NBER WORKING PAPER SERIES

MANAGEMENT, SUPERVISION, AND HEALTH CARE: A FIELD EXPERIMENT

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Working Paper 23749
http://www.nber.org/papers/w23749

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
August 2017

The intervention evaluated in this study is the result of a collaboration between the Nigerian Federal Ministry of Health, Nigerian National Primary Healthcare Development Agency (formerly known as the Saving One Million Lives initiative), and the World Bank. We gratefully acknowledge the invaluable support of Marcus Holmlund, Arianna Legovini, Marie Francoise Marie-Nelly, Kelechi Ohiri, Ado J.G Muhammad, Muhammad Ali Pate, and Hong Wang. We are also grateful to Oyebanji Filani, Giacomo de Giorgi, Benjamin Loevinsohn, Oluwole Odutolu, and participants in various conferences and seminars for helpful comments. We thank Ayodele Fashogbon for field coordination and Qiao Wang for research assistance. The research protocol was reviewed and approved by Nigeria's National Health Research Ethics Committee and the Homewood Institutional Review Board of Johns Hopkins University. This study was made possible through generous funding from the Bill and Melinda Gates Foundation. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

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NBER Working Paper No. 23749
August 2017
JEL No. I15,M10,O15

ABSTRACT

If health service delivery is poorly managed, then increases in inputs or ability may not translate into gains in quality. However, little is known about how to increase managerial capital to generate persistent improvements in quality. We present results from a randomized field experiment in 80 primary health care centers (PHCs) in Nigeria to evaluate the effects of a health care management consulting intervention. One set of PHCs received a detailed improvement plan and nine months of implementation support (full intervention), another set received only a general training session, an overall assessment and a report with improvement advice (light intervention), and a third set of facilities served as a control group. In the short term, the full intervention had large and significant effects on the adoption of several practices under the direct control of the PHC staff, as well as some intermediate outcomes. Virtually no effects remained one year after the intervention concluded. The light intervention showed no consistent effects at either point. We conclude that sustained supervision is crucial for achieving persistent improvements in contexts where the lack of external competition fails to create incentives for the adoption of effective managerial practices.

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1. Introduction

In recent years, improving the quality of health care provision – beyond merely making it available – has become a higher priority for the World Health Organization (WHO) and other health agencies (WHO 2006; Institute of Medicine, 2001; Das et al. 2008). Recent research suggests that improvements in outcomes may not always require significant infusions of additional resources. In wealthy economies, a wide dispersion in health outcomes remains after controlling for access, spending and other structural aspects of quality (Chandra et al. 2013; Skinner 2011). The idea that improvements in health care quality can be achieved without increasing the recurrent resources employed can be particularly appealing to resource-constrained developing countries. At the same time, a recent and growing literature suggests that managerial and organizational practices matter greatly for organizational productivity and outcomes (Bloom, Sadun and Van Reenen 2012; Bloom, Eifert, Mahajan, McKenzie and Roberts. 2013), including in the health care sector (Bloom, Sadun and Van Reenen 2014), and that differences in management practices across organizations and countries account for a large share of the dispersion in productivity not explained by the quantity and quality of the inputs used. In fact, Brun, Karlan, and Schoar (2013) suggest that the lack of managerial and organizational capital may be a key constraint to productivity growth in developing countries. If so, then simply increasing the quantity of inputs may not translate into improved quality of health care: Das and Hammer (2014) find "no correlation between structural inputs and practice quality" across a number of studies, and Das et al. (2012) find that differences in levels of medical training of caregivers account for small or no differences in the quality of provided care. Improving the management of health facilities holds the promise of improving the quality of care and increasing the returns to other inputs.

The empirical literature on the role of "managerial" or "organizational" capital on the quality of health care delivery in developing countries is still scarce and, to our knowledge, limited to hospitals (Bloom, Sadun and Van Reenen 2014). However, the typical first point of access to care in developing countries is primary health centers (PHCs). The expansion of PHCs has been a crucial component of many developing countries' strategies to expand access to care to their populations, especially in rural areas. However, despite the expansion of PHCs, the quality of health care delivery in developing countries remains low (Das and Hammer 2014; Strasser, Kam and Regalado 2016).

In this paper, we present results from a randomized field experiment conducted in partnership with the Nigerian Federal Ministry of Health (FMOH) to evaluate the effects of a health care management consulting program for public PHCs in six Nigerian states. The FMOH contracted SafeCare, an international agency that specializes in health care quality standards and patient safety in developing-country contexts, to (i) provide a general training session to representatives from the PHCs, (ii) conduct baseline quality assessments at each PHC accompanied by a brief report, (iii) assist the PHCs' staff in formulating improvement plans, and (iv) provide periodical feedback and support toward implementation of the plans for the duration of nine months. The assessment and plans focused on a set of organizational and managerial practices that comprise basic international standards for

running primary health care facilities, ranging from the management of human resources, information, and risk, to the organization of the pharmacy and management of the drug inventory.[1]

An independent evaluation of the SafeCare intervention is policy-relevant in its own right, as many countries across Africa – including Ghana, Kenya, Namibia, Tanzania and Uganda – are working with this agency to improve standards of care at primary and secondary health care facilities (SafeCare 2017). However, our experimental design allows us to go beyond a simple program evaluation. In particular, we distinguish between different mechanisms through which a management consulting intervention can affect practices and outcomes.

Of the 80 facilities included in the study, 24 were randomly assigned to receive the full treatment described above; 24 to receive a light, information-only treatment consisting of (i) a general training session to PHC representatives and (ii) a baseline quality assessment and a brief report highlighting basic improvement areas and actions, but without a detailed improvement plan and without any additional feedback and support; and 32 to a control group. Comparing the full and the light interventions allows us to identify whether the main barriers to improving practices and quality of care are information constraints or implementation constraints. In the first case, the staff lacks knowledge of the appropriate or recommended organizational and operational practices, and providing that information (the light treatment) should improve practices. On the other hand, if the principal barrier to improvement is an implementation constraint – i.e., the staff lack the capacity to implement the changes, whether because of a lack of management ability or a lack of attention due to competing tasks – then information plus continued coaching and monitoring have the potential to improve practices.

To distinguish between management ability and attention, in addition to collecting data periodically during the implementation phase and immediately after its completion, we gathered data one year after the end of the intervention. Results from this long-term evaluation reveal whether the intervention had lasting effects and – importantly – demonstrate the relative importance of implementation support versus monitoring. Persistent impacts would suggest that initial implementation support improved management ability, which endured beyond the period of support. Short-run impacts with no long-run impacts would suggest that a lack of consistent attention to quality improvements is the binding constraint and that ongoing monitoring is key to sustained improvements. Testing the effects of monitoring is particularly important in this public sector context where the lack of competition implies that incentives to adopt superior organizational practices are essentially non-existent for the facilities' officers-in-charge.

Although the ultimate objective of better standards of care is to improve health outcomes, the scale of this program was insufficient to allow us to detect meaningful changes in outcomes such as infant or maternal mortality or infections. Because the focus of the intervention was to improve practices, our main outcome variables of interest relate to the adoption by the PHCs of the recommended organizational standards. We also measured several intermediate outcomes that should be affected by the improved practices, and that are demonstrated to impact health outcomes in other

[1] SafeCare is an agency created as part of a collaboration between the Joint Commission International based in the US, PharmAccess Foundation of the Netherlands, and the Council for Health Service Accreditation of Southern Africa established to "address issues of poor and limited health care delivered in developing countries." The SafeCare standards were accredited by the International Society for Quality in Health Care in March of 2013 (SafeCare 2013).

contexts. One organizational standard was to organize drugs and vaccines in the drug storeroom by type, using labels and ordering them by expiration date. An organized pharmacy should reduce the likelihood of stock-outs, improving the PHCs' ability to provide patients with essential drugs and vaccines, thereby improving the recovery chances of sick patients and immunization rates. In our study, we observe how the pharmacy is organized (practice adoption) and stock-outs of essential drugs and vaccines (intermediate outcomes), which are necessary conditions for improvements in actual health outcomes. Another intermediate outcome is the observed cleanliness of the PHC. Finally, we also measured patient experience and satisfaction through patient exit interviews. One of the Nigerian government's goals with this intervention was to encourage more people to seek care in the public PHCs: Higher patient satisfaction might improve the PHC's reputation in the community and thus contribute to increased access.

The full intervention had large and significant effects on the adoption of several organizational practices that were under the direct control of the facilities' staff. These included practices that required a minimal, one-time effort exertion such as displaying posters with hand-washing guidelines or having clearly marked waste bins for different types of waste, but also practices that required moderate and sustained effort such as labeling and organizing drugs in the pharmacy by expiration date or making hand-washing supplies consistently available in the consulting room and in other key areas of the facility. We also detected economically and statistically significant effects on some intermediate outcomes, including cleanliness of toilets and waiting rooms. In contrast, the light intervention had no systematic effects; in most cases, the estimated coefficients were both economically and statistically insignificant, indicating no meaningful differences with the control group.

Because we are considering many outcomes, we perform corrections for Multiple Hypothesis Testing (Anderson 2008; List, Shaikh and Xu 2016). Specifically, we combine outcomes into broad indices (z-scores), thereby reducing the number of tests being performed, and we also compute Family Wise Error Rate-adjusted and False Discovery Rate-adjusted p-values of the individual outcome estimated coefficients. The results are robust to these corrections.

When we measured practices and intermediate outcomes one year after the end of the intervention, however, we found that almost all of these effects had disappeared. Taken together, the two treatments and the short-term and long-term effects indicate that, first, information alone on what practices should be adopted is not sufficient; results are obtained only when detailed information on what changes need to occur is combined with sustained implementation support and monitoring. Second, the lack of long-term effects – despite the fact that about 70% of the core staff who were employed in the PHCs at the time of the intervention were still present one year later – suggests that monitoring during implementation played a crucial role. Third, the results are also informative about the nature of "adjustment costs," which have been emphasized as a reason why organizations are often reluctant to adopt new, more efficient practices (Bloom, Sadun and Van Reenen 2013): the intervention failed to produce sustainable changes, but it did result in measurable changes in practices during the "implementation support" phase; this suggests that adjustment costs might be best viewed and modeled as variable costs rather than one-time fixed costs.

Finally, we found no effects on practices that required substantial additional effort on the part of staff, infrastructure investments, or support from and coordination with government agencies (e.g., consistent access to power). This is not surprising, but it underlines the fact that improved management and organizational processes are insufficient to solve the major infrastructural constraints faced in many PHCs around the world. A lack of incentives may also contribute to explain the absence of effects for organizational practices requiring considerable additional and continued effort on the part of the staff.

Our study makes several contributions. Our main contribution is to the literature on the adoption of organizational and managerial practices with what we believe is the first evidence from primary health care facilities in a developing country context. Although in recent years evidence has accumulated indicating that management practices have important effects on productivity, the mechanisms through which superior practices are adopted and the barriers to their adoption are still poorly understood. The profit motive can explain why managers in market contexts adopt better practices upon learning about them (Bloom et al. 2013). However, in many contexts the profit motive is absent. In the health care sector in particular, public providers play a central role in many countries, often with limited competition from private providers. Our experiment demonstrates whether and how better managerial and organizational practices can be adopted by staff in public health care facilities. Specifically, our design distinguishes between the effects of information, implementation support, and supervision on the adoption of practices in the short term and in the long term. Moreover, we advance the empirical literature on health care quality in developing countries, by providing evidence on the effects of a policy-relevant intervention that several governments, particularly in African countries, are adopting to achieve improvements. Previous literature on improving health care quality examines non-managerial policies—including legal mandates, accreditation and administrative regulations, professional oversight, national and local guidelines, information sharing, and incentive provision—with mixed results (Peabody et al., 2006). Even when existing studies report positive results of interventions aimed at improving organizational and individual performance in adopting standards, they have significant design limitations, often focusing on longitudinal change without a credible control group.[2] This makes interpretation of the results problematic. Moreover, the interventions typically have multiple components without a design that allows for the effects of the various components to be assessed separately. In contrast with the existing health care management literature, the randomized-controlled nature of our study allows clearer causal inferences, and our experimental and data collection design allow us to distinguish the effects of different components of the intervention.

The remainder of the paper is structured as follows. In Section 2 we describe the context and provide details on the SafeCare program. In Section 3 we describe our experimental design and research questions, and in Section 4 we discuss the data and estimation strategy. We present the results

[2] For instance, Berwick (2004) reports on a successful intervention in Peru aimed at improving tuberculosis care by adopting standard practices such as treatment planning, systematic drug supply management, and maintenance of registries. Chakraborti et al. (2000) studied the effect of information, feedback and monitoring on private practitioners' case-management skills for treating sick children in rural India, finding large positive effects on a number of standard procedures.

in Section 5, where we also perform various corrections for Multiple Hypotheses Testing. In Section 6 we offer our conclusions and discuss policy implications.

