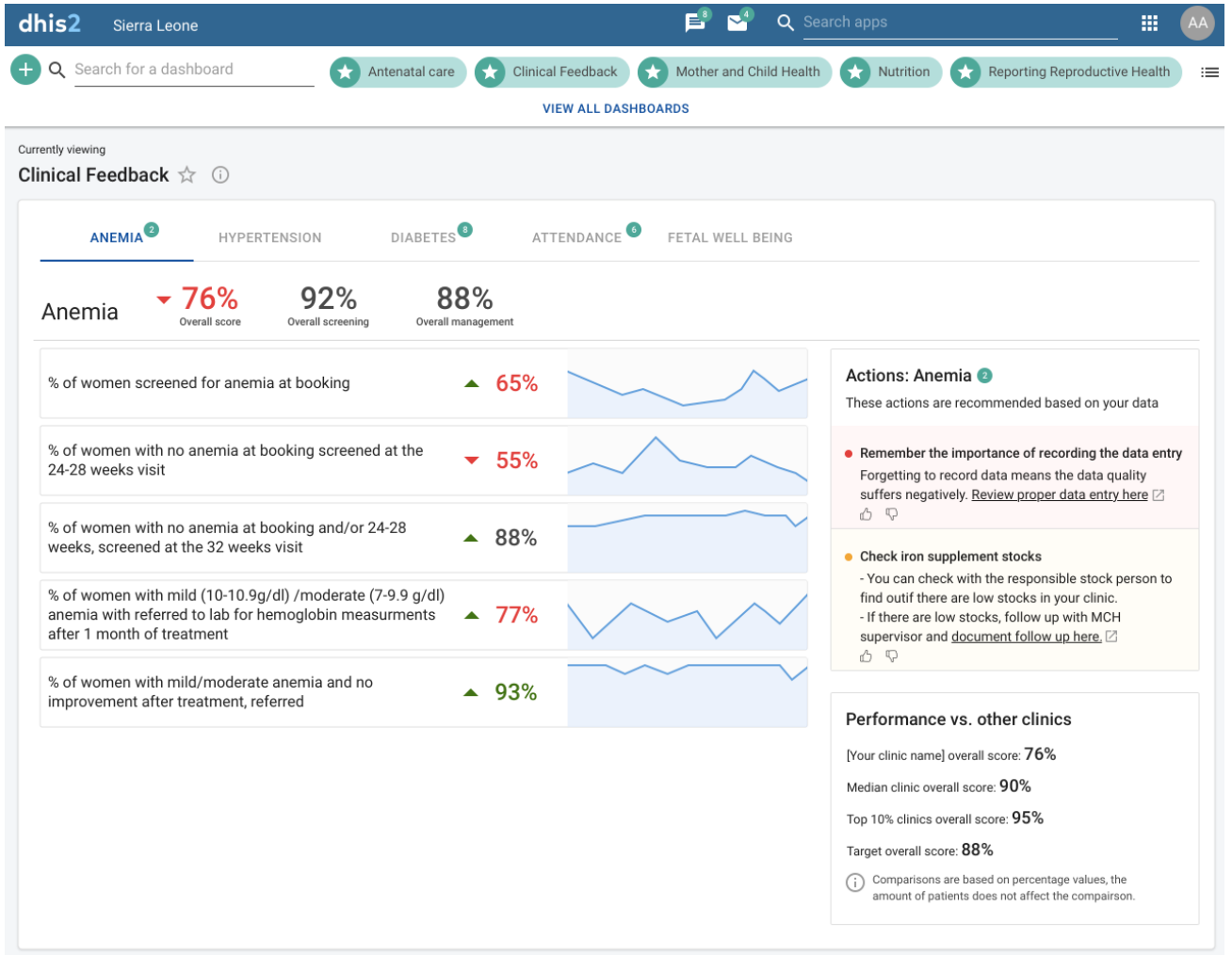
5.5 Mock-up of final system design

Given the findings and recommendations from this study, a final mock-up was created that would guide software development for the feedback dashboard. The score achieved for each indicator would trigger tasks, resulting in an action plan displayed in the dashboards, providing HCP feedback that was not only in the form of numbers and data, but also a written form of specific and concrete tasks to improve their provision of maternal health care. Displaying the information using graphs and trend lines over time will encourage HCPs to complete recommended tasks, and see the change in their performance longitudinally.

Figure 10: Final mock-up of Feedback Dashboard for Palestine

System Functionality

1. Separate tabs for each topic
2. Rotating the tabs to change the content weekly
3. Include a summary dashboard and tab
4. Alerts/Warning/Reminders
  a. Have a pop up or a forced action to look at the dashboards
5. Benchmarks
  a. Have a target goal for each indicator based on Palestine and Gaza retrospective data
  b. Clinical summaries
  c. Clinic, district, and national levels
  d. Floating means (moving averages)
  e. Trend figure (performance over time)
6. Have a color code associated with percentages
  a. Traffic light colored icon.
  i. Green: “good performance”. Under top 10% benchmark
  ii. Yellow: “room for improvement”. Score above or slightly under the median benchmark
  iii. Red: “improvement recommended”
7. Be able to “drill down” into an indicator
8. Patient lists: with patients who have not met the indicator or desired outcome, to then take actions where appropriate
9. Allow for messaging/communicating with other healthcare providers in the clinic or in the district



CHAPTER 6: METHODOLOGICAL CONSIDERATIONS

6.1 Combining FIT/MAF and HCDID

Early in the planning for this study, we determined that FIT and MAF may not be sufficient for answering the question of how a A&F dashboard for Palestine should be designed. These approaches were not developed in the context of resource poor settings, and did not provide specific guidance around digital functionality. To address these potential gaps, we selected for a qualitative approach in Palestine that would allow us to get specific reactions and insight from the HCPs that would place the recommendations from FIT and MAF into context, and provide evidence about the applicability of these models to our setting. We also chose to use HCDID as a complementary approach that would lead to specific software functionality. The combination of these approaches leverages the behavior and psychology-based FIT and MAF, with the software oriented HCDID, through a rich contextual data collection process, with the hope that the resulting software recommendations would match both the literature and the users needs.

We found that this combination of approaches was useful. It allowed us to answer the questions of the study – namely, in a new digital tool for A&F in Palestine, what functionality would likely yield improved performance and would be accepted by users.

6.2 Strengths of the study

By combining a strong theoretical framework (FIT/MFA) with the best practice for user-led design for information systems (HCDID), this study included an uncommon level of rigor to digital health design. All recommendations combine not only user preferences and the most commonly proposed technological interventions, but also an underlying framework that has been extensively studied in various settings. Applying this framework to a lower- and middle income setting is novel, as far as I have been able to determine.

With the integrated support from the Palestinian MOH in this study, I was able to achieve broad access to many different respondents, as well as the opportunity to record all conversations and develop transcripts to ensure that the participants' feedback is accurately presented. I was able to spend significant time with HCPs in Gaza, a location that is severely restricted, and the value of the feedback from these participants is significant.

The approach of separating data collection into two phases – a pilot first in the spring of 2017, and the main data collection later in the summer of 2017 – allowed me to refine the tools used for information gathering, and delve more deeply into the context and specific environment.

The HCPs and MCH supervisors involved in the study were extraordinarily generous with their time, providing the opportunity for rich discussion and observation.

6.3 Limitations of the study

This study attempted to develop a rich description of current audit and feedback practices for MCH HCPs in Palestine, and evaluate HCP preferences with regards to the proposed digital feedback dashboard. Although the study participants were selected from the appropriate population (i.e. MCH HCPs at various levels of the Palestinian health care system), resource availability precluded the option of obtaining a truly representative sample. In order to travel to obtain permission to visit healthcare clinics and talk to HCPs, I worked closely with the MOH to arrange dates, times and locations, rather than follow a random sampling strategy. Given the restrictions on travel within the West Bank and Gaza, it is likely the case that our site visits were deliberately selected from areas that are easier to reach, which may have a skewing effect on some of the findings. For example, sites that are less accessible likely receive less supervision and feedback than the clinics that were included.

Although I conducted training on qualitative data collection methods with the MOH staff that accompanied me, her presence during the conversations and data collection may have reduced the willingness of HCPs to speak freely. They may have expressed more enthusiasm for the proposed dashboards, or less criticism of the existing processes.

Although officially Gaza and the West Bank have a unified approach to MCH care, in practice there are differences. I attempted to control for these differences by having a reasonable number of informants and site visits from both areas of Palestine, and to include in the recommendations findings from both sides.

CHAPTER 7: FUTURE RESEARCH

This study suggested some potential modifications to the FIT/MFA model when applied to LMICs. There was a strong preference for feedback to not be individualized below the clinic level; and customizability of data analysis tools appeared to be of less interest, given the lack of experience with data analysis. Future research could assess whether these are generalizable caveats to the FIT/MFA model in similar settings to Palestine.

With Palestine in particular, many of the recommendations from this study suggest ongoing research and adaptation of the feedback dashboard, learning from HCPs as they become more familiar with the tool. The associated research trial that follows this study will provide interesting findings about the impact of digital audit and feedback in LMIC settings.

The methodological approach used in this study could be more broadly applied to digital health interventions for LMICs, outside of the area of audit and feedback. The literature on health information systems and digital health tools is often not aligned with public and clinical health literature, and vice versa. More cross-disciplinary studies would provide useful findings to both research areas.

CHAPTER 8: CONCLUSIONS

This study found that routine audit and feedback is limited for MCH HCPs in Palestine. Most reporting and supervisory processes are centered around higher level data requirements, and not on performance improvement at the clinical level. The FIT/MFA model proved to be a valuable underlying theory for improved feedback and audit in Palestine, with some exceptions involving individualization and customizability. Specific recommendations for the creation of a digital feedback dashboard were developed, relying on information gathered through an HCDID process. If followed, these recommendations may increase user acceptance and impact of the feedback dashboard.

References

Alvesson, M., & Skoldberg, K. (2018). *Reflexive methodology: New vistas for qualitative research. Third Edition.* London: Sage Publications Ltd.