2. The Nigerian Context and the Program

2.1 Health and Health Care in Nigeria

Nigeria has a population of almost 186 million and a per capita income of US$2,178 ($5,867 when adjusted for purchasing power parity). The country's total health expenditures amount to 3.7 percent of GDP. Life expectancy at birth is 53 years. Even though life expectancy has increased in the past decade, it is still 12 years shorter than the average among countries in the same income group (World Bank 2016).[3] The main causes of death in Nigeria are lower respiratory infections (14%), HIV/AIDS (10.4%), malaria (8.7%), diarrheal diseases (6.3%), pre-term birth complications (4.7%) and birth asphyxia and birth trauma (4.3%) (WHO 2015).

In 2013, the under-five mortality rate was about 120 per 1000 live births (WHO 2015). About a quarter of all under-five deaths are accounted for by deaths of newborn babies. The leading cause of under-5 death is malaria (21%), followed by acute respiratory infections (15%), prematurity (12%), birth asphyxia (10%), diarrhea (10%), and neonatal sepsis (5%). In the same year, maternal mortality was 560 deaths per 100,000 live births. Many deaths could be prevented by simple, essential interventions reaching women and children on time, for example with antenatal care, vaccination, and timely diagnosis of treatable infectious diseases such as malaria, pneumonia, diarrhea, and measles. Improved quality of health care delivery at primary health care facilities is one important vehicle to achieve better health outcomes (WHO 2006).

Nigeria's large population means that it accounts for a large share of total deaths in the African continent and worldwide. For example, in 2013 Nigeria alone accounted for about 14 percent of the total number of maternal deaths, 13 percent of under-five deaths and 10 percent of neonatal deaths worldwide (UNICEF 2014). Thus, even small reductions in mortality rates through improvements in the quality of health services could result in large reductions in the absolute number of lives saved. For example, a one percent reduction in the under-five mortality rate would save the lives of about 8,000 children under the age of five every year in Nigeria.

The intervention we evaluate in this paper was part of a broader set of actions implemented by the Nigerian government between 2011 and 2015 with the overarching goal of improving health care access and quality. The Health Strategy and Delivery Foundation (HSDF), a not-for-profit organization, partnered with the FMOH to develop a National Framework for Quality Improvement.[4] The FMOH partnered with the World Bank in the assessment of quality of service across primary, secondary and tertiary facilities nationwide. In addition, the FMOH set an agenda to improve the delivery of primary health care services around the country through its Subsidy Reinvestment and Empowerment Program – Maternal and Child Health component (SURE-P MCH), by improving staffing and upgrading primary health care facilities and increasing usage of MCH services through a

[3] Nigeria is classified as a "lower middle income" country by the World Bank. Life expectancy at birth for all lower middle income countries is 67.4 years.

[4] The HSDF was formerly known as the Saving One Million Lives Initiative.

conditional cash transfer incentive scheme. Quality improvement of PHCs was part of the national quality strategy across primary, secondary, and tertiary care facilities. Thus, in 2013, the FMOH implemented a management intervention to build local capacity and improve quality of care through the organization SafeCare, in partnership with HSDF.

2.2 The SafeCare Program

Formed in 2001, SafeCare is an agency specializing in producing and assessing quality standards specific to resource-constrained public and private health care facilities of all kinds. These include tertiary (teaching) hospitals, referral hospitals, district hospitals, primary health centers (as in our case), basic health centers, and health shops or nurse-driven clinics. SafeCare also offers technical assistance, or consulting, with a focus on building knowledge to guide and facilitate the adoption of quality standards.

The SafeCare standards are grouped in 13 "service elements" in four broad areas: health care organization management, care of patients, specialized services, and ancillary services (Table 1). The service elements encompass the entire range of clinical services, including management of human resources, information and risk, logistics and management of medication, and laboratory and facility services, among others. For each service element, SafeCare has developed a set of indicators for specific standards or managerial/organizational practices or actions. The SafeCare standards were accredited by the International Society for Quality in Health Care in March of 2013 (SafeCare 2013). The full set of standards can be found in SafeCare (2015).

The SafeCare program consists of the following five components:

(1) General training session: SafeCare conducted an initial 2-day general training session attended by one point person from each PHC. The attendees were trained in standard best practices according to the SafeCare model.

(2) Baseline assessment and gap analysis: SafeCare personnel visit each PHC and make a detailed assessment. Specifically, for each of 823 standards in health care organization management, care of patients, specialized services, and ancillary services, SafeCare gives a score to the facility ranging from 5 points ("not compliant, very serious") to 100 points ("compliant").[5]

(3) Initial feedback: Based on the outcome of the assessment, SafeCare provides a summary of the main gaps that were identified in the facility, highlighting areas where the facility needs to improve. The feedback is communicated to the PHC point person and the PHC's "officer in charge" (OIC or the "in charge" for short).

(4) Improvement Plan: In consultation with the facility's staff and personnel from the Federal Ministry of Health, the SafeCare consultants formulate a detailed "quality improvement plan" (QIP) for each PHC. Appendix Table lists the standards and actions that were recommended by SafeCare.

[5] The full scoring scale is as follows: 100 if "compliant", 75 if "partially compliant – mild", 65 if "partially compliant – moderate", 55 if "partially compliant – serious", 45 if "partially compliant – very serious", 35 if "non compliant – mild", 25 if "not compliant – moderate", 15 if "not compliant – serious", 5 if "not compliant – very serious" (SafeCare 2014).

(5) Implementation Assistance and Feedback: SafeCare personnel provide both remote and in-person assistance and feedback to the PHC staff towards the implementation of the plan. The in-person visits by SafeCare personnel occur every other week for nine months from the introduction of the plan. A staff member of the FMOH also accompanies SafeCare personnel; the staff visited each facility once a week to monitor progress and assist the PHC's staff in the implementation of the improvement plan.

3. Experimental Design

3.1 Experimental design

To evaluate the program's effects, the assignment of PHCs to the treatment was randomized, and independent data collection took place.[6] The randomized controlled trial involved a total of 80 PHCs, located in 20 hospital catchment areas in 6 states. These facilities were randomly assigned to one of the following experimental conditions:

- **Treatment A**: The full SafeCare program as described in Section 2, including the general 2-day training session, the initial assessment and feedback, the quality improvement plan, and the implementation support and monitoring for nine months.
- **Treatment B**: A light version of the SafeCare program, including the general 2-day training session, the baseline assessment and initial feedback, but without improvement plan or implementation support.
- **Control**: Facilities in the control group did not receive any treatment.

Poor quality of health service delivery could be due to the PHC staff's lack of management training, which would imply that the staff is unaware of the recommended practices (standards) to organize a health care facility. Another possibility is that the staff is aware of how the facilities should be managed and organized, but they lack the capacity (either skill or attention) to implement the practices or to put in place the processes necessary for the practices to be adopted. Treatment A provides both information about what should be done and for the implementation of the practices, whereas Treatment B only provides facilities with information, but not with implementation support. Therefore, comparison of the full and the light interventions allows us to identify whether the main barriers to improving practices and quality of care are information constraints or implementation constraints. The implementation assistance includes periodic visits to the PHCs by both SafeCare personnel and by FMOH staff. Thus, this component of the program contains both implementation support and monitoring. Both elements could potentially lead to better outcomes, but through different mechanisms: the implementation support is a form of training, and the monitoring could induce the staff at the PHC to exert additional effort to implement the plan, either because regular monitoring visits keep attention on quality improvements, or out of a concern that failure to do so might be

[6] Ugo et al. (2016) performed a before-after comparison using the SafeCare assessments and without a control group.

penalized by the FMOH financially or with dismissal.[7] To distinguish between these two channels, in addition to collecting data during and immediately after the intervention, we collected data one year after the end of the intervention. If any process and outcome improvements associated with Treatment A (if any) are simply due to the periodical monitoring, then they are more likely to depreciate once the monitoring ceases; if, however, the improvements are mainly due to the assistance component, then we expect them to be more likely to persist over time.

3.2 Selection of states and PHCs

The FMOH selected six states for the intervention in order to achieve representation from each of Nigeria's 6 geopolitical zones: Niger (North Central zone), Bauchi (North East), Kebbi (North West), Anambra (South East), Cross River (South South), and Ekiti (South West). The PHCs selected to receive the intervention, 80 facilities in total, were all facilities included in the SURE-P subsidy program in these states (described in section 2.1).

3.3 Baseline PHCs characteristics in participating and non-participating facilities

Although the random assignment of facilities to experimental conditions, coupled with the fact that facilities could not opt out of the intervention, ensures the internal validity of our comparisons, how representative are our participating facilities of primary health care facilities in Nigeria? Facility characteristics are not available for the universe of PHCs in Nigeria; however, our baseline data do provide us with rich data on a number of characteristics of all 474 PHCs that were included in the nationwide subsidies program (SURE-P) described in section 2.1, 80 of which were located in the six states that constitute our study's sample. The comparisons presented in Table 2 reveal that on most dimensions, the participating PHCs are similar to the remaining 394 non-participating PHCs. For example, the average number of staff members qualified as midwives or nurses is 2.5 in participating facilities and 2.7 in non-participating facilities; 73 percent of the participating PHCs and 74 percent of the non-participating ones have at least one midwife per shift; participating facilities have on average 2.8 beds while non-participating facilities have 3.2 beds; the average total number of health workers is 12.3 in participating facilities and 12.4 in non-participating facilities; 50 percent of the participating PHCs and 58 percent of the non-participating PHCs had developed a "facility workplan" for the current year (prior to the intervention); and both groups of facilities are located on average around 20 km from the referral hospital. Participating and non-participating facilities differ substantially, on average, on some dimensions including the number of registered cases of antenatal care (49 versus 71 cases per month) and the number of deliveries (9 versus 30 deliveries per month), which are explained by the presence of several larger facilities among the non-participating ones.

[7] There were no formally stated or directly enforced consequences for failure to implement the quality improvements, but attention from superiors can still induce a concern for consequences. Qualitative evidence from Zambia shows that with regular and thorough supervision visits to health centers, health workers "feel pressured to improve performance and also take pride in their recognized accomplishments" (Evans 2017).

3.4 Assignment of PHCs to treatment and control conditions

Twenty-four of the 80 PHCs were randomly assigned to Treatment A, and 24 were assigned to Treatment B. The number of facilities assigned to Treatments A and B were constrained by FMOH budget limitations. The remaining 32 facilities were assigned to the control condition. For the random assignment, we stratified by state and SURE-P intervention.[8] Table 3 shows the distribution of facilities across experimental conditions by state, and Figure 1 shows a map with the 6 states and the location of the study's PHCs by experimental condition.

4 Data, Baseline comparisons and Estimation methods

4.1 Data sources

We use data from existing PHC-level surveys as well as data that we collected specifically for the purposes of this study. There is no facility-level attrition, since all 48 PHCs assigned to the two treatment groups participated in the program and were surveyed.

Baseline data: Baseline pre-intervention data stems from two sources, the Service Delivery Indicators (SDI) from August 2013, and a World Bank data collection exercise that covered all of Nigeria's 500 SURE-P PHCs in September/October 2013. The SDI include data from a facilities questionnaire with general facility information, infrastructure, and availability of equipment, materials, drugs, and supplies.[9] From the SURE-P baseline data collection, we use information on facility characteristics and staffing details (e.g., number of doctors, nurses, and community-health workers). The SDI and SURE-P data are used to make baseline comparisons and randomization checks, and also as controls in some of the regressions in Section 5 below.

Follow-up data: We implemented six rounds of monthly data collection, the first about two months since the start of the SafeCare program (June 2014), and the last one about one year after its conclusion. This repeated data collection over the course of the intervention improves the statistical power of our tests for actions and outcomes that are not strongly autocorrelated (McKenzie 2012). Our data collection instrument included three parts. First, we administered a questionnaire to each "officer-

[8] The randomization of PHCs into the two treatment groups and the control group followed these steps: (1) We assigned a random number to each of the 80 PHCs in our population; (2) These numbers were ranked in ascending order; (3) We ranked these numbers within each hospital cluster; (4) The PHC with the highest random number in each was assigned to Treatment A, the second highest number was assigned to Treatment B, and the third highest number was assigned to the control group. This created groups of 20 for each treatment arm; (5) lastly, the 20 PHCs with the fourth highest numbers were ranked again. Then, the 4 highest numbers were allocated to Treatment A, numbers 5-8 went to Treatment B, and the rest were assigned to the control group. Each hospital cluster was within a single state and SURE-P intervention group. The SURE-P intervention groups included monetary incentives for midwives, non-monetary incentives for midwives, a combination, and a control group.