Bank, W. (2011). *West Bank and Gaza-Coping and conflict: poverty and inclusion*. Retrieved from Washington D.C.: http://documents.worldbank.org/curated/en/561491468327943264/West-Bank-and-Gaza-Coping-and-conflict-poverty-and-inclusion

Bosmans, M., Nasser, D., Khammash, U., Claeys, P., & Temmerman, M. (2008). Palestinian women's sexual and reproductive health rights in a longstanding humanitarian crisis. *Reprod Health Matters, 16*(31), 103-111. doi:10.1016/s0968-8080(08)31343-3

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Brehaut, J. C., Colquhoun, H. L., Eva, K. W., Carroll, K., Sales, A., Michie, S., … Grimshaw, J. M. (2016). Practice Feedback Interventions: 15 Suggestions for Optimizing Effectiveness. *Annals of Internal Medicine*, *164*(6), 435. doi: 10.7326/m15-2248

Brown, B., Balatsoukas, P., Williams, R., Sperrin, M., & Buchan, I. (2016). Interface design recommendations for computerised clinical audit and feedback: Hybrid usability evidence from a research-led system. *International Journal of Medical Informatics, 94*, 191-206. doi:10.1016/j.ijmedinf.2016.07.010

Brown, B., Gude, W.T., Blakeman, T. *et al. (2019).* Clinical Performance Feedback Intervention Theory (CP-FIT): a new theory for designing, implementing, and evaluating feedback in health care based on a systematic review and meta-synthesis of qualitative research. *Implementation Sci* 14, 40 doi:10.1186/s13012-019-0883-5

Cohen D, Crabtree B. "Qualitative Research Guidelines Project." July 2006. http://www.qualres.org/HomeInfo-3631.html

Colquhoun, H. L., Brehaut, J. C., Sales, A., Ivers, N., Grimshaw, J., Michie, S., . . . Eva, K. W. (2013). A systematic review of the use of theory in randomized controlled trials of audit and feedback. Implementation Science, 8(1), 66. doi:10.1186/1748-5908-8-66

DHIS2. (n.d.). About. Retrieved from https://www.dhis2.org/

Dowding, D., Merrill, J., & Russell, D. (2018). Using Feedback Intervention Theory to Guide Clinical Dashboard Design. *AMIA ... Annual Symposium proceedings. AMIA Symposium, 2018*, 395-403. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6371234/

Frøen, J. F., Flenady, V. J., Myhre, S., Frost, M. J., Chou, D., Mehl, G., & Temmerman, M. (2015). Electronic Health Registries for Mothers and their Children. *Lancet Global Health (Invited submission in conjunction with Ending Preventable Stillbirth series)*.

Frost, M. (2017). Palestine system description (hRHR). Unpublished document.

Fusch, P. I., & Ness, L. R. (2015). Are We There Yet? Data Saturation in Qualitative Research. *The Qualitative Report*, *20*(9), 1408-1416. Retrieved from https://nsuworks.nova.edu/tqr/vol20/iss9/3

Giacaman, R., Abdul-Rahim, H. F., & Wick, L. (2003). Health sector reform in the Occupied Palestinian Territories (OPT): targeting the forest or the trees? *Health Policy Plan, 18*(1), 59-67. doi:10.1093/heapol/18.1.59

Gill, PW., Stewart, KF., Treasure, E., & Chadwick, B. (2008). Methods of data collection in qualitative research: Interviews and focus groups. *British Dental Journal*, *204*, 291 - 295. https://doi.org/10.1038/bdj.2008.192

Gittelsohn, J., Steckler, A., Johnson, C. C., Pratt, C., Grieser, M., Pickrel, J., Stone, E. J., Conway, T., Coombs, D., … Staten, L. K. (2006). Formative research in school and community-based health programs and studies: "state of the art" and the TAAG approach. Health education & behavior : the official publication of the Society for Public Health Education, 33(1), 25-39.

Gude, W. T., Roos-Blom, M.-J., van der Veer, S. N., de Jonge, E., Peek, N., Dongelmans, D. A., & de Keizer, N. F. (2017). Electronic audit and feedback intervention with action implementation toolbox to improve pain management in intensive care: protocol for a laboratory experiment and cluster randomised trial. *Implement Sci, 12*(1), 68-68. doi:10.1186/s13012-017-0594-8

Hassan-Bitar, S., & Narrainen, S. (2011). 'Shedding light' on the challenges faced by Palestinian maternal health-care providers. *Midwifery, 27*(2), 154-159. doi:http://dx.doi.org/10.1016/j.midw.2009.05.007

Hysong, S. J., Best, R. G., & Pugh, J. A. (2006). Audit and feedback and clinical practice guideline adherence: Making feedback actionable. Implementation Science, 1, 9-9. doi:10.1186/1748-5908-1-9

Hysong, S. J., Teal, C. R., Khan, M. J., & Haidet, P. (2012). Improving quality of care through improved audit and feedback. Implement Sci, 7, 45. doi:10.1186/1748-5908-7-45

Hysong, S., Kell, H.J., Petersen, L.A., Campbell, B.A., & Trautner, B.W. (2017). Theory-based and evidence-based design of audit and feedback programmes: examples from two clinical intervention studies. British Medical Journal, 26(4). doi: http://dx.doi.org/10.1136/bmjqs-2015-004796

Initiative, e.-R. (n.d.). The eRegistries Model. Retrieved from http://eregistries.org/the-eregistries-model/

Ivers, N., Jamtvedt, G., Flottorp, S., Young, J. M., Odgaard-Jensen, J., French, S. D., . . . Oxman, A. D. (2012). Audit and feedback: effects on professional practice and healthcare outcomes. Cochrane Database Syst Rev(6), Cd000259. doi:10.1002/14651858.CD000259.pub3

Ivers, N. M., Grimshaw, J. M., Jamtvedt, G., Flottorp, S., O'Brien, M. A., French, S. D., . . . Odgaard-Jensen, J. (2014). Growing literature, stagnant science? Systematic review, meta-regression and cumulative analysis of audit and feedback interventions in health care. *J Gen Intern Med, 29*(11), 1534-1541. doi:10.1007/s11606-014-2913-y

Ivers, N. M., Sales, A., Colquhoun, H., Michie, S., Foy, R., Francis, J. J., & Grimshaw, J. M. (2014). No more 'business as usual' with audit and feedback interventions: towards an agenda for a reinvigorated intervention. Implement Sci, 9, 14. doi:10.1186/1748-5908-9-14

Jamshed, S. (2014). Qualitative research method-interviewing and observation. Journal of Basic and Clinical Pharmacy, 5(4), 87. doi: 10.4103/0976-0105.141942

Johnson, C. M., Johnson, T. R., & Zhang, J. (2005). A user-centered framework for redesigning health care interfaces. *Journal of Biomedical Informatics, 38*(1), 75-87. doi:http://doi.org/10.1016/j.jbi.2004.11.005

Kitabayashi, H., Chiang, C., Al-Shoaibi, A. A. A., Hirakawa, Y., Aoyama, A. J. M., & Journal, C. H. (2017). Association Between Maternal and Child Health Handbook and Quality of Antenatal Care Services in Palestine. *21*(12), 2161-2168. doi:10.1007/s10995-017-2332-x

Kluger, A. N., DeNisi A. . (1996). The effects of feedback interventions on performance: A historical review, a meta-analysis, and a preliminary feedback intervention theory. . Psychological Bulletin, 119(2), 254-284.

Larson, E. L., Patel, S. J., Evans, D., & Saiman, L. (2013). Feedback as a strategy to change behaviour: the devil is in the details. *Journal of Evaluation in Clinical Practice, 19*(2), 230-234. doi:10.1111/j.1365-2753.2011.01801.x

Mack, N., Woodsong, C., MacQueen, K., Guest, G., & Namey, E. (2005). Qualitative Research Methods: A Data Collector's Field Guide (p. 1). Research Triangle Park, North Carolina 27709 USA: Family Health International. Retrieved fromhttps://www.fhi360.org/sites/default/files/media/documents/Qualitative%20Research%20Methods%20-%20A%20Data%20Collector's%20Field%20Guide.pdf

Manca, D. P. (2015). Do electronic medical records improve quality of care? Yes. *Canadian family physician Medecin de famille canadien*, *61*(10), 846–851.

Manenti, A., de Ville de Goyet, C., Reinicke, C., Macdonald, J., & Donald, J. (2016). *Report of a field assessment of health conditions in the occupied Palestinian territory*. Retrieved from http://apps.who.int/gb/statements/report_palestinian_territory/report_palestinian_territory-en.pdf

Mays, N., & Pope, C. (1995). Qualitative Research: Observational methods in health care settings. *Bmj*, *311*(6998), 182–184. doi: 10.1136/bmj.311.6998.182

Mcdaniel, R. R., Lanham, H. J., & Anderson, R. A. (2009). Implications of complex adaptive systems theory for the design of research on health care organizations. *Health Care Management Review*, *34*(2), 191–199. doi: 10.1097/hmr.0b013e31819c8b3

Michie. S., Abraham, C. (2004) Interventions to change health behaviours: evidence-based or evidence-inspired?, Psychology & Health, 19:1, 29-49. doi: 10.1080/0887044031000141199

Ministry of Health, P. (2017). *Health Annual Report Palestine 2016*. Retrieved from Palestine: https://www.site.moh.ps/Content/Books/ZxRcynmiUofNqt66u4CrHRgmJR6Uv7z77srjjIEAho6xnz5V3rgLTu_RhO7xf2j2VusNiIvWkjwp84yXHLdGleB97gKrHHI5iZ9oPJ25owGEN.pdf

Ndabarora, E., Chipps, J. A., & Uys, L. (2014). Systematic review of health data quality management and best practices at community and district levels in LMIC. *Information Development, 30*(2), 103-120. doi:10.1177/0266666913477430

Norwegian Institute of Public Health (NIPH). (2017). Research. Retrieved from https://www.fhi.no/en/qk/international/eregistries/about-eregistries2/research/

Palestinian Central Bureau of Statistics. (2017). The Status of the rights of Palestinian children, 2016. Ramallah-Palestine. Retrieved from http://www.pcbs.gov.ps/Downloads/book2105.pdf

Palestinian Central Bureau of Statistics. (2018). Retrieved from http://www.pcbs.gov.ps/site/lang__en/881/default.aspx#

Patel, S. J., Saiman, L., Duchon, J. M., Evans, D., Ferng, Y.-H., & Larson, E. (2012). Development of an Antimicrobial Stewardship Intervention Using a Model of Actionable Feedback. *Interdisciplinary Perspectives on Infectious Diseases*, *2012*, 1–6. doi: 10.1155/2012/150367

Patton, M. (1999). Enhancing the Quality and Credibility of Qualitative Analysis (p. 1197). Health Services Research. Retrieved fromhttps://www.ncbi.nlm.nih.gov/pmc/articles/PMC1089059/pdf/hsresearch00022-0112.pdf

Rahim, H. F. A., Wick, L., Halileh, S., Hassan-Bitar, S., Chekir, H., Watt, G., & Khawaja, M. (2009). Maternal and child health in the occupied Palestinian territory. *The Lancet, 373*(9667), 967-977. doi:https://doi.org/10.1016/S0140-6736(09)60108-2

Right to health Palestinian voices (2018). Cairo: WHO Regional Office for the Eastern Mediterranean; License: CC BY-NC-SA 3.0 IGO. Retrieved from http://www.emro.who.int/images/stories/palestine/documents/WHO_Story_Book_final_for_web.pdf?ua=1

Rinkus, S., Walji, M., Johnson-Throop, K. A., Malin, J. T., Turley, J. P., Smith, J. W., & Zhang, J. (2005). Human-centered design of a distributed knowledge management system. Journal of Biomedical Informatics, 38(1), 4-17. doi:https://doi.org/10.1016/j.jbi.2004.11.014

Roller, M.R. (2012). Interviewer bias & reflexivity in qualitative research (Blog Post). Retrieved from https://researchdesignreview.com/2012/11/14/interviewer-bias-reflexivity-in-qualitative-research/

Rytter, M. J. H., Kjældgaard, A.-L., Brønnum-Hansen, H., & Helweg-Larsen, K. (2006). Effects of armed conflict on access to emergency health care in Palestinian West Bank: systematic collection of data in emergency departments. doi:10.1136/bmj.38793.695081.AE %J BMJ

Salam, R. A., Lassi, Z. S., Das, J. K., & Bhutta, Z. A. (2014). Evidence from district level inputs to improve quality of care for maternal and newborn health: interventions and findings. *Reproductive Health, 11*(2), S3. doi:10.1186/1742-4755-11-s2-s3

Scott NA, Vian T, Kaiser JL, Ngoma T, Mataka K, Henry EG, et al. (2018) Listening to the community: Using formative research to strengthen maternity waiting homes in Zambia. PLoS ONE 13(3): e0194535. https://doi.org/10.1371/journal.pone.0194535

Sharma, J., Leslie, H.H., Kundu, F.,& Kruk, M.E. (2017) Poor Quality for Poor Women? Inequities in the Quality of Antenatal and Delivery Care in Kenya. *PLoS ONE 12(1): e0171236*. https://doi.org/10.1371/journal.pone.0171236

Standforth, R. (2007). *Poverty in Palestine: The human cost of the financial boycott*. Retrieved from Oxford, United Kingdom: http://www.oxfam.de/download/Palestinian_Aid_Crisis.pdf

Taylor, S.J., Bogdan, R., DeVault, M. (2015). Introduction to qualitative research methods: A guidebook and resource. Hoboken, New Jersey: John Wiley & Sons.

United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA), (2007). *UNRWA emergency appeal 2008. Gaza Strip: United Nations Relief and Works Agency*

Venkateswaran, M., Morkrid, K., Ghanem, B., Abbas, E., Abuward, I., Baniode, M., . . . Froen, J. F. (2018). eRegQual-an electronic health registry with interactive checklists and clinical decision support for improving quality of antenatal care: study protocol for a cluster randomized trial. *Trials, 19*(1), 54. doi:10.1186/s13063-017-2386-5

Wick, L. (2002). *Birth at the checkpoint, the home or the hospital? Adapting to the changing reality in Palestine*. Retrieved from https://reliefweb.int/report/israel/birth-checkpoint-home-or-hospital-adapting-changing-reality-palestine

WHO guideline: recommendations on digital interventions for health system strengthening. (2019). Geneva: World Health Organization; 2019. License: CC BY-NC-SA 3.0 IGO. Retrieved from https://www.who.int/reproductivehealth/publications/digital-interventions-health-system-strengthening/en/

Yilmaz, K. (2013). Comparison of Quantitative and Qualitative Research Traditions: epistemological, theoretical, and methodological differences. *European Journal of Education*, *48*(2), 311–325. doi: 10.1111/ejed.12014

Zhang, J. (2005). Human-centered computing in health information systems Part 1: Analysis and design. Journal of Biomedical Informatics, 38(1), 1-3. doi:http://doi.org/10.1016/j.jbi.2004.12.002

Annex 1: Supervisor Interview form

Focus Group Discussion Guidelines:

Supervisors from trial one: Current Supervision Practices for nurses and midwives in the antenatal (ANC) clinics.

Introduction: The interviewer should introduce himself or herself; reiterate the objectives of the study and ask if anyone has any questions. The interviewer will remind the participants; that names will not be recorded, and they are free to leave at any point during the discussion with no consequences.

Objective: The objective for this focus group is to get a better understanding of the current supervision practices for nurses and midwives in the antenatal (ANC) clinics. This discussion will contribute to guide system and process design for the eRegistry, with the intention to design the supervision aspect of the eRegistry with input from the people that use and work with the program.

Before we start, I would like to remind you that there are not right or wrong answers in the discussion. I do not know about the current supervision practices of the antenatal (ANC) clinics, so I am here to learn. I am interested in knowing what each one of you think. So please feel free to share your point of view.

I will tape record the discussions so that I do not miss anything you say. The recordings will be deleted once they have been transcribed.

However, I would very much appreciate it if only one person talks at a time for everyone of us to hear the views of everyone in the discussion. There is a lot to discuss, so bear with me if I sometimes move the discussion on to focus on our issues.

I.Role of supervisor

First, I am interested in understanding how supervision for the ANC clinics is performed.

1. Can you explain how supervision is set up in the districts? (Probe: How many HCP are you responsible for? How many clinics are you responsible for?, What is the travel distance? Who do you report to?)
2. How often do you visit the clinics? (Probe: monthly, quarterly, annually)
3. How do you prioritize your visits to the clinics?
4. How do you know when you will next visit a clinic? How do you know if you missed a supervision visit?
5. How long does a clinic supervision and audit take? (Probe: 1 hour, half of a work day, full work day)

When you are at the clinic for an audit…

6. What kinds of information do you (the supervisor) collect and audit during clinic visits?
7. What kind of interactions with the HCP do you have when you are at the clinics? (Probe: Do you ask them questions? Do they ask you questions?)

II.Reporting

After you have completed a audit what does reporting entail...

1. Once you have done a clinic visit and gathered the information needed, what do you do with that information? (Probe: How do you input it into the "system"? Who looks at this information? Do you bring it up with the care provider?)
2. Please tell me about your current reporting system. (Probe: how, timing, like-dislike, and other opinion).
3. How often do you deliver you report? (Probe: weekly/monthly/quarterly)
4. To whom you do you submit the report? (Probe: Higher supervisor, MOH)
5. What are your main challenges to make your report every month? Have you faced any challenges to make your report every month?
6. What are the positive aspects about the current reporting system?

III. Feedback

The researchers and software designers are interested in adding a "performance feedback" component to the eRegistry. When I speak of "performance feedback", I am talking about a summary of clinical performance of healthcare over a specified time period. I would like to ask you some questions about how the current system is set up to provide performance feedback.

1. What kind of performance feedback do you give to the nurses and midwives after the audit has been done, if any? (Probe: comparison to other clinics, suggestions for needed improvement, or praise)
2. How do you give performance feedback? (Probe: in person, through email or letter, in a mass email or letter)
3. What are your perceptions about your role as a supervisor in providing performance feedback to nurses and midwives?
4. How long after the audit is it before you give feedback? (Probe: week, month, at the next audit)
5. Is the feedback you give individualized? Please tell me about it. (Probe: standardized feedback for the whole district, individual feedback for the clinic, individual feedback for specific HCP, attention to past performance level)
6. Are there any actions of punishment for poor audit results? (Probe: consequences, discipline, reprimands, rebukes, reproach, chastening, criticism, and is this formal or unformal)
7. Are there any actions of praise for sufficient or superior audit results (Probe: incentives, recognition, and is this formal or unformal)
8. What is the follow up plan when performance feedback is given to nurses and midwives, if there is one? (Probe: are there clear targets (specific goals) and is there an action plan)
9. What resources and strategies are used by MCH supervisors to make decisions about performance feedback?
10. What factors as a MCH supervisor perceive as barriers for providing performance feedback?
11. What are some of the criteria used to report about performance feedback/supervision visits?
12. What are some of the strategies implemented in the clinic to improve performance feedback?

Electronic Supervision

Thank you for participation, this will be the last sections of questions that I have to ask. The current MCH Supervision sheet is going to be converted in to an electronic format in the eRegistry.

1. How do you think changing from paper charting to electronic charting will effect supervision?
2. What do you think will be the challenges of changing the supervision sheet to an electronic format? (Probe: challenges in training, capabilities, permitted time, how can this fit in the system)
3. How can this electronic format can provide benefit to you (the supervisor) and the nurses and midwives you supervise?
4. How should the electronic format be implemented to benefit supervisors, nurses, and midwives?
5. What would you like to keep from the current MCH supervision sheet? (Probe: What is most useful, what gives you a clear picture of how the clinic is doing)
6. What would you recommend removing from the current MCH supervision sheet? (Probe: What questions are not useful information)

Thank you for your participation, and invaluable information. Are there any questions you want to raise? Are there any suggestions you want to put forward? Thank you for your time and participation. We value all your comments and opinions. Together we will develop effective ways of transitioning to electronic charting and supervision.

Annex 2: Clinical Provider Interview Form

Semi-Structured open ended questions interview guidelines:

Maternal and Child Health Providers (Midwives and Nurses): experience with supervision

Introduction: The interviewer should introduce himself or herself; reiterate the objectives of the study and ask if anyone has any questions. The interviewer will remind the participants; that names will not be recorded, and they are free to leave at any point during the discussion with no consequences.

Objective: The objective for this focus group is to get a better understanding of the current supervision practices for nurses and midwives in the antenatal (ANC) clinics. This discussion will contribute to guide system and process design for the eRegistry, with the intention to design the supervision aspect of the eRegistry with input from the people that use and work with the program.

Spoken introduction: Before we start, I would like to remind you that there are not right or wrong answers in the discussion. I do not know about the current supervision practices of the antenatal (ANC) clinics, so I am here to learn. I am interested in knowing what you think. So please feel free to share your point of view.

My colleague (name...) will be translating from English to Arabic. I will be tape recording this discussion so that I do not miss anything you say. The recordings will be deleted once they have been transcribed. There is a lot to discuss, so bear with me if I sometimes move the discussion on to focus on our issues.

I. Supervision

First, I am interested in understanding how supervision for the ANC clinics is performed.

1. How does your supervisors supervise you? (Probe: Clinic visits, audit visits, teaching, etc)
2. Please tell me about it. (Probe: frequency, how much time is needed, how they monitor progress, what do they focus on)

II. Clinic audit

1. Can you explain to me what a typical clinic audit consists of? (Probe: frequency, how much time is needed, how they monitor progress, what do they focus on)
2. What kinds of information does the supervisor collect and audit during the visits?
3. What kind of interactions with the supervisor do you have when they come for a clinic audit (Probe: Do you ask them questions? Do they ask you questions? , Are there any co interventions)
4. Are there any co interventions when your supervisor audits the clinic (answering any questions, supporting concerns and needs, talking with patients, monitoring stock, following up)
5. What are your main challenges with a clinic audit, if any?
6. What are the positive aspects of a clinic audit, if any?

III. Feedback

The researchers and software designers are interested in adding a performance feedback component to the eRegistry. When I speak of "performance feedback", I am talking about a summary of clinical performance of healthcare over a specified time period. I would like to ask you some questions about how the current system is set up to provide performance feedback.