[9] The 5 modules of the SDI are: a. Facility questionnaire: General facility information, infrastructure, availability of equipment, materials, drugs, and supplies. b. Staff roster: Part A: List of all health workers by cadre type; Part B: Administered to 10 randomly selected health workers to measure absenteeism. c. Clinical knowledge assessment: Clinical knowledge using 5 medical vignettes + 2 vignettes for maternal & newborn complications. d. Public expenditure module: Collects receipts and spending (monetary and in-kind) by health facilities. e. Exit module: User satisfaction, socio-demographic characteristics & payments. The SDI data collection included 79 of the 80 clinics in this evaluation. One clinic in Anambra was omitted in the data collection.

in-charge" of the PHC – usually the senior clinic staff member – to collect detailed information on facility practices, staff, inputs, challenges and so on. Second, we employed a facility observation module to check for available infrastructure and equipment, and stockouts of drugs and vaccines. More details on these data will be provided below. Third, we conducted monthly patient exit interviews with about three patients per PHC right after their consultation – with spatial separation from the PHC to ensure confidentiality – to inquire about demographics (e.g., wealth, education, family size), satisfaction with the services rendered, and perceptions about the quality of care. The data collection was carried out by a professional survey firm independent of SafeCare or the Nigerian government. The enumerator visits occurred on dates that were not communicated to the PHCs in advance, and the data were collected electronically using tablets.[10] Questions were read directly from the devices and responses were recorded.

4.3 Randomization checks

Consistent with our random assignment of PHCs to experimental conditions, comparisons between the treatment groups show balance at baseline. Formal tests shown in Table 4 indicate balance on a number of PHC-level characteristics. With only some exceptions, differences across experimental conditions along a number of facility-level variables tend to be small, and t-tests indicate that they are not statistically significant. Taking into account the relatively small sample size of our treatment groups, ($N_A = 24$, $N_B = 24$, $C = 32$), we performed permutation tests in addition to the standard t-tests (Butar and Park 2008). Specifically, we computed Fisher's exact tests and Wilcoxon ranksum tests with 1,000 permutations. The results again show that the differences across experimental conditions are in most cases not statistically significant (Table 4). This indicates that our randomization has succeeded in creating comparable treatment and control groups.

4.4 Estimation methods

We estimate pooled-OLS and ANCOVA models with dummies for each wave of data collection:

$$Y_{i,t} = \beta_0 + \beta_1 T_A + \beta_2 T_B + \beta_3 Y_0 + X_i + \delta_t + \varepsilon_{i,t}$$

$Y_{i,t}$ are the outcome variables (described in the next section), and T_A and T_B indicate whether clinic i is in treatment group A (full treatment) or B (light treatment). Y_0 is the SURE-P or SDI baseline value if available, and δ_t designates survey round fixed effects. X_i designates the stratification dummies including state dummies and SURE-P intervention status.

[10] The data collection employed Asus Google Nexus 7 tablets with the software "SurveyCTO."

5 Outcome Variables and Results

5.1 Outcome variables

The goal of the SafeCare program was to assist the PHCs in adopting a set of organizational practices. The full set of SafeCare standards includes more than 800 indicators. Taken together, these indicators define the "standard" according to which primary health care facilities in resource-restricted settings should be managed. In coordination with the FMOH, we have selected a subset of 75 outcome indicators. We did so prior to the intervention, with the agreement that the research team would collect data on these outcomes independently of the consultants or the government. Our aim was to select a broad range of outcomes in critical managerial and organizational areas and with varying degrees of ease of implementation. In fact, the "standards" (both the full set and the subset on which we focus) vary in whether they are under the control of PHCs' staff, and in the amount of effort required to achieving them.

To organize the analysis, the selected outcomes were classified into three groups: "Within PHC control/Low effort", "Within PHC control/Moderate effort" and "Outside PHC control/High effort". The "Within PHC control/Low effort" outcomes are fully within the control of the PHC staff and require no or minimal additional resources and effort – e.g., displaying posters in the waiting area with hand washing guidelines, malaria symptoms, or a charter of patient rights. The "Within PHC control/Moderate effort" outcomes can be implemented with higher and more sustained effort on the part of staff, but still without any additional support from the local or central government – e.g., ensuring the presence of hand washing materials and keeping the facility clean. Finally, the "Outside PHC control/High effort" outcomes include outcomes that require either substantial additional effort on the part of the staff or significant infrastructure support from the government. For example, one of the SafeCare standards prescribes that each PHC should have uninterrupted access to electricity; however, whether any given PHC is connected to the national power grid is outside the control of local PHC management. Of the 75 selected outcomes, 18 were classified as "Within PHC control/Low effort", 37 indicators were classified as "Within PHC control/Moderate effort", and 20 were classified as "outside PHC control/High effort". The full list of outcomes and their classification are provided in the appendix.

At the time when we selected and classified the outcome variables, we did not yet have access to the Quality Improvement Plans (QIPs) that the 24 Treatment A facilities had received. When we received access to the detailed QIPs, we matched the actions in the QIPs to the variables that we used in our data collection. The actions in the QIPs are fairly broad in their formulation (see the examples in Figure 2), and therefore in most cases there were multiple variables from our surveys that would match with an individual QIP action. However, for other QIP actions, there were no variables in our surveys that matched. In total, we matched 46 variables from our surveys to the QIP actions. The FMOH and representatives from the PHCs involved in Treatment A determined who at the PHC was responsible for implementing the suggested improvements. 30 QIP actions were directed at the PHC's officer-in-charge, 7 others were directed at the local government or the federal (SURE-P) program

managers, and 9 were aimed at both levels.[11] Changes to be implemented by the federal or local government would be harder (or even impossible) to change by the local staff of the PHC. When we compare our Low/Moderate/High effort-classification with the QIP actions for the variables that could be matched, we observe a large overlap in the classifications, as a large majority of the variables we classified as "Within PHC control/Low effort" or "Within PHC control/Moderate effort" were indeed marked as changes to be implemented by the PHC staff in the QIPs. Specifically, about 80% of our "Within PHC control/Low" and "Within PHC control/Moderate effort" variables were classified by the FMOH as being within the control of the facility staff, and the remaining 20% was classified as being the responsibility of both the staff and the local or federal government; and all of the outcome variables that we classified as "Outside PHC control/High effort" were classified by the FMOH as being outside the control of the PHCs' staff. It is important to note that the SafeCare intervention could in principle have effects also on "Outside PHC control/High effort" practices. In fact, the FMOH was considerably involved in the implementation of the intervention; specifically, FMOH personnel would visit Treatment A facilities periodically, providing monitoring and support during the implementation of the improvement plan.

We also classified indicators according to where they reach the clinical process. Some changes ("process" indicators) focus principally on process but only indirectly affect patient health, such as putting up a poster with clinical information. Other changes ("intermediate outcome" indicators) may have a more direct effect on patient health, such as the cleanliness of the facilities and the availability of hand washing materials. Across our 75 measured indicators, we identified 61 that are focused on process and 14 that capture intermediate outcomes. The ultimate goal of this intervention, of course, is to actually improve health outcomes. However, as explained above, given the sample size of the evaluation, implausibly large changes in health outcomes would be required in order to emerge as statistically significant; as such, we focus on the adoption of practices and on intermediate outcomes.

5.2 Results

5.2.1 Summary of Results

Before presenting our results in detail, we summarize the findings (Table 5): Treatment A had a positive and statistically significant effect on 22 of the 75 indicators that we considered, whereas Treatment B had a statistically significant effect on only 3 indicators. When we divide the indicators according to the difficulty of implementation as described above, we observe that the vast majority of the statistically significant effects of Treatment A were obtained for the indicators that were classified as being "Within PHC control/Low effort" (7 out of 18 indicators, or 39%) or "Within PHC control/Moderate effort" (12 out of 37 indicators, or 32%), whereas the Treatment A had a statistically significant effect on only 3 of the 20 "Outside PHC control/High effort" indicators. As for Treatment B, we only find statistically significant differences in 8% (3 out of 37) "Within PHC control/ Moderate effort" indicators.

[11] A detailed list of QIP actions and their corresponding variables in our surveys can be found in Appendix table 3.

Looking at "process" versus "intermediate outcome" indicators, we observe that Treatment A resulted in positive, significant changes in 30% of the process indicators (18 out of 61), and 29% of the intermediate outcome indicators (4 out of 14). Treatment B, instead, resulted in significant changes in 5% of process indicators and none of the intermediate outcome indicators.

After describing our detailed regression results below, we perform two exercises to correct for Multiple Hypothesis Testing. First, we construct a small set of indices based on the classification of indicators described above, which reduce greatly the number of tests being performed. Second, we adjust the p-values on the original regressions' coefficients to account for the fact that we are testing a large number of hypotheses.

5.2.2 Process Indicators

Management and Leadership (Table 6A)

The SafeCare program emphasized certain aspects of facility management, including the need for regular communications between the health center staff. In Table 6A we observe that Treatment A clinics increased the likelihood of holding staff meetings in the previous month by 16 percentage points, and reported holding about 0.2 additional meetings in the previous month (marginally significant). By comparison, 67 percent of facilities in the control group reported holding a staff meeting in the last month, and the average number of meetings held in the control facilities was slightly above 1. Both these indicators were classified as "Within PHC control/Moderate effort." PHCs in Treatment A are also 15 percentage points more likely (statistically insignificant) to report that they are "working towards quality improvement targets". However, staff did not appear to be more likely to make suggestions for improvement to the officer-in-charge.

Treatment A clinics displayed a 64 percentage point higher likelihood than control facilities of posting an organizational chart on the wall (versus a rate of zero in the control group), an action classified as "Within PHC control/Low effort," and a 20 percentage point higher likelihood of having a well-organized drug storage area, i.e. with drugs that are labeled and arranged by expiration date (versus a rate of zero in the control group). The latter, an action classified as "Within PHC control/Moderate effort," is a practice recommended to reduce the likelihood of stock-outs of essential drugs and vaccines. No meaningful (statistically or economically) effects were found for Treatment B.

Patient Rights (Table 6B)

Treatment A led to a 63 percentage point increase in PHCs visibly posting a patient rights charter in the waiting area (versus a rate of zero in the control group). However, no effect was found for posters with clinical information, although those started from a much higher baseline of 57 percent. Both of these processes were classified as "Within PHC control/Low effort" actions. The number of ward screens in the facility – an action classified as "Outside PHC control/High effort" – increased for both treatment groups; however, the estimated effect of Treatment A is twice as large as that of Treatment B, and it is statistically significant, whereas the estimated coefficient is insignificant for Treatment B.

Risk Management, Waste Management, Sterilization and Security (Table 6C)

Risk management and sterilization processes are core elements of quality of care and patient safety. Treatment A led to a 34 percentage point increase (from a baseline of 16 percent) in the likelihood that facilities designate an individual responsible for infection control. Also, Treatment A facilities were 20 percentage points more likely to have guidelines on waste management, compared to a baseline of zero (significant at the ten percent level). Both these indicators were classified as "Within PHC control/Low effort."

SafeCare also emphasized the separation of medical waste from ordinary waste, as medical waste that is not properly handled and disposed of represents a high risk of infection or injury to health care personnel, as well as a lesser risk to the general public through the spread of micro-organisms from health care facilities into the environment (Windfield and Brooks 2015). Treatment A led to a 32 percentage point increase in the adoption of clearly marked bins for different types of waste (versus a baseline of 32 percent in the control PHCs), and to a (marginally significant) 17 percentage point increase in the availability of a poster showing waste separation. However, we do not detect effects on medical and other waste actually being disposed of differently, which is a harder to change intermediate outcome indicator (classified as "Within PHC control/Moderate effort") than the relatively low effort processes of putting up posters or marking waste bins. Neither treatment increased the availability of medical gloves or sterilization equipment. We classified the availability of professional sterilization equipment as "Outside PHC control/High effort," because the PHCs are dependent on actions by government authorities to provide these tools.

Finally, SafeCare emphasized the importance of using different cleaning devices, such as mops, for the different areas of the clinic, for example to reduce the likelihood of spreading germs from the toilets to the waiting area. Despite this emphasis, we do not observe that the treatments increased usage of different mops, which could have been implemented with some effort ("Within PHC control/Moderate effort"). However, for the clinics that did use different mops, both treatments increased the likelihood that a color-coded system was employed to differentiate the respective mops.

Facility Management Services (Table 6D)

We do not observe changes in basic facility infrastructure (e.g., whether the facility has electricity interruptions or clean water available all year), which are of course "Outside PHC control/High effort" actions. So access to power and water were not affected by Treatment A or Treatment B. However, if the facility possessed a generator (which is classified as a "Outside PHC control/High effort" process indicator), Treatment A led to a 26 percentage point increase in the availability of fuel for the generator (a "Within PHC control/Moderate effort action with a baseline of 58% in control PHCs). Note that PHCs did not receive an additional discretionary budget, so additional availability of fuel may imply some community organization.

Human Resources Management (Table 6E)

We do not observe changes in any of the indicators related to human resources management. Because the facilities' officers-in-charge do not have resources or authority to hire extra staff or to reward staff performance, there are no differences between the numbers of clinic staff or human resource practices such as performance measurement systems or reward programs. However, some indicators that were classified as "Within PHC con troll/Low effort," namely whether the facility had a written list of all clinical staff and whether they had submitted a request for additional staff, were also unaffected by the treatment.

Primary Health Care Services (Table 6F)

The program showed no impacts on intermediate outcome indicators such as the number of antenatal care visits, the number of deliveries at the clinic or the number of deliveries with complications. However, Treatment A facilities are significantly more likely to report Apgar scores for newborns ("Within PHC control/Moderate effort"), an important tool, but neither treatments shows effects on the availability of a partograph ("Within the PHC control/Low effort").[12,13] The treatments also did not affect whether the clinics would keep individual case records ("Within PHC control/Moderate effort").

Critical goals of the quality improvement program were procedures that would improve hygiene and cleanliness. Evidence from other studies demonstrates that handwashing improves health (Ejemot-Nwadiaro et al. 2015; WHO 2009) and that the provision of handwashing materials can increase handwashing (Kotch et al. 2007; Maury et al. 2000). We find that Treatment A increased the availability of hand washing facilities for patients by 18 percentage points (from a baseline of 42 percent), and both Treatment A and B increased the availability of hand washing facilities for medical personnel, although the baseline in control PHCs in this case was 84 percent. Treatment A also increased the availability of water in the consulting room and the waiting room by 28 percent and 13 percent, respectively (from a baseline of about 30 percent in both cases). We detected no effects on water availability in the bathrooms and the delivery room. All these indicators were classified as "Within PHC control/Moderate effort." Treatment A also had a large impact on the availability of a poster describing hand-washing behavior (which was a "Within PHC control/Low effort action).

5.2.3 Intermediate Outcomes

In Table 7 we show the results of our regressions where the dependent variable measures an intermediate outcome. We have two sets of intermediate outcomes: the cleanliness of critical areas in

[12] Apgar is a quick test performed on a baby at 1 and 5 minutes after birth. The 1-minute score determines how well the baby tolerated the birthing process. The 5-minute score tells the doctor how well the baby is doing outside the mother's womb. The Apgar test is done by a doctor, midwife, or nurse. The health care provider examines the baby's breathing effort, heart rate, muscle tone, reflexes, and skin color.

[13] The partograph is a graphical record of the course of labor. Its use can reduce the rate of maternal mortality since abnormal markers in the progress of labor can be identified early on (Asibong et al. 2014).

the facility (Table 7A), and the availability of essential drugs and vaccines (Table 7B).[14] Specifically, our enumerators took pictures and evaluated the degree of cleanliness of the waiting areas, the toilets, and the bed linens stored at the facility. They also visited the drug storage area in each facility, took pictures, and checked whether unexpired essential drugs and vaccines were available.

Treatment A increased the likelihood that the waiting room is reported to be "very clean" by 13.6 percentage points and the toilets to be perceived as "very clean" by 11 percentage points (measured on a 1-5 Likert scale). Both coefficients are statistically significant at the 10 percent confidence level. We do not detect any significant impacts for Treatment B. These outcomes were classified as "Within PHC control/Moderate effort" outcomes. We detect a 9.8 percentage point increase in the probability that all essential drugs are available due to Treatment A (significant at the 10 percent level), up from a baseline of 15 percent in control facilities, but we find no effect on the availability of vaccines, although the baseline in this case was much higher (88 percent of control PHCs had all essential vaccines available). During 85% of our visits at least one essential drug was out of stock, whereas in 88% of our visits all essential vaccines were available.

5.2.4 Patient Experience and Satisfaction

One of the goals of the government was to increase patient satisfaction. There is evidence from elsewhere in Africa that better clinical knowledge is associated with higher levels of patient satisfaction (Leonard 2008; Evans & Tärneberg 2017). As shown in Table 8, we find that the treatments had no impact on measures of patient experience and satisfaction. In part, this might reflect the fact that the initial levels of patient satisfaction were high, hovering around the 90% mark.[15] The only significant result is that patients for clinics in treatment group A are slightly more inclined to report that staff spent sufficient time with them.

5.3 Multiple Hypothesis Testing

Because we consider a large number of indicators that are potentially affected by the treatments, we are concerned about the possibility of Type I errors (i.e., false positives). In fact, it is well known that the probability of finding a statistically significant effect when the true effect is zero increases sharply with the number of hypotheses being tested (Savin 1984). In our study, the concern is attenuated because if our findings were purely due to Type I errors we would expect a roughly similar proportion of positive and significant coefficients for Treatment A and Treatment B, whereas almost all of the statistically significant effects are associated with Treatment A. Nonetheless, we perform various corrections for "multiple hypothesis testing" (MHT) as described below.

There are two main ways to deal with MHT. The first involves aggregating the outcomes into a smaller set of indicators, thereby reducing the number of tests being performed (see – for example –

[14] Drugs defined as essential are Misoprostol, Oxytocin, Magnesium Sulfate (MG), Zinc, Chlorhexidine, Amoxycillin, ORS, ACT, Fansidar/IPT. The essential vaccines are BCG, Penta, Polio, Measles, Yellow Fever, Hepatitis B.

[15] In these same PHCs, we find not only extremely high rates of satisfaction but also evidence of "acquiescence bias," that patients tend to agree with interviewer statements and so satisfaction may be an artifact of positively framed statements (e.g., do you agree or disagree with the statement, "You were satisfied with your service") (Dunsch et al. 2017). Evidence from a larger Nigerian sample shows similarly high levels of satisfaction (Evans & Tärneberg 2017).

Kling et al., 2007). The second approach consists of applying a statistical correction to the p-values of the estimated coefficients to account for the fact that multiple tests are being performed simultaneously (Family-Wise Error Rate (FWER)-adjusted or False-Discovery Rate (FRD)-adjusted p-values; see Anderson 2012). We follow both approaches. The first approach is useful because it allows us to answer the question "did the intervention lead to statistically significant changes overall?", which in our context is a meaningful question in particular when we consider our classification of the indicators into groups based on the ease of implementation and the process/intermediate outcome nature of the variables, as defined above. However, the second approach allows us to look at specific process and intermediate outcome indicators, which is important because different indicators vary in their potential ultimate impact on health outcomes (e.g., putting up a poster with patient rights vs. providing hand washing supplies to patients). In other words, as noted by Anderson (2012), these two approaches make different tradeoffs, with the first method reducing the number of tests while avoiding to adjust p-values (which reduces statistical power), and the second adjusting p-values without reducing the number of tests being performed; using both methods balances the tradeoffs of each of them. In total, we conduct 3 tests. Specifically, we construct indices (Kling et al., 2017; Table 9A), we utilize an FDR-correction approach (Benjamini et al., 2006; Tabel 9B), and a FWER-correction (List et al., 2016; Table 9C).

Indices (Table 9A): To build the indices we followed Kling et al. (2007), creating summary indices that aggregate information over several treatment effect estimates. Panel A of Table 9 presents the outcomes grouped in indices following our earlier classification ("Within PHC control/Low effort", "Within PHC control/Moderate effort", "Outside PHC control/High effort", and "Process vs. Outcome"). After allocating each outcome variable to one index, we adjusted the signs so that a positive sign would be always associated with a better outcome for all variables. Next, we demeaned all variables and divided them by the control group's standard deviation, which converted them into normalized effect sizes.[16] Therefore, each element of the index has mean 0 and standard deviation 1 for the control group. Lastly, we regressed the index variable on the treatment status to estimate the effect.

We pooled the observations from each PHC into one observation each (column 1; N = 80). Column 2 shows the number of variables that were pooled in the respective index. Columns 4 and 5 show the coefficients for Treatments A and B, measured in standard deviation units. Row 1 shows that Treatment A had large significant effects of 1.66 standard deviation units in Treatment Group A for the "Within PHC control/Low effort" index and 1.28 standard deviation units for the "Within PHC control/Moderate effort" index. This corroborates our earlier findings (see section 5.2.1) as most of the significant effects from individual outcome indicators were found for the "Within PHC control/Low effort" and (to a lesser degree) "Within PHC control/Moderate effort" actions. There were no significant effects for the "Outside PHC control/High effort" index. We also detected strongly

[16] For the indices we use only 72 of the 75 indicators. Two indicators had no variation in the control group, and one indicator's coefficient is an extreme outlier ("patients' right charter visibly displayed") which would have distorted the index.

significantly effects of Treatment A on the "Process" index (1.45 standard deviation units), which overlaps highly with the "Within PHC control/Low effort" index. The "Outcome" index for Treatment A is marginally significant with a 0.47 standard deviation unit increase.

FDR adjustment (Table 9B): The false discovery rate (FDR) was developed as a middle-ground between measures that are considered too restrictive (e.g., the Bonferroni adjustment) and not controlling for multiplicity at all (Benjamini et al., 2006). The false discovery rate (FDR) designates the proportion of null-hypothesis rejections that are type I errors (Anderson 2012; Benjamini & Hochberg 1995). FDR has greater power than FWER (see below), at the cost of allowing a higher rate of type I errors. Using the two-stage step-up FDR-control procedure following Benjamini et al. (2006), we are rejecting a total of 12 of the initially 22 rejected null-hypotheses when using naïve p-values (Table 9B).[17] 6 of the 7 initially rejected null-hypotheses in the "Within PHC control/Low effort" group, and 6 of the 12 initially rejected null-hypotheses in the "Within PHC control/Moderate effort" group remain rejected when correcting for the FDR. The fact that a substantial portion of the significant results for Treatment A remain significant after controlling for the FDR corroborates our finding that Treatment A was effective at improving quality of care standards that are within the control of the local PHC staff.

FWER adjustment (Table 9C): The family-wise error rate designates the probability that at least one true null hypothesis is rejected (Holm, 1979). To control for the FWER (at 0.05 confidence level), we followed a procedure developed by List et al. (2016), which asymptotically controls for the FWER and incorporates information about the joint dependence structure of the test statistics and therefore is more powerful than the standard procedures developed by Bonferroni (1935) and Holm (1979). When controlling for the FWER, 11 null-hypotheses remain rejected. Due to the different methodology utilized, these 11 do not all coincide with the 12 null hypotheses rejected using the FDR-control.[18]

5.4 Long-Term Effects

One year after the intervention ended, we gathered a final round of data in order to examine whether the impacts were likely driven by improved management capacity (which would be signaled by persistent effects) or by supervision (non-persistent effects). Only 3 of our 22 rejected null-hypotheses for Treatment A are still significant in our long-run follow up data (round 7): The visible display of a patients' rights charter ($\beta = 0.571$***; SE =0.098), clearly marked waste bins of different types of waste ($\beta = 0.308$*; SE =0.111), and the availability of an organizational structure chart in the facility ($\beta = 0.557$***; SE =0.119).[19] All three of these findings could result from inaction on the part of the staff; they simply did not take down the patients' rights charter, for example. This underscores

[17] We used the "krieger" Stata command described in Newson et al. (2003), originated from Benjamini et al. (2001).
[18] With the List et al FWER-correction it is not possible to include control variables, which is why the total number of rejected null-hypotheses using uncontrolled p-values is 29 in Table 9C, as opposed to 22 when employing control variables (and as we reported in section 5.2.1).
[19] The visible presence of hand washing supplies ($\beta = 0.202$*; SE =0.079) and clean storage of bed linens ($\beta = 0.254$*; SE =0.106) were marginally significant in the long-run follow-up, but were not significant during rounds 1-6.

the notion that the driver of our effects in Treatment A, which was a composite of providing information and support/monitoring, was likely the regular monitoring component.

The lack of sustained effects in the long-run is not due to staff turnover. In fact, 71% of the core staff (doctors, midwives, nurses) that worked at the PHCs in round 1 were still working there through round 7, i.e. one year after the intervention ended (see table 10). Retention rates are similar across the three experimental conditions.

6 Conclusions

We conducted a randomized field experiment evaluating the effects of a health care management consulting program for primary health care centers in Nigeria. To our knowledge, this is the first randomized controlled study of the effects of management consulting on the adoption of organizational "standards" in primary health care facilities in a developing country context. Moreover, our experimental design allows us to distinguish between information effects, implementation support effects, and supervision effects.

We find that providing a detailed quality improvement plan paired with continuous monitoring and feedback increased the adoption of several standards and processes. The more intensive treatment also led to improvements in some intermediate outcomes, namely those that were within direct control of the PHC staff, such as cleanliness of toilets and waiting rooms and availability of hand-washing equipment. These effects, however, essentially disappeared one year after the end of the intervention. Alternatively, merely presenting baseline quality assessments and summary feedback were insufficient to change health care practices.

All of the short-term effects were found for practices that were under the direct control of the PHC staff, and that required minimal or moderate additional effort. The lack of adequate infrastructure and support structures for PHC staff which our data reveal are contributing factors to poor quality of health care provision. For example, many clinics do not have access to the national power grid, and stock-outs of essential drugs are not always promptly replenished. Moreover, the PHC staff seem to lack incentives to implement process improvements that require extra effort and thus are not "free".

These findings indicate that information alone on what practices should be adopted is not sufficient. That is, there seem to be no minimal interventions that immediately lead to the sustained adoption of modern organizational practices. We find that improvements occur when specific information on practices to be adopted is combined with implementation support. In particular, periodical monitoring of the progress appears to be important for achieving sustained improvements in contexts where the absence of external competition or managerial pay-for-performance fail to create incentives for the adoption of organizational standards. In a context where many health care facilities share the same challenges, a lower-cost alternative to the intervention here may involve a less intensive baseline evaluation but more sustained monitoring.