1. What kind of performance feedback do you get from your supervisor after the audit has been done, if any? (Probe: comparison to other clinics, suggestions for needed improvement, or praise)
2. How do you get performance feedback? (Probe: in person, through email or letter, in a mass email or letter)
3. How long after the audit is it before you get feedback? (Probe: week, month, at the next audit)
4. Is the feedback you get individualized? Please tell me about it. (Probe: standardized feedback for the whole district, individual feedback for the clinic, individual feedback for specific HCP, attention to past performance level)
5. Are there any actions of punishment for poor audit results? (Probe: consequences, discipline, reprimands, rebukes, reproach, chastening, criticism, and is this formal or unformal)
6. Are there any actions of praise for sufficient or superior audit results (Probe: incentives, recognition, and is this formal or unformal)
7. What is the follow up plan when performance feedback is given to you (the nurse/midwife, if there is one?(Probe: are there clear targets (specific goals) and is there an action plan)

IV. Electronic Supervision

Thank you for participation, this will be the last sections of questions that I have to ask. Parts of the current MCH Supervision sheet are going to be converted in to an electronic format in the eRegistry.

8. How do you think changing from paper charting to electronic charting will effect supervision?
9. What do you think will be the challenges of changing the supervision sheet to an electronic format? (Probe: challenges in training, capabilities, permitted time, how can this fit in the system)
10. How can this electronic format can provide benefit to you (nurse/midwife)??
11. How should the electronic format be implemented to benefit nurses, and midwives?
12. What would you like to keep from the current MCH supervision sheet? (Probe: What are the most useful questions you report)
13. What would you recommend removing from the current MCH supervision sheet? (Probe: What are questions are not useful information)

Background information

12. What is your background as a healthcare provider? How long have you worked in this clinic?

Thank you for your participation, and invaluable information. Any questions you want to raise? Any suggestions you want to put forward? Thank you for your time and participation. We value all your comments and opinions. Together we will develop effective ways of transitioning to electronic charting and supervision.

Annex 3. MCH Supervision Sheet

State of Palestine

Ministry of Health

General Administration of Primary Health Care and Public Health

Community Health Department

MCH Supervision Sheet

District health directorate: ---------- Name of center (clinic):----------

Number of the population in the region where the center (clinic) is located: ----------

No.	Data points		Comments				
1.	Date of visit						
2.	Number of nursing staff (MCH)/ midwifery						
3.	Number of working days / month		Staff	No of staff	No of working days	No of non-working days	reason
		Children	MCH Doctor				
		Antenatal Care	Nurse				
		Family Planning	Midwife				
		Postnatal Care	GP				

		High risk pregnancy			
		Ultrasound			
4.	Medical equipments (tools) and devices available and good for use	Medical tools		Medical devices	Devices are sent for the maintenance department since (date)
		Yes	No	Yes	No

	Newborn Care	Notes
1.	Child care and vaccination record is correctly/properly filled out	Yes/No
2.	Daily work statistics record for child care is correctly/properly filled out	Yes/No
3.	Number of children being vaccinated in the center (clinic) from the beginning of the year up to the date of the visit	
4.	Number of children being registered at the center (clinic) from the beginning of the year up to the date of the visit	
5.	Number of children registered compared to number of children vaccinated at the center (clinic) (coverage ratio)	
6.	Number of children being registered during the past year	

	Newborn/child file (Random check of 10 Files)			
1.	Child Development/ correctly and properly filled out	Yes	No	Notes
2.	Growth chart / correctly and properly filled out			
3.	Method of measuring the child's length is correct			

4. Method of measuring the child's weight is correct
5. Method of measuring the child's head circumference
6. Hemoglobin test is recorded in the child file
7. Child's nutrition is recorded in the child file
8. Child's visits to the nurse/follow up
9. Child's visits to the doctor / follow up
10. Notes of physician's examination is recorded in the child's file
11. Child's supplements is dispensed according to the protocol
12. Supply of Iron and Vitamin (A+D)
13. Reports are compatible with files /records
14. MCH Handbook was distributed according to protocol

Antenatal care

1.	Antenatal record is correctly/properly filled out	Yes/No
2.	Daily work statistics record for antenatal care is correctly/properly filled out	Yes/No
3.	Number of registered pregnant women from the beginning of the year	
4.	Number of pregnant women following up during the past month	
5.	Coverage ratio compared to number of children registered at the center (clinic)	
6.	Number of registered pregnant women during the past year	
7.	Number of high risk pregnant women registered at the center (clinic)	
8.	Number of registered deliveries during the past month	
9.	MCH Handbook was distributed according to protocol	

10. Number of MCH handbooks having hospital notes during the previous month

11. Reports are compatible with files /records

Pregnancy File (Random Check of 5 Files)

		Examination	Done	Not Done	Danger sign was documented	Referral was done	Notes
2.		Women examination by nurse / health worker					
3.		Blood pressure examination					
4.		Urine examination					
5.		Weight					
6.		Evaluation of danger signs					
7.	7	Laboratory examination					
8.		Fundal height measurement					
9.		Fetal heart rate monitoring					
10.		Pregnant women examination by physician /health worker					
11.		Ultrasound examination for pregnant women is registered					
12.		Dispensing folic acid for pregnant women					
13.		Dispensing iron + folic acid for pregnant women					

Postpartum care

	Number of postpartum care cases from the beginning of the year up to the date of this visit
1.	Coverage ratio for postpartum care women compared to children registered at the center (clinic)
2.	Postpartum examination and measurements are filled out in the record/file
3.	Routine Postpartum Hemoglobin

4.	Dispensing of supplements for women in postpartum period		
5.	Family planning counselling		
6.	Number of women of low risk after delivery		
7.	Number of referrals after delivery		
	Other services		
1.	Number of women who had breast examination from the beginning of the year up to the date of the visit		
2.	Number of women who had breast examination during the past year		
3.	Number of women referred for mammography screening		
4.	Number of Pap smear tests from the beginning of the year up to the date of the visit		
	Educational brochures are available and displayed	Yes/No	Note and document the use of different means (ways)
5.	Antenatal care Family Planning Nutrition Sexually Transmitted Diseases Danger signs during pregnancy and after delivery		
6.	Use of appointment agenda for the following : 1- ANC 2- PPC 3- Vaccination	Yes /No	
7.	Reading the refrigerator temperature	Yes /No	

Needs:

1- Equipments/tools
2- Devices
3- Educational Brochures'
4- Training
5- Medications
6- Other needs

Notes of Supervisor : ----------

Name of supervisor: ---------- Signature: ----------

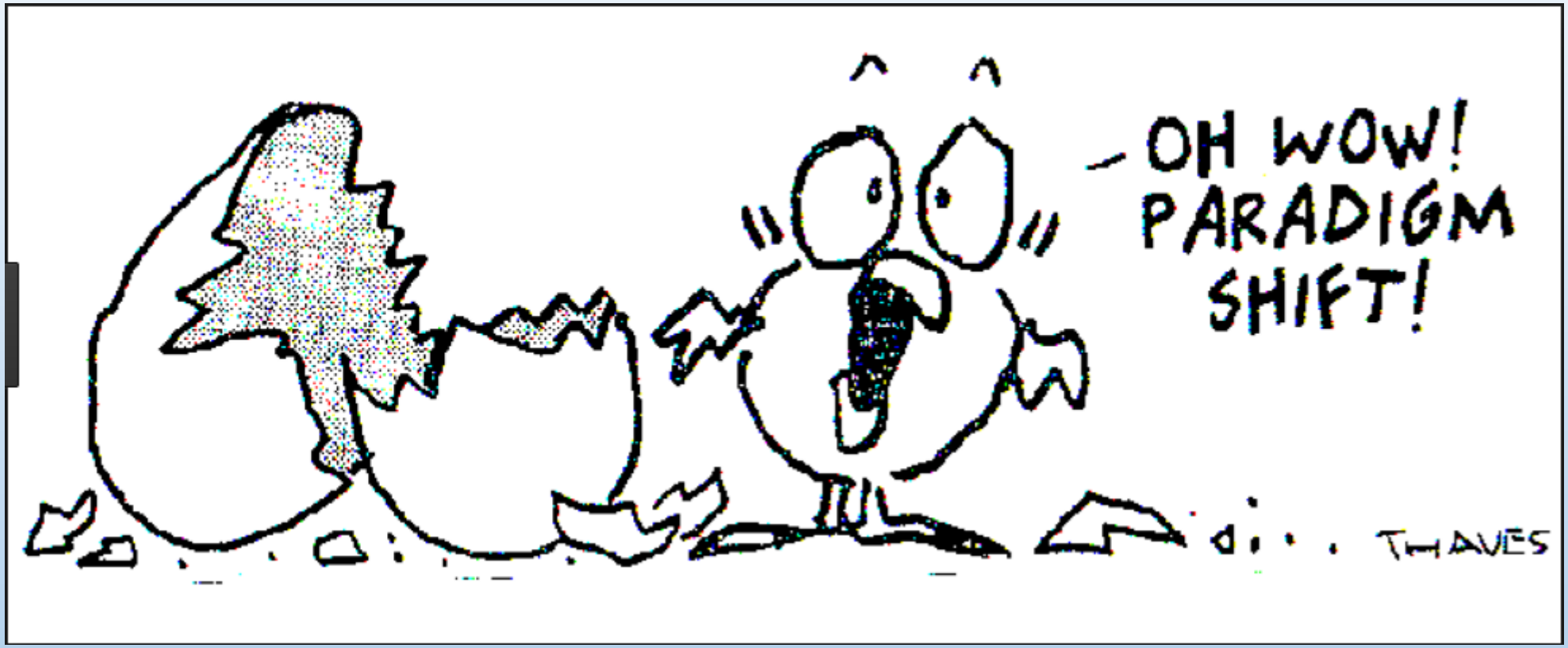
Annex 4. Feedback Dashboard slides used in Palestine