References

Anderson, M.L., 2012. Multiple inference and gender differences in the effects of early intervention: A reevaluation of the Abecedarian, Perry Preschool, and Early Training Projects. *Journal of the American statistical Association*.

Asibong, U., Okokon, I. B., Agan, T. U., Oku, A., Opiah, M., Essien, E. J., & Monjok, E. (2014). The use of the partograph in labor monitoring: a cross-sectional study among obstetric caregivers in general Hospital, calabar, cross river state, nigeria. *International journal of women's health*, *6*, 873.

Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: a practical and powerful approach to multiple testing. Journal of the royal statistical society. Series B (Methodological), 289-300.

Benjamini, Y., Krieger, A., & Yekutieli, D. (2001). Two-Staged Linear Step-Up FDR Controlling Procedure, Department of Statistics and Operation Research, Tel-Aviv University, and Department of Statistics, Wharton School, University of Pennsylvania. Technical Report.

Benjamini, Y., Krieger, A. M., & Yekutieli, D. (2006). Adaptive linear step-up procedures that control the false discovery rate. Biometrika, 93(3), 491-507.

Berwick, D. 2004. "Lessons from Developing Nations on Improving Health Care." British Medical Journal 328 (7448): 1124–29.

Bloom, N., Sadun, R., and Van Reenen, J. 2012. "The organization of firms across countries". Quarterly Journal of Economics.

Bloom, N., Eifert, B., Mahajan, A., McKenzie, D. and Roberts, J., 2013. "Does management matter: evidence from India", Quarterly Journal of Economics.

Bloom, N., Sadun, R. and Van Reenen, J., 2013. Management as a Technology. Research paper, Stanford University.

Bloom, N., Sadun, R., and Van Reenen, J. 2014. "Does Management Matter in Health care?", mimeo, Harvard University.

Bonferroni, C. E. (1935). Il calcolo delle assicurazioni su gruppi di teste. Tipografia del Senato.

Butar, F. B., & Park, J. W. (2008). Permutation tests for comparing two populations. Journal of Mathematical Science & Mathematics Education V3, (2), 19-30.

Chakraborty, S., D'Souza, S. A., & Northrup, R. S. 2000. Improving private practitioner care of sick children: testing new approaches in rural Bihar. Health policy and planning, 15(4), 400-407.

Chandra, A., Finkelstein, A., Sacarny, A., & Syverson, C. (2013). Health care Exceptionalism? Productivity and Allocation in the US Health care Sector (No. w19200). National Bureau of Economic Research.

Das, Jishnu and Jeffrey Hammer. 2014. "Quality of Primary Care in Low-Income Countries". Annual Review of Economics. DOI 10.1146/annurev-economics-080213_041350.

Das, J., Holla, A., Das, V., Mohanan, M., Tabak, D., & Chan, B. (2012). In urban and rural India, a standardized patient study showed low levels of provider training and huge quality gaps. *Health Affairs*, *31*(12), 2774-2784.

Das, J., Hammer, J., & Leonard, K. (2008). The quality of medical advice in low-income countries. The Journal of Economic Perspectives, 22(2), 93-114.

Dunsch, F.A., Evans, D.K., Macis, M., & Wang, Q. (2017). Framing effects are biasing measured health care quality: Evidence from patient satisfaction surveys in Nigeria. Unpublished manuscript.

Ejemot-Nwadiaro, R. I., Ehiri, J. E., Arikpo, D., Meremikwu, M. M., & Critchley, J. A. (2015). Hand washing promotion for preventing diarrhoea. The Cochrane Database of Systematic Reviews, (9), 1–95. http://doi.org/10.1002/14651858.CD004265.pub3

Evans, A. (2017). Amplifying Accountability by Benchmarking Results at District and National Levels. Development Policy Review. doi: 10.1111/dpr.12213.

Evans, D.K., & Tärneberg, A.W. (2017). Health Care Quality and Information Failure: Evidence from Nigeria. Unpublished manuscript.

Holm, S. (1979). A simple sequentially rejective multiple test procedure. Scandinavian journal of statistics, 65-70.

Institute for Health Metrics and Evaluation. (2016). Nigeria Country Profile. http://www.healthdata.org/nigeria (accessed August 1, 2017).

Institute of Medicine. (2001). Crossing the Quality Chasm: A New Health System for the 21st Century. Washington D.C.: National Academy Press.

Jacob, B., Kapustin, M., & Ludwig, J. (2014). Human capital effects of anti-poverty programs: evidence from a randomized housing voucher lottery (No. w20164). National Bureau of Economic Research.

Kling, J. R., Liebman, J. B., & Katz, L. F. (2007). Experimental analysis of neighborhood effects. Econometrica, 75(1), 83-119.

Kotch, J.B., Isabell, P., Weber, D.J., Nguyen, V., Savage, E., Gunn, E., Skinner, M., Fowlkes, S., Virk, J., Allen, J. 2007. "Hand-Washing and Diapering Equipment Reduces Disease Among Children in Out-of-Home Child Care Centers." Pediatrics 120(1).

Leonard, K. (2008). Is patient satisfaction sensitive to changes in the quality of care? An exploitation of the Hawthorne effect. Journal of health economics, 27(2), 444-459.

List, J.A., Shaikh, A.M. and Xu, Y., 2016. Multiple hypothesis testing in experimental economics (No. w21875). National Bureau of Economic Research.

Maury, E., Alzieu, M., Baudel, J.L., Haram, N., Barbut, F., Guidet, B., Offenstadt, G. 2000. Availability of an alcohol solution can improve hand disinfection compliance in an intensive care unit. American Journal of Respiratory and Critical Care Medicine, 162:324-327.

McKenzie, D. (2012). Beyond baseline and follow-up: The case for more T in experiments. Journal of Development Economics, 99(2), 210-221.

Newson, R., & ALSPAC Study Team. (2003). Multiple-test procedures and smile plots. Stata J, 3(2), 109-132.

Okoli, U., Eze-Ajoku, E., Oludipe Modupe, Spieker, N., Ekezie Winifred, and Ohiri Kelechi. "Improving Quality of Care in Primary Health-Care Facilities in Rural Nigeria Successes and Challenges." Health Services Research and Managerial Epidemiology 3 (2016): 2333392816662581.

Peabody JW, Taguiwalo MM, Robalino DA, et al. Improving the Quality of Care in Developing Countries. In: Jamison DT, Breman JG, Measham AR, et al., editors. Disease Control Priorities in Developing Countries. 2nd edition. Washington (DC): World Bank; 2006. Chapter 70. Available from: http://www.ncbi.nlm.nih.gov/books/NBK11790/

Peabody, J., P. Gertler, and A. Liebowitz. 1998. "The Policy Implications of Better Structure and Process on Birth Outcomes in Jamaica." Health Policy 43 (1): 1–13.

SafeCare. 2013. "SafeCare Standards receive International ISQua Accreditation." http://www.safe-care.org/index.php?mact=News,cntnt01,detail,0&cntnt01articleid=17&cntnt01returnid=45. Accessed October 30, 2015.

SafeCare. 2014. "Standards: SafeCare Advanced Assessment." http://www.safe-care.org/uploads/Standards%202014%20ADVANCED.pdf. Accessed October 30, 2015.

SafeCare. 2015. "SafeCare Standards." http://www.safe-care.org/index.php?page=safecare-standards. Accessed October 30, 2015.

SafeCare. "Government partners." http://www.safe-care.org/index.php?page=government-partners (accessed July 31, 2017).

Savin, N. E. 1984. "Multiple hypothesis testing." Handbook of econometrics 2 (1984): 827-879.

Strasser, R., Kam, S.M. and Regalado, S.M., 2016. Rural health care access and policy in developing countries. *Annual review of public health*, 37, pp.395-412.

Ugo, O., Eze-Ajoku, E., Modupe, O., Nicole, S., Winifred, E. and Kelechi, O., 2016. Improving Quality of Care in Primary Health-Care Facilities in Rural Nigeria: Successes and Challenges. *Health Services Research and Managerial Epidemiology*, 3, p.2333392816662581.

UNICEF (2014), "Levels & Trends in Child Mortality - Report 2013". Available at http://www.childinfo.org/files/Child_Mortality_Report_2013.pdf (downloaded on 7/18/2015).

Windfeld, E. S., & Brooks, M. S. L. (2015). Medical waste management–A review. *Journal of environmental management*, *163*, 98-108.

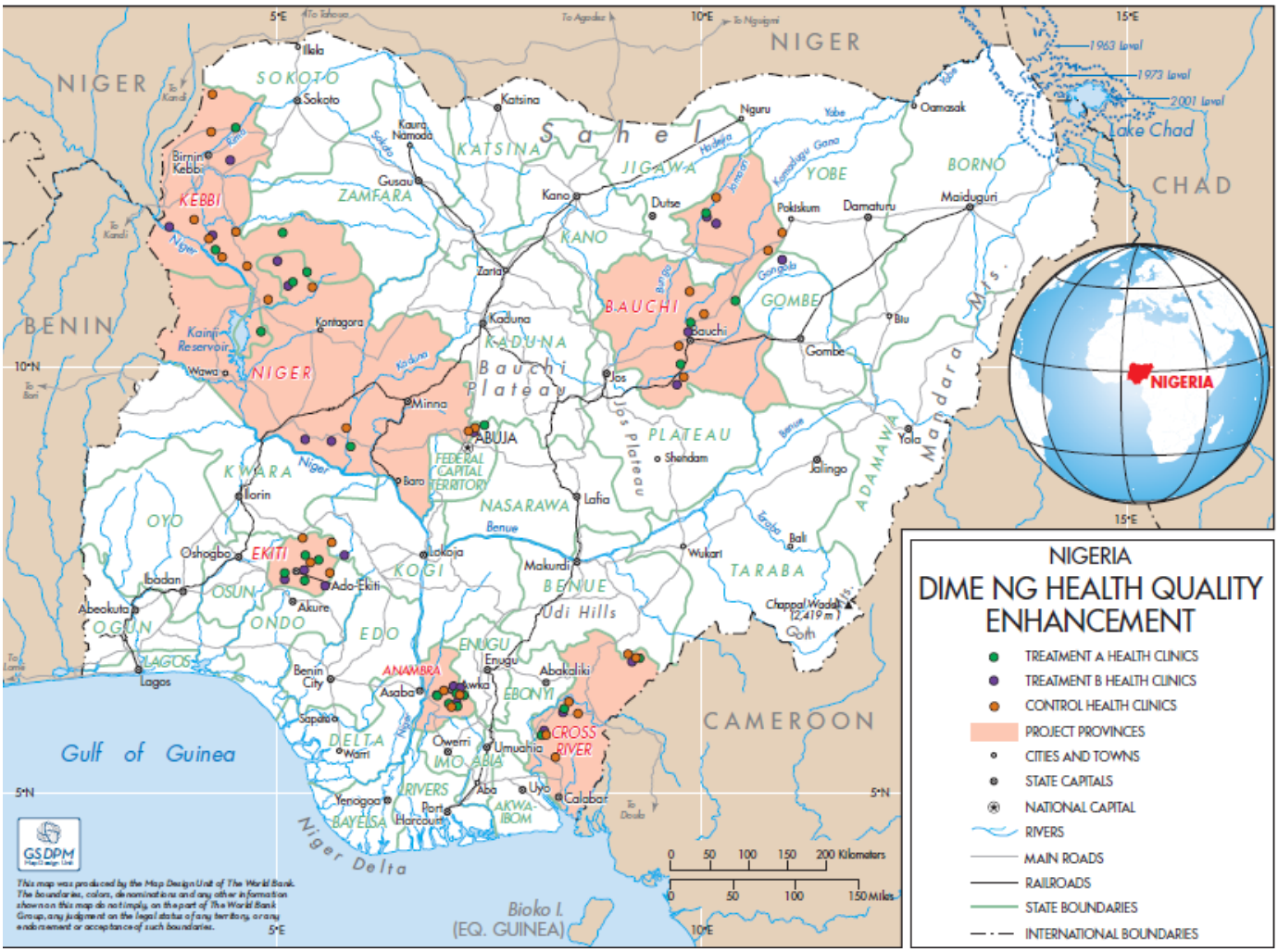
World Bank. (2016). World Development Indicators. Available at http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators (accessed on August 1, 2017).

World Health Organization. (2006). Quality of care: a process for making strategic choices in health systems.

World Health Organization. (2009). WHO Guidelines on Hand Hygiene in Health Care: A Summary. http://www.who.int/gpsc/5may/tools/who_guidelines-handhygiene_summary.pdf (accessed on August 1, 2017).

World Health Organization. (2015). “Nigeria: WHO statistical profile,” World Health Organization, Geneva. http://www.who.int/gho/countries/nga.pdf?ua=1 (accessed on August 1, 2017).

Figure 1: Map with Study Sites



Note: The map shows the 6 states where the intervention took place. Treatment A facilities are marked with a green dot, Treatment B facilities are marked purple, and facilities in the control group are orange. A higher resolution map can be found here: http://tinyurl.com/map-nigeria.

Figure 2: Examples of action items from the Quality Improvement Plans and our outcome variables.

QIP Example 1: Design an organizational chart or document which describes the lines of authority and account-ability from governance and within the service. (1.1.1.2)

Our variable:

- *Is an organizational structure chart available in the facility?*

QIP Example 2: Ensure the availability of safety boxes and covered dustbins in all areas of the facility for waste collection. Dustbins should have colour coded bin liners or should be painted with the respective colour codes. (5.6.2.4.; 13.3.4.2.; 13.3.4.3.)

Our variables:

- *Are there waste bins in the clinic?*
- *Are the waste bins covered?*
- *Are the waste bins for different types of waste clearly marked? (for example color coded)*

Table 1: SafeCare standards categories

Health care organization management	1. Management and leadership 2. Human resource management 3. Patient rights and access to care 4. Management and information 5. Risk management
Care of patients	6. Primary health care services 7. In-patient care
Specialized services	8. Operating theatre and anesthetic services 9. Laboratory services 10. Diagnostic imaging services 11. Medication management
Ancillary services	12. Facility management services 13. Support services

Note: The full list of SafeCare standards can be found at this website: http://www.safe-care.org/index.php?page=safecare-standards.

Table 2: Comparison of participating and non-participating facilities

	(1) **Participating PHCs**	(2) **Non-Participating PHCs**	(3) **p-values** (Participating vs. Non-participating)
N. of facilities	79	394	
Facility Characteristics			
% having 24 hours shift rotation	0.86	0.88	0.67
% having at least one midwife per shift	0.73	0.74	0.97
% having a reception/registration room	0.66	0.72	0.31
number of observation beds	2.77	3.23	0.16
number of days with no electricity/light at all during the last week	4.83	4.74	0.78
distance to the referral facility/hospital (km)	19.18	20.76	0.58
% having transportation for patients	0.10	0.15	0.22
Working Conditions			
number of staff meeting in the past 12 months	8.17	9.41	0.23
% having developed a facility workplan for this year	0.50	0.58	0.21
% having a WDC supervisor	0.95	0.93	0.51
% having a patients feedback mechanism	0.63	0.68	0.47
% having a staff reward system	0.30	0.21	0.08
Human Resources			
number of staff qualified as midwife and nurse	2.54	2.67	0.69
number of staff qualified as midwife only	0.63	0.73	0.55
number of staff qualified as nurse only	0.33	0.31	0.88
number of health workers	12.25	12.35	0.93
Patients			
number of women discharges last week after having given birth	3.99	3.59	0.46
number of registered cases of antenatal care last month	40.05	35.86	0.40
number of registered cases of deliveries last month	6.92	6.54	0.68

Notes: Data are from the 2013 Nigeria SURE-P MCH facilities' survey. The universe consists of the 474 PHCs nationwide that participated in the SURE-P subsidies program (see Section 2 of the paper for details).

Table 3: Distribution of PHCs across experimental conditions, by State

State	Total # of PHCs	Treatment A	Treatment B	Control
Anambra	12	5	4	3
Bauchi	16	4	5	7
Cross River	12	3	3	6
Ekiti	12	4	4	4
Kebbi	16	4	4	8
Niger	12	4	4	4
Total	**80**	**24**	**24**	**32**

Table 4: Baseline balance tests – 4A: Treatment A vs. Control

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Mean		**non-Permutation Tests**			**Permutation Tests**		
	Control	*Treatment A*	*T-test*	*Exact*	*Ranksum*	*T-test*	*Exact*	*Ranksum*
Respondent								
age	43.32	45.08	0.35	0.22	0.47	0.39	0.79	0.47
gender	0.48	0.63	0.31	0.41	0.30	0.32	0.69	0.32
Facility Characteristics								
% having 24 hours shift rotation	0.77	0.92	0.16	0.27	0.16	0.16	0.83	0.17
% having at least one midwife per shift	0.65	0.83	0.12	0.14	0.12	0.12	0.91	0.11
% having a reception/registration room	0.61	0.75	0.29	0.39	0.29	0.26	0.76	0.26
number of observation beds	3.13	2.30	0.15	0.57	0.22	0.14	0.45	0.22
number of days with no electricity/light at all during the last week	5.00	5.04	0.96	0.53	0.98	0.96	0.48	0.98
distance to the referral facility/hospital (km)	21.90	16.17	0.27	0.92	0.24	0.24	0.09	0.23
% having transportation for patients	0.10	0.13	0.74	1.00	0.74	0.78	0.32	0.79
Working Condition								
number of staff meeting in the past 12 months	10.77	7.61	0.27	0.19	0.41	0.22	0.81	0.42
% having developed a facility workplan for this year	0.55	0.43	0.41	0.58	0.41	0.42	0.57	0.42
% having a WDC supervisor	0.97	0.88	0.20	0.31	0.19	0.18	0.82	0.22
% having a patients feedback mechanism	0.68	0.63	0.69	0.78	0.69	0.72	0.40	0.72
% having a staff reward system	0.42	0.21	0.10	0.15	0.10	0.11	0.88	0.11
Human Resources								
number of staff qualified as midwife and nurse	1.97	3.08	0.07	0.25	0.07	0.10	0.75	0.07
number of staff qualified as midwife only	0.84	0.50	0.42	0.98	0.80	0.37	0.04	0.79
number of staff qualified as nurse only	0.45	0.38	0.74	0.31	0.95	0.69	0.71	0.93
number of health workers	14.00	12.13	0.33	0.04	0.11	0.28	0.95	0.11
Patients								
number of women discharges last week after having given birth	3.94	3.30	0.46	0.06	0.87	0.56	0.95	0.87
number of registered cases of antenatal care last month	40.38	40.95	0.95	0.18	0.92	0.95	0.84	0.91
number of registered cases of deliveries last month	6.89	7.78	0.65	0.15	0.51	0.65	0.85	0.53

Table 4 (Continued) – 4B: Treatment B vs. Control

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Mean		**non-Permutation Tests**			**Permutation Tests**		
	Control	*Treatment B*	*T-test*	*Exact*	*Ranksum*	*T-test*	*Exact*	*Ranksum*
Respondent								
age	43.32	43.48	0.94	0.80	0.56	0.95	0.24	0.55
gender	0.48	0.54	0.68	0.79	0.67	0.69	0.33	0.69
Facility Characteristics								
% having 24 hours shift rotation	0.77	0.92	0.16	0.27	0.16	0.16	0.82	0.17
% having at least one midwife per shift	0.65	0.75	0.41	0.56	0.41	0.41	0.52	0.43
% having a reception/registration room	0.61	0.63	0.93	1.00	0.93	0.94	0.24	0.94
number of observation beds	3.13	2.74	0.53	0.32	0.62	0.49	0.68	0.65
number of days with no electricity/light at all during the last week	5.00	4.42	0.44	0.48	0.30	0.43	0.53	0.31
distance to the referral facility/hospital (km)	21.90	18.65	0.55	0.90	0.41	0.52	0.12	0.42
% having transportation for patients	0.10	0.08	0.87	1.00	0.86	0.93	0.34	0.94
Working Condition								
number of staff meeting in the past 12 months	10.77	5.33	0.05	0.66	0.03	0.03	0.35	0.04
% having developed a facility workplan for this year	0.55	0.50	0.71	0.79	0.71	0.71	0.29	0.71
% having a WDC supervisor	0.97	1.00	0.38	1.00	0.38	0.61	0.43	0.40
% having a patients feedback mechanism	0.68	0.58	0.48	0.58	0.48	0.51	0.53	0.51
% having a staff reward system	0.42	0.25	0.20	0.26	0.19	0.18	0.78	0.19
Human Resources								
number of staff qualified as midwife and nurse	1.97	2.75	0.24	0.30	0.40	0.28	0.69	0.43
number of staff qualified as midwife only	0.84	0.50	0.40	0.57	0.98	0.38	0.45	0.98
number of staff qualified as nurse only	0.45	0.13	0.13	0.39	0.15	0.11	0.64	0.15
number of health workers	14.00	10.13	0.01	0.51	0.01	0.02	0.49	0.01
Patients								
number of women discharges last week after having given birth	3.94	4.71	0.51	0.16	0.57	0.48	0.85	0.57
number of registered cases of antenatal care last month	40.38	38.78	0.86	0.49	0.49	0.85	0.52	0.49
number of registered cases of deliveries last month	6.89	6.09	0.67	0.98	0.68	0.65	0.03	0.67

Table 4 (Continued) – 4C: Treatment A vs. Treatment B

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Mean		**non-Permutation Tests**			**Permutation Tests**		
	Treatment A	*Treatment B*	*T-test*	*Exact*	*Ranksum*	*T-test*	*Exact*	*Ranksum*
Panel A: Respondent								
age	45.08	43.48	0.50	0.71	0.96	0.47	0.35	0.96
gender	0.63	0.54	0.57	0.77	0.56	0.64	0.55	0.52
Panel B: Facility Characteristics								
% having 24 hours shift rotation	0.92	0.92	1.00	1.00	1.00	1.00	0.46	1.00
% having at least one midwife per shift	0.83	0.75	0.49	0.72	0.48	0.63	0.57	0.47
% having a reception/registration room	0.75	0.63	0.36	0.53	0.36	0.44	0.69	0.36
number of observation beds	2.30	2.74	0.39	0.93	0.39	0.47	0.07	0.39
number of days with no electricity/light at all during the last week	5.04	4.42	0.40	0.39	0.34	0.44	0.63	0.36
distance to the referral facility/hospital (km)	16.17	18.65	0.61	0.48	0.82	0.66	0.54	0.83
% having transportation for patients	0.13	0.08	0.65	1.00	0.64	0.81	0.51	0.76
Panel C: Working Condition								
number of staff meeting in the past 12 months	7.61	5.33	0.12	0.19	0.16	0.39	0.82	0.16
% having developed a facility workplan for this year	0.43	0.50	0.66	0.77	0.66	0.67	0.35	0.66
% having a WDC supervisor	0.88	1.00	0.08	0.23	0.08	0.10	0.98	0.10
% having a patients feedback mechanism	0.63	0.58	0.77	1.00	0.77	0.89	0.32	0.86
% having a staff reward system	0.21	0.25	0.74	1.00	0.73	0.87	0.35	0.67
Panel D: Human Resources								
number of staff qualified as midwife and nurse	3.08	2.75	0.67	0.17	0.43	0.66	0.83	0.44
number of staff qualified as midwife only	0.50	0.50	1.00	0.84	0.78	1.00	0.21	0.78
number of staff qualified as nurse only	0.38	0.13	0.15	0.32	0.13	0.31	0.72	0.14
number of health workers	12.13	10.13	0.20	0.39	0.66	0.30	0.63	0.68
Panel E: Patients								
number of women discharges last week after having given birth	3.30	4.71	0.22	0.76	0.59	0.21	0.25	0.60
number of registered cases of antenatal care last month	40.95	38.78	0.84	0.23	0.62	0.82	0.79	0.64
number of registered cases of deliveries last month	7.78	6.09	0.40	0.21	0.30	0.38	0.80	0.28

Notes: Nigeria SURE-P MCH Survey Data; Column (1) and (2) present the mean of the indicated group. Column (3) presents p-values from simple T-tests with null hypothesis Treatment A (mean) = Control (mean). Column (4) and (5) present p-values from Fisher's Exact Tests (Exact) and Wilcoxon Ranksum Tests. Column (6), (7) and (8) are p-values from permutated T-tests, Fisher's Exact Tests and Wilcoxon Ranksum Tests with 1000 repetitions. Permutation p-value=number of cases with absolute difference value >= |diff| (real observed one) /number of random permutations performed (reps(1000)).