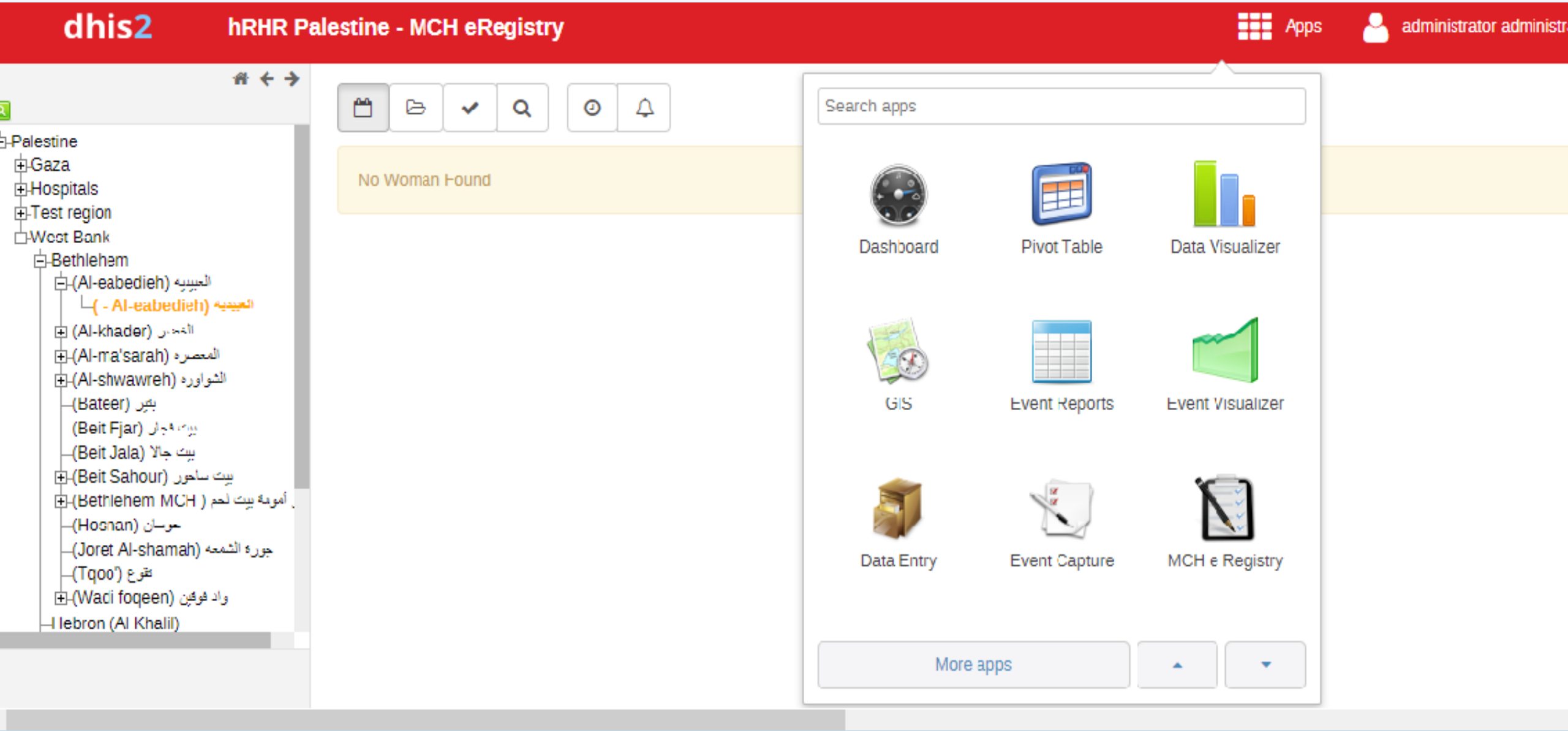
Feedback Dashboards

Indicators and Design

Booking visit, Anemia, Hypertension, Diabetes, Attendance,

Fetal well being: growth, presentation, movement


OH WOW!
PARADIGM
SHIFT!
THAVES


dhis2
hRHR Palestine - MCH eRegistry
Apps
administrator administr
Palestine
Gaza
Hospitals
Test region
West Bank
Bethleham
(Al-eabedieh) العبيديه
(- Al-eabedieh) العبيديه
(Al-khader) الخضر
(Al-ma'sarah) المعصره
(Al-shwawreh) الشواوره
(Bateer) بتير
(Beit Fjar) بيت فجار
(Beit Jala) بيت جالا
(Beit Sahour) بيت ساحور
(Bethlehem MCH) أمومة بيت لحم
(Hosnan) حوسان
(Joret Al-shamah) جوره الشمعه
(Tqoo') تقوع
(Wadi foqeen) واد فوقين
Hebron (Al Khalil)
No Woman Found
Search apps
Dashboard
Pivot Table
Data Visualizer
GIS
Event Reports
Event Visualizer
Data Entry
Event Capture
MCH e Registry
More apps

Update profile • Write feedback • Report A: ANC Report

Messages Interpretations Search for users, charts, maps, reports and resources Search

Add Manage Share < >

Data Monitoring | Report A: ANC Report | Report C: for high risk pregnancy (ANC and PNC) | Report D: Ultrasound Report

Remove | Resize | Explore | Share interpretation

Delivery Outcomes (all except infant deaths)

Palestine	
Data / Period	June 2017
Alive FINAL	
Abortions FINAL	
Stillbirths FINAL	
Early neonatal deaths FINAL	
Late neonatal deaths FINAL	
Total	

Remove | Resize | Explore | Share interpretation

Tetanus Boosters

Palestine	
Data / Period	June 2017
Tetanus boosters administered FINAL	

Remove | Resize | Explore | Share interpretation 1

Number of Registered ANC in the clinic (Booking)

Palestine	
Data / Period	June 2017
Total booking visits in the clinic FINAL	2

Remove | Resize | Explore | Share interpretation

Distribution of new pregnant women according to the age

Palestine	
Data / Period	June 2017
Booking visits below age 16 FINAL	
Booking visits between 16 and 40 FINAL	2
Booking visits above age 40 FINAL	

Remove | Resize | Explore | Share interpretation

Pregnant Examination (Doctor)

Palestine	
Data / Period	June 2017
Booking visit seen by doctor FINAL	
Follow up seen by doctor FINAL	1
Total	1

Remove | Resize | Explore | Share interpretation

Pregnant Examination (Nurse)

Palestine	
Data / Period	June 2017
Booking visit seen by nurse FINAL	1
Follow up seen by nurse FINAL	
Total	1

Write feedback • 15 unread messages • Feedback

Messages | Interpretations | Search for users, charts, maps, reports and resources | Search

Add | Manage | Share | < | >

Report A: ANC Report | Report C: for high risk pregnancy (ANC and PNC) | Report D: Ultrasound Report

Feedback

Remove

Messages Page: 1/6

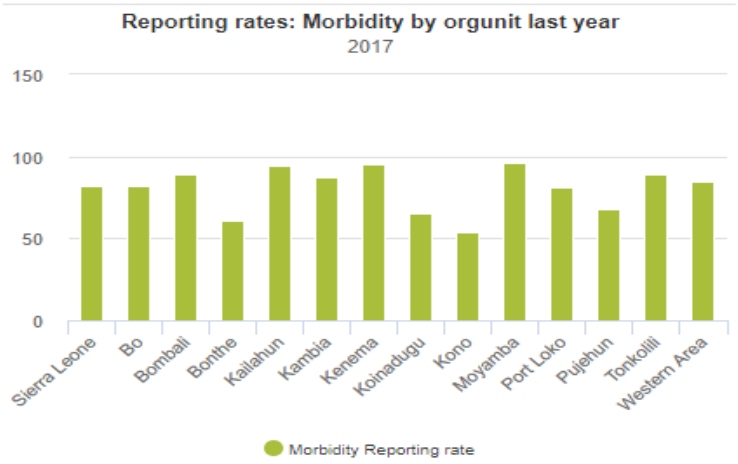
Possible Malaria outbreak detected	2017-05-29T16:50:27.716
Possible Malaria outbreak detected	2017-05-29T16:50:27.696
Possible Malaria outbreak detected	2017-05-29T16:50:27.674
Possible Malaria outbreak detected	2017-05-29T16:50:27.652
Possible Malaria outbreak detected	2017-05-29T16:50:27.629

Explore | Resize | Share interpretation | Remove

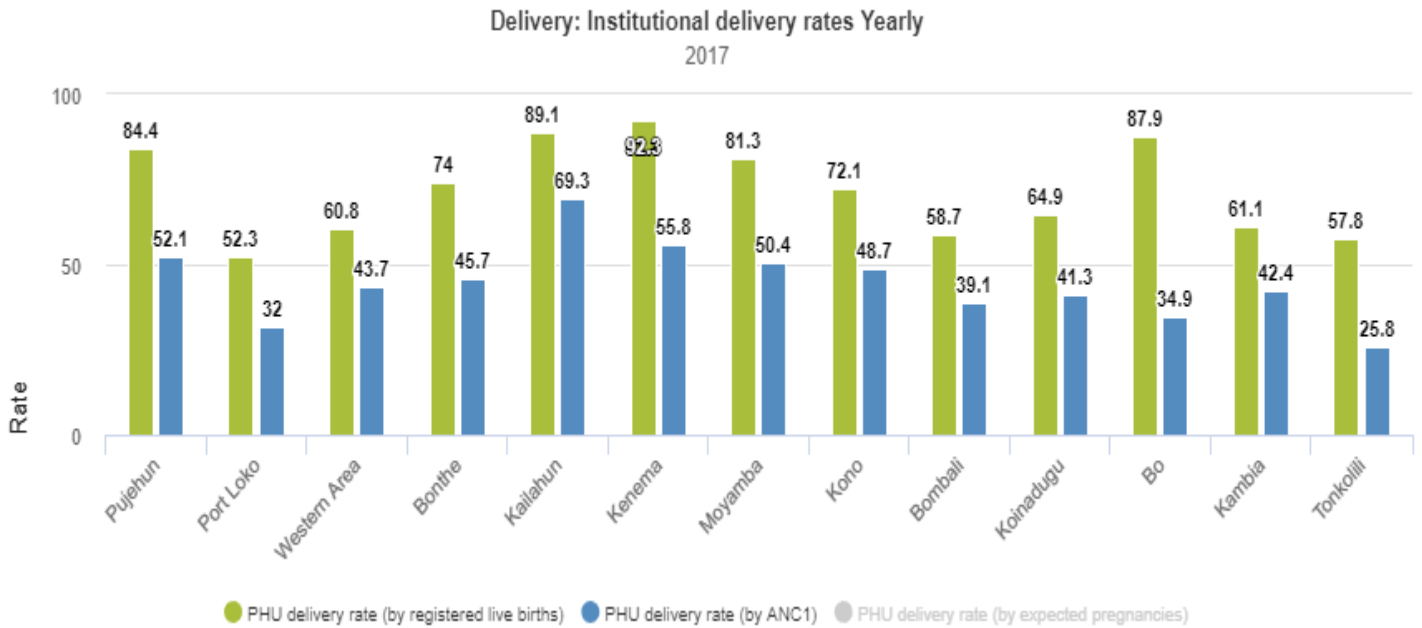
Delivery: Live births in facilities last 4 quarters

Data	Live births					
Organisation unit / Period	Apr to Jun 2016	Jul to Sep 2016	Oct to Dec 2016	Jan to Mar 2017		Total
Baoma Station CHP	22	30	31	16	99	99
Blamawo MCHP	43	35	35	43	156	156
Faabu CHP	7	8	11	28	54	54
Gerehun CHC	132	143	113	124	512	512
Golu MCHP	23	18	11	28	80	80
Jembe CHC	141	121	84	122	468	468
Jormu MCHP	34	19	14	31	98	98
Kigbai MCHP	6	11	5	12	34	34
Kpumbu MCHP	22	25	15	8	70	70
Mbundorbu MCHP	21	23	23	18	85	85

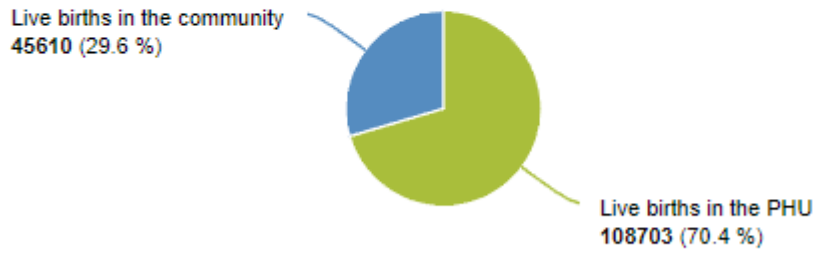
Explore | Resize | Share interpretation | Remove



Explore | Resize | Share interpretation | Remove 1



Explore | Resize | Share interpretation | Remove



Explore | Resize | Share interpretation | Remove

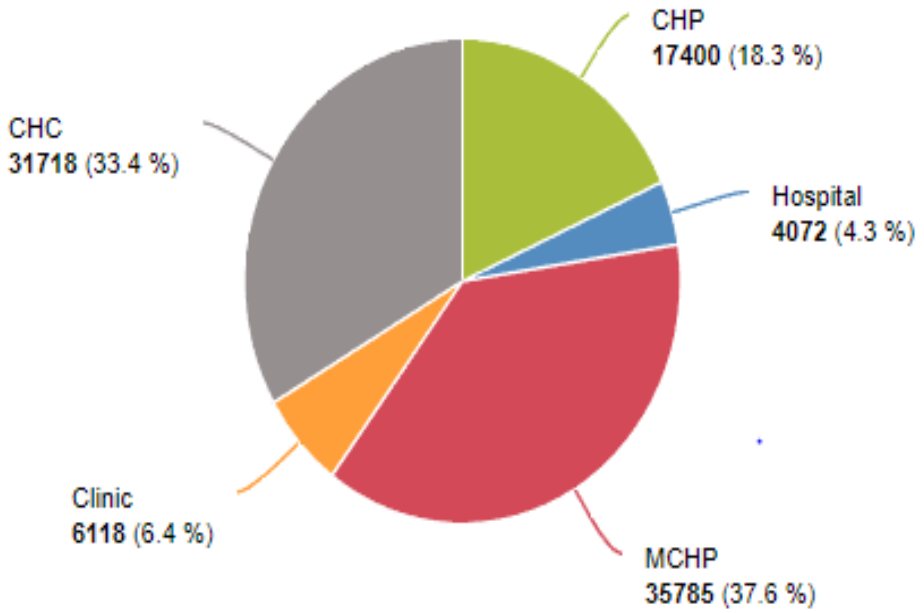
Delivery: Live births in facilities last 4 quarters

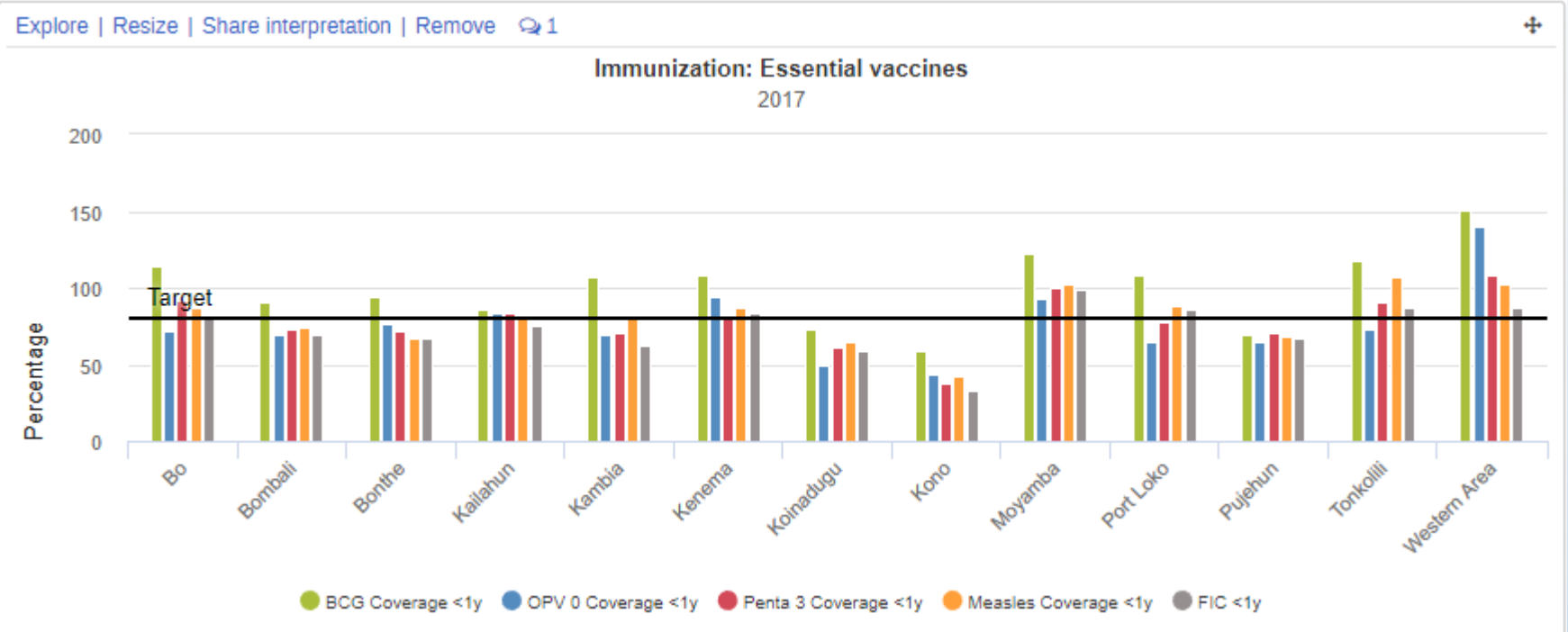
Data	Live births					
Organisation unit / Period	Apr to Jun 2016	Jul to Sep 2016	Oct to Dec 2016	Jan to Mar 2017		Total
Baoma Station CHP	22	30	31	16	99	99
Blamawo MCHP	43	35	35	43	156	156
Faabu CHP	7	8	11	28	54	54
Gerehun CHC	132	143	113	124	512	512
Golu MCHP	23	18	11	28	80	80
Jembe CHC	141	121	84	122	468	468
Jormu MCHP	34	19	14	31	98	98
Kigbai MCHP	6	11	5	12	34	34
Kpumbu MCHP	22	25	15	8	70	70
Mbundorbu MCHP	21	23	23	18	85	85

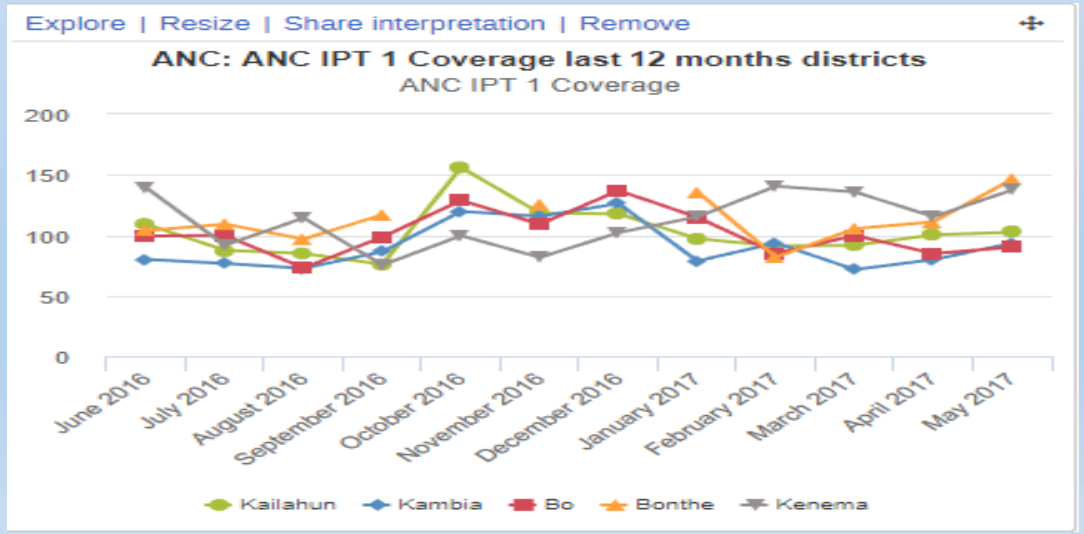
Explore | Resize | Share interpretation | Remove

ANC: 4+ visits by Facility Type last year

ANC 4th or more visits - 2017 - Sierra Leone




Explore | Resize | Share interpretation | Remove 1
Immunization: Essential vaccines
2017
Percentage
200
150
100
50
0
Target
Bo
Bombali
Bonthe
Kailahun
Kambia
Kenema
Koinadugu
Kono
Moyamba
Port Loko
Pujehun
Tonkolili
Western Area
BCG Coverage <1y
OPV 0 Coverage <1y
Penta 3 Coverage <1y
Measles Coverage <1y
FIC <1y


Explore | Resize | Share interpretation | Remove
ANC: ANC IPT 1 Coverage last 12 months districts
ANC IPT 1 Coverage
200
150
100
50
0
June 2016
July 2016
August 2016
September 2016
October 2016
November 2016
December 2016
January 2017
February 2017
March 2017
April 2017
May 2017
Kailahun
Kambia
Bo
Bonthe
Kenema

Explore | Resize | Share interpretation | Remove

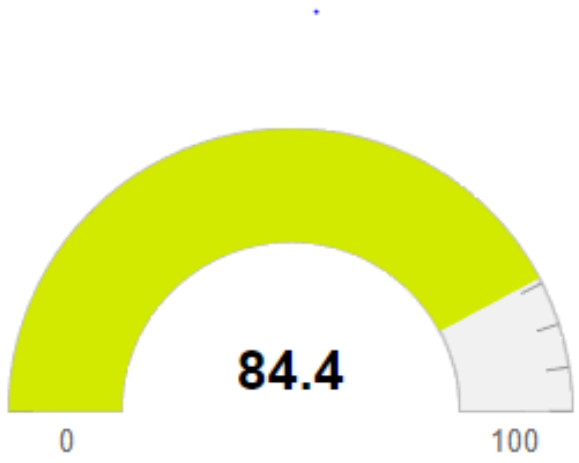
Immunization: Indicators last 12 months with legend set