Table 5: Summary of the Results

		Treatment A	
	No. Indicators	No. Significant	%
Results by "Within/Outside PHC control and effort"			
"Within PHC control/Low effort" Index	18	7	39%
"Within PHC control/Moderate effort" Index	37	12	32%
"Outside PHC control/High effort" Index	20	3	15%
In total	75	22	29%
Results by "Process vs Intermediate Outcome"			
"Process" Index	61	18	30%
"Intermediate Outcome" Index	14	4	29%
In total	75	22	29%

Table 6: Regressions Results – Processes

6A: Management & Leadership

	Sample	Model	Obs.	Ctrl Mean	Treatment A	Treatment B	Within/Outside PHC control and effort level	Process vs. Intermediate outcome
An organizational structure chart available in the facility?	round 6	(1)	80	0.03	0.643*** [0.0977]	-0.048 [0.0477]	Within PHC control /low effort	Process
Any staff meetings held last month?	rounds 1-6	(1)	466	0.67	0.161** [0.0539]	0.026 [0.0558]	Within PHC control /moderate effort	Process
N. meetings held last month	rounds 1-6	(1)	336	1.13	0.169* [0.0732]	-0.013 [0.0687]	Within PHC control /moderate effort	Process
Have a written summary for the most recent meeting last month?	rounds 1-6	(1)	332	0.79	0.077 [0.0443]	-0.020 [0.0569]	Within PHC control /moderate effort	Process
Ever been approached by staff or approached in-charge with suggestions for PHC improvement	rounds 1 and 6	(1)	471	0.25	0.079 [0.0405]	-0.008 [0.0491]	Within PHC control /low effort	Process
Currently working towards any improvement targets?	round 6	(1)	76	0.61	0.152 [0.0997]	-0.098 [0.116]	Within PHC control /low effort	Process
Drugs and vaccines are labeled and organized by expiration date	rounds 1-6	(1)	439	0.03	0.197** [0.0673]	-0.017 [0.0259]	Within PHC control /moderate effort	Process

6B: Patient Rights

	Sample	Model	Obs.	Ctrl Mean	Treatment A	Treatment B	Within/Outside PHC control and effort level	Process vs. Intermediate outcome
Is a patient rights charter visibly displayed?	rounds 1-6	(1)	471	0.02	0.632***	-0.014	Within PHC control /low effort	Process
					[0.0694]	[0.0208]		
Have you put up any posters with clinical information last month?	rounds 1-6	(1)	471	0.57	0.072	0.036	Within PHC control /low effort	Process
					[0.0444]	[0.0364]		
Number (out of 7) of printed medical issue guidelines available	rounds 1-6	(1)	471	1.56	0.114	0.110	Within PHC control /moderate effort	Process
					[0.0739]	[0.0913]		
How many ward screens are available throughout the facility?	rounds 1-6	(1)	471	1.74	0.934**	0.414	Outside PHC control /high effort	Process
					[0.346]	[0.261]		

6C: Risk Management, Waste Management, Sterilization and Security

	Sample	Model	Obs.	Ctrl Mean	Treatment A	Treatment B	Within/Outside PHC control and effort level	Process vs. Intermediate outcome
Flammable materials are clearly labeled	round 6	(1)	80	0.56	-0.079	0.147	Within PHC control	Process
					[0.110]	[0.0913]	/low effort	
Are there fire extinguishers (functional)?	rounds 1-6	(1)	468	0.52	0.187*	0.035	Outside PHC control	Process
					[0.0869]	[0.0981]	/high effort	
Are there posters showing waste separation in the clinic?	round 6	(1)	80	0.00	0.174*	0.052	Within PHC	Process
					[0.0797]	[0.0492]	control/low effort	
Is there a waste bin in the clinic?	rounds 1-6	(1)	471	0.98	0.004	0.005	Within PHC control	Process
					[0.0131]	[0.0162]	/moderate effort	
Are the waste bins for different types of waste clearly marked?	round 6	(1)	79	0.32	0.322**	-0.052	Within PHC	Process
					[0.106]	[0.0979]	control/low effort	
Medical waste and regular waste are disposed of separately	rounds 1-6	(1)	391	0.28	-0.016	0.006	Within PHC control	Intermediate outcome
					[0.0628]	[0.0643]	/moderate effort	
Does this facility have any guidelines on health care waste management?	round 6	(1)	80	0.00	0.208*	0.043	Within PHC	Process
					[0.0826]	[0.0444]	control/low effort	
Have you or any provider(s) received training in health care waste management?	round 6	(1)	80	0.09	0.117	0.000	Within PHC control	Process
					[0.106]	[0.0827]	/moderate effort	
Are there different mops available for high and low risk areas?	round 6	(1)	80	0.63	0.074	-0.311*	Within PHC control	Process
					[0.129]	[0.127]	/moderate effort	
There is color system for these mops	round 6	(1)	47	0.25	0.371**	0.428**	Within PHC control	Process
					[0.119]	[0.147]	/moderate effort	
Are there medical gloves available?	round 6	(1)	80	0.97	0.020	-0.021	Within PHC control	Process
					[0.0306]	[0.0581]	/moderate effort	

Is there a designated individual responsible for infection control at this facility?	round 6	(1)	80	0.16	0.337** [0.114]	-0.019 [0.0926]	Within PHC control /low effort	Process
Were staff trained on disinfection techniques? (last 6 months)	round 6	(1)	74	0.03	0.176 [0.0953]	0.041 [0.0544]	Within PHC control /moderate effort	Process
Are there materials for sterilization of equipment	rounds 1-5	(2)	380	0.90	-0.075 [0.0498]	-0.014 [0.0593]	Outside PHC control /high effort	Process
IF YES, is there a functional Autoclave?	rounds 1-5	(1)	346	0.65	0.031 [0.0872]	-0.014 [0.0720]	Outside PHC control /high effort	Process
IF YES, is there an electric dry heat sterilizer (functional)	rounds 1-5	(1)	345	0.24	-0.010 [0.125]	-0.075 [0.110]	Outside PHC control /high effort	Process
Have contact phone numbers of any external security sources?	round 6	(1)	80	0.28	0.190 [0.118]	-0.081 [0.101]	Within PHC control /low effort	Process

6D: Facility Management Services

	Sample	Model	Obs.	Ctrl Mean	Treatment A	Treatment B	Within/Outside PHC control and effort level	Process vs. Intermediate outcome
Connected to national power grid?	rounds 1-6	(1)	471	0.74	-0.026	-0.111	Outside PHC control /high effort	Process
					[0.0783]	[0.104]		
Hours connected to national power grid	rounds 1-6	(1)	345	3.34	-0.053	-0.320	Outside PHC control /high effort	Process
					[0.614]	[0.603]		
N. days without electricity interruptions in past two weeks	round 6	(1)	64	3.12	-0.389	0.138	Outside PHC control /high effort	Process
					[1.031]	[0.956]		
N. days without electricity interruptions in past two weeks	round 6	(2)	26	3.12	-0.791	2.003		
					[1.758]	[1.411]		
Have functional generator?	rounds 1-6	(1)	459	0.58	0.066	0.022	Outside PHC control /high effort	Process
					[0.0910]	[0.0906]		
Currently have fuel for the generator?	rounds 1-6	(1)	277	0.58	0.257**	-0.012	Within PHC control /moderate effort	Process
					[0.0932]	[0.117]		
N. days with access to power last week	rounds 1-6	(1)	410	3.76	0.378	0.243	Outside PHC control /high effort	Process
					[0.420]	[0.389]		
Clean water seasonal or available all year?	rounds 1 and 6	(1)	160	0.86	0.056	-0.051	Outside PHC control /high effort	Process
					[0.0650]	[0.0764]		
N. days with access to clean water last week	rounds 1-6	(1)	469	6.56	0.130	-0.149	Outside PHC control /high effort	Process
					[0.189]	[0.212]		
N. days without water supply interruptions in past two weeks	round 6	(1)	75	13.34	-0.132	-0.889	Outside PHC control /high effort	Process
					[0.781]	[1.046]		

6E: Human Resources Management

	Sample	Model	Obs.	Ctrl Mean	Treatment A	Treatment B	Within/Outside PHC control and effort level	Process vs. Intermediate outcome
Facility has written list of all clinical staff	round 1 and 6	(1)	159	0.83	0.077 [0.0618]	-0.035 [0.0701]	Within PHC control /low effort	Process
Facility has enough staff	round 1 and 6	(1)	129	0.14	0.038 [0.0845]	0.029 [0.0795]	Outside PHC control /high effort	Process
Has this facility submitted a request for additional staff?	rounds 1 and 6	(1)	144	0.68	-0.089 [0.0914]	-0.114 [0.0892]	Within PHC control /low effort	Process
Facility has system for measuring personnel performance	rounds 1 and 6	(1)	153	0.37	-0.029 [0.0740]	0.029 [0.0794]	Within PHC control /moderate effort	Process
Facility has system for rewarding personnel performance	rounds 1 and 6	(2)	154	0.54	0.022 [0.0794]	-0.019 [0.0706]	Outside PHC control /high effort	Process

6F: Primary Health Care Services

	Sample	Model	Obs.	Ctrl Mean	Treatment A	Treatment B	Within/Outside PHC control and effort level	Process vs. Intermediate outcome
Pregnancies, Labor and Delivery								
How many antenatal visits did this facility receive last month?	rounds 1-6	(2)	432	96.59	2.395 [17.67]	9.122 [28.67]	Outside PHC control /high effort	Intermediate outcome
Keep individual ANC records?	round 6	(1)	67	0.77	0.025 [0.0976]	0.078 [0.0779]	Within PHC control /moderate effort	Process
How many deliveries took place at this PHC in the last month?	rounds 1-6	(1)	468	18.93	1.010 [3.445]	5.851 [5.298]	Outside PHC control /high effort	Intermediate outcome
N. deliveries without complication/N. deliveries in the PHC	rounds 1-6	(1)	466	0.98	0.007 [0.00929]	0.010 [0.00808]	Outside PHC control /high effort	Intermediate outcome
Did the respondent use written records to answer the above questions?	rounds 1-6	(1)	50	0.96	0.054 [0.0833]	0.005 [0.0429]	Within PHC control /moderate effort	Process
Is there a partograph available in the facility?	rounds 1 and 6	(2)	151	0.27	0.137 [0.0789]	-0.076 [0.0739]	Within PHC control /low effort	Process
IF YES, is it posted visibly?	rounds 1 and 6	(1)	49	0.29	-0.074 [0.169]	0.233 [0.222]	Within PHC control /low effort	Process
Of the 10 most recent births records, how many have an "apgar" report?	rounds 1-6	(1)	468	3.55	1.407** [0.415]	-0.096 [0.451]	Within PHC control /moderate effort	Intermediate outcome
Patient Records								
Do you keep individual case records?	round 6	(1)	80	0.81	0.034 [0.0936]	0.007 [0.0970]	Within PHC control /moderate effort	Process
Can we look at 5 records now please?	round 6	(1)	67	0.96	0.019 [0.0430]	-0.024 [0.0716]	Within PHC control /moderate effort	Process
Average completeness of the 5 patient records	round 6	(1)	65	0.82	0.041 [0.0393]	-0.011 [0.0411]	Within PHC control /moderate effort	Process
Keep files for all patients (not just selected or sporadical cases)?	round 6	(1)	67	0.69	0.047 [0.113]	-0.216 [0.124]	Within PHC control /moderate effort	Process

Diagnosis and Treatment of Malaria								
Do you have printed guidelines for the treatment of Malaria	rounds 1 and 6	(1)	160	0.95	-0.032 [0.0448]	0.043 [0.0366]	Within PHC control /moderate effort	Process
N. cases diagnosed via RDT/N. cases malaria	rounds 1-6	(1)	453	0.789	-0.0854 [0.0484]	-0.0265 [0.0400]	Within PHC control /moderate effort	Intermediate outcome
N. cases diagnosed via lab/N. cases malaria	rounds 1-6	(1)	453	0.0461	0.0408 [0.0434]	-0.0434* [0.0197]	Within PHC control /moderate effort	Intermediate outcome
Keep individual malaria records?	round 6	(1)	67	0.23	-0.011 [0.0923]	-0.105 [0.0837]	Within PHC control /moderate effort	Process
Hand Washing Guidelines and Equipment								
Is there a hand washing facility for patients?	rounds 1-6	(1)	471	0.42	0.178** [0.0619]	0.114 [0.0847]	Within PHC control /moderate effort	Process
Is there a hand washing facility for medical personnel?	rounds 1-6	(1)	471	0.84	0.132* [0.0510]	0.155** [0.0546]	Within PHC control /moderate effort	Process
Visible presence of hand washing supplies (soap and water)	rounds 1-6	(1)	438	0.83	0.080 [0.0418]	0.014 [0.0613]	Within PHC control /moderate effort	Process
Water available in the consulting room	rounds 1-6	(1)	453	0.29	0.281*** [0.0808]	0.122 [0.0885]	Within PHC control /moderate effort	Process
Water available in the bathrooms	rounds 1-6	(1)	393	0.35	0.029 [0.0918]	0.066 [0.0805]	Within PHC control /moderate effort	Process
Water available in the waiting room	rounds 1-6	(1)	448	0.32	0.132* [0.0647]	0.007 [0.0695]	Within PHC control /moderate effort	Process
Water available in the delivery room	rounds 1-6	(1)	460	0.84	0.036 [0.0501]	-0.005 [0.0421]	Within PHC control /moderate effort	Process
Is there a poster on display describing hand-washing behavior?	round 6	(1)	80	0.16	0.371*** [0.100]	0.006 [0.0812]	Within PHC control /low effort	Process