		BCG Coverage <1y	Dropout rate Penta 1 - 3	Dropout rate Penta 1 - Measles	FIC <1y	Measles Coverage <1y	C
June 2016	Bo	125.2	19.8	27.8	74.3	77.6	
	Bombali	104.4	26.8	25.5	76.1	80.3	
	Bonthe	142.8	32.9	41.6	72.6	81	
	Kailahun	104	15.3	26.1	78.5	81	
	Kambia	121.3	32.9	26.8	64.6	84.2	
	Kenema	125.3	20.5	9.1	90.4	95.5	
	Koinadugu	76	26.2	13.9	49.7	63.8	
	Kono	102.8	31.4	34.5	28.3	57	
	Moyamba	129.5	30.4	27.3	86.9	88.9	

Explore | Resize | Share interpretation | Remove

Immunization: OPV 3 coverage last month

OPV 3 Coverage <1y - Sierra Leone



Dashboard actionable indicators

NICE foundation website | NICE Online | Data dictionary | Data uploads | Help | username(logout)

Pain | Blood | Antibiotics | Ventilation

Action plan overview →

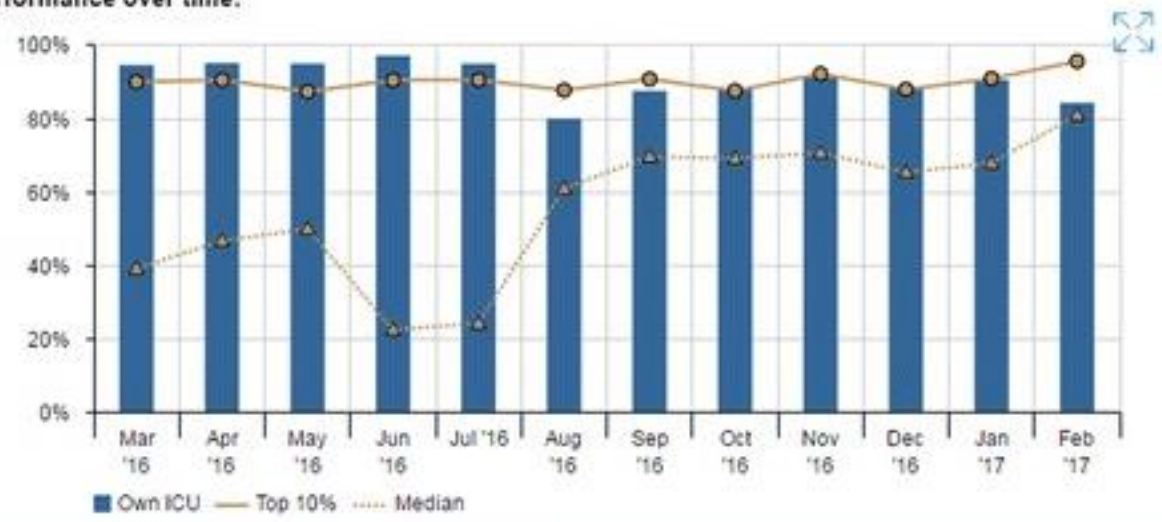
Quality indicator	Own ICU	Median	Top 10%	Target	Actions
Performing pain measurements each shift	**89,0%**	67,0%	90,1%	100,0%	0
Acceptable pain scores	**76,2%**	85,0%	90,9%	80,0%	0
Repeating pain measurements with unacceptable score within 1 hour	**44,9%**	13,0%	55,2%	100,0%	2
Unacceptable pain scores normalised within 1 hour	**36,6%**	9,2%	29,0%	60,0%	0

Details | Patients | Info | Action plan

Average performance in most recent 3 months:

Own ICU	Median	Top 10%	Previous period
89,0% (good performance)	67,0%	90,1%	-0,1%

Performance over time:



Operationalisation:
Patient shifts during which pain was measured at least once.

Period:
1 December 2016 t/m 28 February 2017

Population in this period:

Own ICU:	180 admissions
All ICUs:	3840 admissions in 12 ICUs

Colour thresholds based on all ICUs:

- 81,1% - 100,0% Good performance
- 60,3% - 81,1% Room for improvement
- 0,0% - 60,3% Improvement recommended

Actions:
0 actions in progress
0 actions implemented

Ben Brown

BLOOD PRESSURE

ASTHMA

COPD (COMING SOON)

KIDNEY HEALTH (COMING SOON)

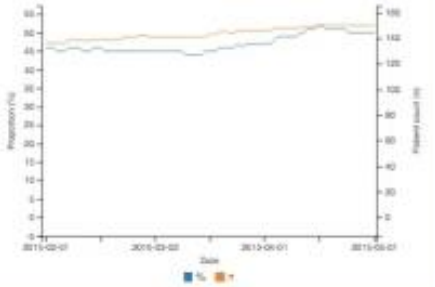
Home | Instructions | NICE | Blood Pressure > Monitoring

Search for patients...

Download Action Plan

Monitoring

Patients who have had BP measured



Improvement opportunities

Patients with opportunities for BP measurement

Type	n	%
No opportunities	40	55.6
Face-to-face	12	16.7
Non face-to-face	20	27.8

Patients

NHS no.	Last BP Date
5552953083	2014-10-16
5551465155	2014-10-11
5551960805	2014-09-09
5552737659	2014-09-03
5550777945	2014-08-31
5551775917	2014-08-19
5550644379	2014-08-19
5552492315	2014-08-11
5552376822	2014-07-29
5550295217	2014-07-26
5551668339	2014-07-25
5551806647	2014-07-13
5552990876	2014-07-10
5551533856	2014-06-19
5551262910	2014-06-17
5551118156	2014-06-16
5553125053	2014-06-14
5550000041	2014-06-10
5550516099	2014-06-10
5551650840	2014-05-27

Suggested action plan

Team / Organisation | Individual Patient

Suggested Actions	Agree?
Ensure the **pop-ups in your patient record are working** so clinicians are reminded to take a patient's blood pressure when they see them.	
Customise your pop-ups to demonstrate the consequences of ignoring them.	
Put a **blood pressure machine in your waiting room** so patients can take their blood pressure and give the receptionists the reading link to an example from a practice.	
Hold an **educational session** or meeting at your practice to highlight to colleagues: the importance of blood pressure measurement, be aware of pop-ups during patient consultation, the proportion of patients attending and not having their blood pressure measured at your practice, and that if there are legitimate reasons why blood pressure is not measured it should be coded in their notes. A presentation.	
Organise an **open access** or a regular nurse-led blood pressure clinic (e.g. monthly) to enable patients to get the blood pressure checked link to an example from a practice.	
Work with your local pharmacy to enable them to take blood pressure readings and send the results directly to you link to an example from a practice as well as checking for adverse events and drug compliance.	
Introduce a text-messaging service to remind patients they need a blood pressure check.	
Synchronise hypertension annual reviews of patients with other reviews of long-term conditions (e.g. COPD, Asthma) to ensure blood pressure is measured at the same time as other reviews – this could be done for the patient's birthday link to an example from a practice.	
Nominate a hypertension lead in your practice who can initiate some of these changes link to an example from a practice.	
Arrange to have blood pressures taken during upcoming vaccination programmes e.g. flu, shingles, whooping cough link to an example from a practice.	
Generate a list of patients who regularly attend and do not have a blood pressure measurement and circulate to practice doctors or administrative staff to highlight when these patients are attending in advance.	
Ensure all consulting rooms have electronic BP machines so it is quicker to take a measurement than using a manual sphygmomanometer.	

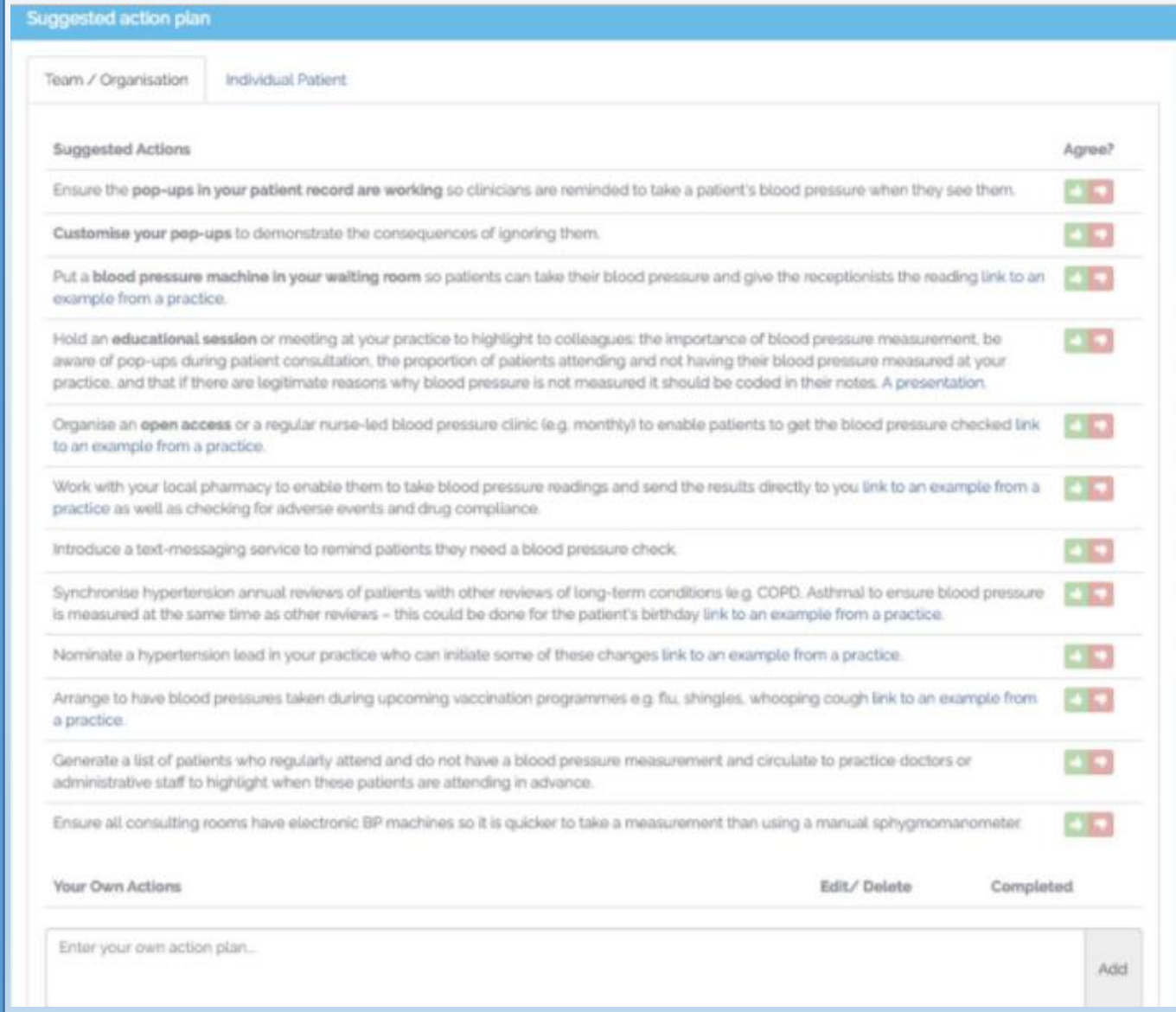
Your Own Actions	Edit/ Delete	Completed

Enter your own action plan...

Add

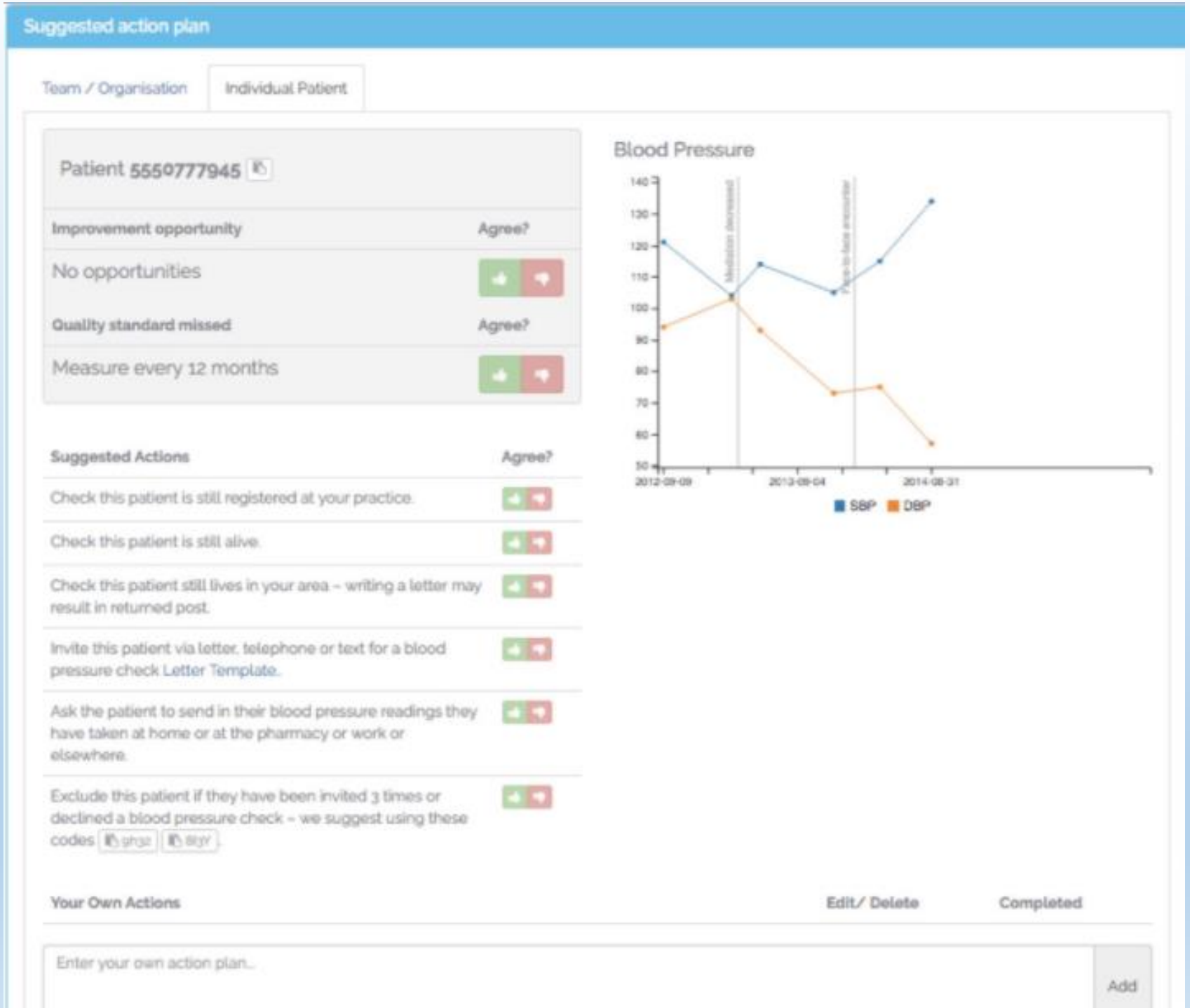
TEAM/ORGANISATION
Suggested Action Plan

- Put a blood pressure machine in your waiting room so patients can take their blood pressure and give the receptionists the reading (link to an example from a practice)
- Hold an educational session or meeting at your practice to highlight to colleagues: the importance of BP measurements, the proportion of patients attending and not having their BP measured at your practice, and that if there are legitimate reasons why BP is not measured if should be coded in their notes (*Link to a presentation)*
- Organize an open access or regular nurse-led blood pressure clinic (e.g. monthly to enable patients to get the blood pressure checked (Link to an example from a practice)
- Work with your local pharmacy to enable them to take blood pressure readings and send the results directly to you (Link to an example from practice as well as checking for adverse events and drug compliance
- Nominate a hypertension lead in your practice who can initiate some of these changes (Link to an example from a practice)
- Ensure all consulting rooms have electronic BP machines so it is quicker to take measurements than using a manual sphygmomanometer



INDIVIDUAL PATIENT
Suggested action plan

- Check this patient is still registered at your practice
- Check this patient is still alive
- Check this patient still lives in your area-writing a letter may result in returned post
- Invite this patient via letter, telephone or text for a blood pressure check (letter Template)
- Ask the patient to send in their blood pressure readings they have taken at home or at the pharmacy or work or elsewhere
- Exclude this patient if they have been invited 3 times of declined a blood pressure check-we suggest using these codes (Links)



Actionable Recommendations

- Specific details and comments
- Contain correct solution
- States how behavior should change to improve performance
- Includes specific goals
- Meaningful data to the individual

% of women screened for anemia at booking

- Remind nurses and doctors to follow the follow the protocol for anemia screening (Link to the protocol).
- Remember the importance of recording the data entry (screen shot of eReg of site of proper data entry).
- Ask the patient if she has any barriers to going to the hospital for admission and document response (Link to screen shot in eReg of where to document)
- Ensure there are adequate stocks of iron supplements avaliable in the clinic (Contact the MCH supervisor if there is no or low % of iron supplements in the clinic, screen shot of where to document follow up on supply)
- Follow up with the patient (Link to anemia patient list).
- Document in the note section of follow up given (show sreen shot in eReg where to document).

6 Focused Topics

- Topic 1-Booking Visit
- Topic 2-Anemia
- Topic 3-Hypertension
- Topic 4-Diabetes
- Topic 5-Attendance
- Topic 6-Fetal well being:
  - fetal growth
  - presentation
  - fetal movement

Indicators
Topic 1-Booking Visit

1. % of women at booking that had there age recorded
2. % of women aged <16 and >40 years referred to high risk clinic
3. % of women with BMI (kilo/m2) recorded at booking
4. % of women with BMI ≥ 35 referred to high risk clinic
5. % of women with a complete record of lab. test results appropriate to their stage of pregnancy.
6. % of women with ultrasound measurements in the first trimester
7. % of women identified with a multiple pregnancy in the first trimester referred to high risk clinic
8. % of women with history of xxx recorded at booking
9. % of women with history of xxx at booking referred to high risk clinic

Indicators
Topic 2-Anemia

1. % of women screened for anemia at booking
2. % of women with no anemia at booking screened at the 24-28 weeks visit
3. % of women with no anemia at booking and/or 24-28 weeks, screened at the 32 weeks visit
4. % of women with mild (10-10.9g/dl) /moderate (7-9.9 g/dl) anemia with referred to lab for hemoglobin measurments after 1 month of treatment
5. % of women with mild/moderate anemia and no improvement after treatment, referred
6. % of women detected with severe (< 7 g/ dl) anemia referred to hospital
7. % of women with moderate or severe anemia at admission for labor

Indicators
Topic 3-Hypertenion

1. % of women with blood pressure values at booking
2. % of women with preexisting hypertension (SBP ≥ 140 mm Hg and/or DBP ≥ 90 mm Hg before 20 weeks) referred to high risk clinic
3. % of women with blood pressure values at every visit
4. % of women with mild gestational hypertension (DBP 90–99 mmHg and/or SBP 140–149 mmHg) and urine protein results at any gestational week
5. % of : women with moderate or severe gestational hypertension (DBP 100–109 mmHg and/or SBP 150–159 mmHg / DBP ≥110 mmHg and/or SBP ≥ 160 mmHg) referred
6. % of women with hypertension and proteinuria referred
7. % of women with eclampsia referred
8. % of babies small-for-gestational age at delivery
9. % of women with severe hypertension at admission of labor

Indicators
Topic 4-Diabetes

1. % of women screened for glucose in urine at booking
2. % of women screened for elevated random blood sugar at booking
3. % of women with elevated random blood sugar at booking referred to the high risk clinic
4. % of women referred to lab for random blood sugar at 23-31 weeks
5. % of women with random blood sugar ≥ 105-140mg/dL (5.8-7.8 mmol/L) at 23-31 weeks referred to lab for glucose challenge test
6. % of women with random blood sugar or 1-hour glucose ≥ 140 mg/dl) at 23-31 weeks referred to high-risk clinic
7. % of babies large for gestational age at delivery

Indicators
Topic 5-Attendance

1. % of women that attended a visit <16 weeks gestation
2. % of women that attended a visit in 18-22 weeks of gestation
3. % of woman that attended a visit in 24-28 weeks of gestation
4. % of woman that attended a visit in 32 weeks of gestation
5. % of women that attended a visit in 36 weeks gestation
6. % of women with only a booking visit

Indicators
Topic 6-Fetal well being: fetal growth

1. % of women with SFH measured at 16-20 weeks
2. % of women with fetal growth monitoring (SFH measured) at every visit after 16- 20 weeks
3. % of women with discrepancy of fundal height (+/- 2cm) referred to ultrasound
4. % of women confirmed small/large for gestational age (discrepancy of fundal height) referred to high risk clinic
5. % of babies large for gestational age at delivery
6. % of babies small-for-gestational age at delivery undetected during pregnancy

Indicators
Topic 6-Fetal well being: presentation

1. % of women screened for malpresentation ≥ 36 weeks
2. % of women identified with malpresentation ≥36 weeks referred to ultrasound
3. % of women detected with malpresentation ≥36 weeks referred to hospital
4. % of women with malpresentation at delivery undetected during pregnancy

Indicators
Topic 6-Fetal well being: fetal movement

1. % of women with decreased fetal movement ≥ 20 – 28 weeks referred to ultrasound and to hospital
2. % of women with absent fetal movement ≥ 20 weeks referred to hospital for US and CTG
3. % of women with decreased fetal movement >28W refer to hospital for US and CTG
4. % of stillbirths

Thank you!

Questions and Comments