Table 7: Regressions Results – Intermediate Outcomes

7A: Cleanliness of Waiting Room, Toilets, and Bed Linens

	Sample	Model	Obs.	Ctrl Mean	Treatment A	Treatment B	Within/Outside PHC control and effort level	Process vs. Intermediate outcome
Is the waiting room clean?	rounds 1-6							
binary 1=no such room at this facility		(1)	471	0.03	-0.026	-0.002	Within PHC control /moderate effort	Intermediate outcome
					[0.0223]	[0.0367]		
binary 1=very clean		(1)	471	0.26	0.136*	0.027		
					[0.0581]	[0.0535]		
binary 1=clean		(1)	471	0.54	-0.035	0.054		
					[0.0615]	[0.0691]		
binary 1=average		(1)	471	0.14	-0.063	-0.057		
					[0.0335]	[0.0334]		
binary 1=dirty		(1)	471	0.02	-0.008	-0.016		
					[0.0125]	[0.0117]		
binary 1=very dirty		(1)	471	0.01	-0.005	-0.006		
					[0.00516]	[0.00555]		
Are the patient toilet rooms clean?	rounds 1-6							
binary 1=no such room at this facility		(1)	467	0.01	0.082	0.006	Within PHC control /moderate effort	Intermediate outcome
					[0.0505]	[0.0197]		
binary 1=very clean		(1)	467	0.09	0.110*	0.060		
					[0.0453]	[0.0487]		
binary 1=clean		(1)	467	0.32	0.117	0.004		
					[0.0745]	[0.0673]		
binary 1=average		(1)	467	0.29	-0.144**	-0.024		
					[0.0466]	[0.0555]		
binary 1=dirty		(1)	467	0.22	-0.126*	-0.037		
					[0.0487]	[0.0516]		
binary 1=very dirty		(1)	467	0.07	-0.039	-0.008		
					[0.0254]	[0.0391]		

Are the stored bed linens clean?	round 6							
binary 1=not clean		(1)	80	0.19	-0.069 [0.0810]	-0.047 [0.0878]	Within PHC control /moderate effort	Intermediate outcome
binary 1=clean		(1)	80	0.53	0.082 [0.112]	0.096 [0.133]		
binary 1=no fresh linens available		(1)	80	0.28	-0.013 [0.0968]	-0.049 [0.115]		

7B: Availability of Essential Drugs and Vaccines

	Sample	Model	Obs.	Ctrl Mean	Treatment A	Treatment B	Within/Outside PHC control and effort level	Process vs. Intermediate outcome
N. out of 9 essential drugs are available/in stock (*)	rounds 1-6	(1)	431	5.908	0.587* [0.266]	0.283 [0.216]	Outside PHC control /high effort	Intermediate outcome
N. out of 6 essential vaccines are available/in stock (**)	rounds 1-6	(1)	117	4.909	-0.143 [0.332]	0.0418 [0.348]	Outside PHC control /high effort	Intermediate outcome
N. out of 9 essential drugs are unexpired/valid (*)	rounds 1-6	(1)	431	5.822	0.635* [0.260]	0.31 [0.211]	Within PHC control /moderate effort	Intermediate outcome
N. out of 6 essential vaccines are unexpired/valid (**)	rounds 1-6	(1)	117	4.886	-0.14 [0.327]	0.0753 [0.352]	Within PHC control /moderate effort	Intermediate outcome
Is there a re-order level for drugs?	rounds 1-6	(1)	430	0.703	-0.0411 [0.0495]	0.0384 [0.0493]	Within PHC control /low effort	Process
Is there a re-order level for vaccines?	rounds 1-6	(1)	336	0.432	-0.0193 [0.0452]	0.0117 [0.0466]	Within PHC control /low effort	Process

Table 8: Patient Experience/Satisfaction

	N	Control Mean	Treatment A	Treatment B
Cleanliness of facility.	1,923	0.89	0.0417*	0.02
			[0.0206]	[0.0191]
Waiting time reasonable.	1,922	0.89	-0.00737	-0.03
			[0.0193]	[0.0288]
Staff courteous and respectful of patient.	1,916	0.98	0.0019	-0.01
			[0.00869]	[0.00881]
Staff explained the patient's condition clearly.	1,909	0.96	-0.0171	-0.01
			[0.0134]	[0.0117]
Patient had enough privacy during visit.	1,915	0.81	-0.0157	-0.03
			[0.0270]	[0.0228]
Staff spent sufficient time with patient.	1,924	0.89	0.0193	-0.02
			[0.0145]	[0.0186]
Hours facility open adequate to meet patient needs.	1,851	0.94	-0.014	0.00
			[0.0151]	[0.0114]
Patient trusts the staff's decision about medical treatment.	1,898	0.92	0.00317	0.01
			[0.0107]	[0.0102]

Table 9: Multiple Hypothesis Testing

Table 9A – Multiple Hypothesis Testing Correction - Z-Scores (equally-weighted)

	(1)	(2)	(3)	(4)	(5)
			Regression Coefficients and Standard Errors		
	N	*N. (vars)*	*Control Mean*	*Treatment A*	*Treatment B*
Results by "Within/Outside PHC control and effort"					
"Within PHC control/Low effort" Index	80	15	0.000	1.663***	-0,301
			(1.000)	[0.270]	[0.185]
"Within PHC control/Moderate effort" Index	80	37	0.000	1.277***	0,172
			(1.000)	[0.200]	[0.207]
"Outside PHC control/High effort" Index	80	20	0.000	0.561	0,174
			(1.000)	[0.288]	[0.387]
Results by "Process vs Outcome"					
"Process" Index	80	58	0.000	1.455***	-0,0389
			(1.000)	[0.234]	[0.206]
"Outcome" Index	80	14	0.000	0.471*	0,308
			(1.000)	[0.205]	[0.204]

Note: We removed *"Displaying patient right charter/poster"* from the "Low effort" and "process" group here, as this had an extreme high coefficient (as almost all Treatment A clinics put up a poster) and thus highly influenced the indices. The 2 indicators *"Are there posters showing waste separation in the clinic?*" and *"Does this facility have any guidelines on health care waste management?"* show no variation in the control group and were therefore excluded here as well, bringing the total number of indicators used in Table 9A to 72 instead of 75.

Table 9B – Corrections to Control False Discovery Rate (FDR)

			Count of rejected null – Treatment A vs. Control	
	Number of observations	Number of outcomes	*Controlling FDR*	*by unadjusted p-Values*
Results by "Within/Outside PHC control and effort"				
"Within PHC control/Low effort"	80	18	6	7
"Within PHC control/Moderate effort"	80	37	7	12
"Outside PHC control/High effort"	80	20	0	3
Total	80	75	13	22
Results by "Process vs Outcome"				
"Process" Index	80	61	10	18
"Outcome" Index	80	14	1	4
Total	80	75	11	22

Table 9C – Corrections using List et al. (2016) FWER-Corrections

			Count of rejected null – Treatment A vs. Control	
	Number of observations	Number of outcomes	*by multiplicity adjusted*	*by unadjusted p-Values*
Results by "Within/Outside PHC control and effort"				
"Within PHC control/Low effort"	80	18	2	7
"Within PHC control/Moderate effort"	80	37	5	16
"Outside PHC control/High effort"	80	20	2	3
Total	80	75	9	26
Results by "Process vs Outcome"				
"Process" group	80	61		
"Outcome" group	80	14	2	5
Total	80	75		

Table 10 – Staff Turnover (Doctors, Midwives, Nurses)

	Average number of staff in round 1	Average number of staff that stayed on through round 7 (one year after the end of the intervention)	Retention rate through round 7
Control	5.3	3.84	76%
Treatment A	5.8	3.92	69%
Treatment B	5.7	3.46	67%
Total	5.6	3.75	71%

Appendix

Appendix Table 1: Recommended standards/practices at treated PHCs

Standard	% of treated facilities with standard included in Safecare
Management & Leadership	
Carry out checks on expiry date of all pharmaceutical and laboratory supplies in all areas of the facility. Ensure proper documentation of these checks. Ensure the 'first expired first out' principle is adhered to.	83%
Document the organizational structure from governance and within the facility. Roles and responsibilities should be documented and education provided to all staff on work dynamics (clinical and administrative).	88%
Introduce a quality management system at the facility (form a quality team, appoint quality lead, organize weekly quality team meetings, take minutes, train staff).	83%
Institute effective mechanisms of communication and collaboration which include handover meetings, ward rounds, clinical meetings, quality team meetings, etc. Keep records. Document and implement action plans.	83%
General storage facilities should be secure, adequate, ventilated and well organised putting different groups of items in sections.	79%
Implement a stock management system with definitions of maximum & reorder levels. Records of stock received, distribution to different units and usage should be kept to prevent stock-outs. Ensure continuous monitoring of stock.	79%
Ensure all new supplies (medication, vaccines, kits, consumables, etc.) are checked for expiry, batch number, labels, signs of tampering, potency, completeness, colour, smell etc. Keep records of action taken if required.	63%
A list of all equipment, furniture and supplies at the facility should be available. This list should be dated, signed and updated periodically. A policy guiding this process should be available.	50%
Implement a system that ensures all equipment and supplies are available, properly stored and distributed to all relevant areas of the facility. A list of all equipment and supplies should be available.	21%
Obtain the national treatment guidelines and standing orders to guide all staff in their clinical practice.	21%
Establish an effective sterilization process (with regular testing) and provide the appropriate training for the personnel.	13%
Ensure completion of the bore-hole-overhead tank-facility system(re-install motor) and provide the means of supplying the water to the point of use. Provide Veronica buckets and other hand washing facilities.	8%
Ensure the provision of a minimum of 2 functional sanitary facilities (patient and staff) in the facility.	8%
Strengthen the community involvement process through establishing goals for the WDC and incorporating quality improvement indicators in the performance review for the	4%

Appendix Table 1 (continued)

Standard	% of treated facilities with standard included in Safecare
Human Resources Management	
Ensure the provision of the needed staff cadres according to the Minimum Standards for PHCs in Nigeria.	46%
Develop an orientation program for new staff at the facility. Keep appropriate records of program content and those in attendance including their signatures.	38%
Create a mechanism that ensures that at the facility levels, job descriptions are known and facility-level performance measurement is done to inform designation and delegation of duties.	4%
Patient Rights & Access to Care	
Obtain patients rights charter. Display strategically in the facility. Train all staff on the patient's right to privacy during examinations, counselling & provision of information (OPD, wards, pharmacy, laboratory, etc).	88%
Ensure the availability of ward screens in relevant areas of the facility (at least 1 ward screen to 2 beds). Ensure windows in patient interaction areas have drapes. Ensure doors are closed during examinations & counselling.	71%
Management of Information	
Ensure all patient records are standardized, dated, up to date, signed and contain the designation of personnel carrying out the assessment.	83%
Make available a secure cabinet/cupboard for the storage of patient files. Ensure files are neatly arranged according to colour, condition and unique identification number. Implement systems for easy retrieval of records.	67%
Ensure all national and local registers are completely filled with correct information. Designate an individual to oversee this process.	58%
Designate an individual to be responsible for the management of information. Establish policy-guided processes regarding data management and provide personnel education/training for the use of data at the facility level.	8%
Risk Management	
Obtain policy on waste management. Train personnel on waste segregation & appropriate containers for collection. Keep adequate records. Display posters on waste segregation at different areas of the facility.	100%
Designate an individual to be responsible for infection control and ensure the provision of continuous in-service training to all personnel. Retrain staff on disinfection techniques. Keep records of training.	96%

Appendix Table 1 (continued)

Standard	% of treated facilities with standard included in Safecare
Risk Management (continued)	
Develop & document a mechanism for summoning the assistance of external sources of security in an emergency (eg. Police, community guards, etc.). Make it known to all personnel. Have available contact details displayed in relevant areas.	92%
Ensure flammable materials (fuel, kerosene, meth spirit, etc.) are clearly labelled & have appropriate signage in its environs. Store these materials in well ventilated rooms or cupboards away from easily combustible materials.	92%
Ensure the availability of safety boxes and covered dustbins in all areas of the facility for waste collection. Dustbins should have colour coded bin liners or should be painted with the respective colour codes.	92%
A colour coded system should be employed for mops & brooms in cleaning different areas of the facility (a designated mop, broom and bucket for the labour room, laboratory, toilets, wards, etc.).	83%
Display posters addressing hand washing at different areas of the facility.	83%
Ensure availability of personal protective equipment (gloves, masks, aprons, boots, googles, e.t.c) for staff in all relevant areas. Ensure that personnel make proper use of personal protective equipment.	83%
Obtain the Government policy for the provision of Post Exposure Prophylaxis. Train staff on the policy and how to access these services.	79%
Develop a process that protects personnel & patients from assault. Ensure staff are aware. Control access to the facility & restricted areas. Display posters on no-tolerance for violence. Ensure no dark areas are within & around the facility.	63%
Ensure access control measures are in place at the pharmacy, laboratory, labour room and other restricted areas. Ensure doors are lockable and have appropriate signage eg. "authorized entry only", "restricted area", etc.	17%
Make provision for more waste bins in the facility.	13%
Guiding/supporting rails should be fitted for all staircases and along the high corridors.	13%
Provision for fire fighting equipment should be made. Staff should be trained on how to use these equipment and regular servicing of fire-fighting equipment should be done.	4%

Appendix Table 1 (continued)

Standard	% of treated facilities with standard included in Safecare plan
Primary Health Care Services	
Obtain national guidelines for the treatment of Malaria. Ensure that the management of malaria accords with national guidelines. Keep appropriate records of cases receiving ACT following a laboratory confirmation.	100%
Obtain patients rights charter. Display strategically in the facility. Train all staff on the patient's right to privacy during examinations, counselling & provision of information (OPD, wards, pharmacy, laboratory, etc).	88%
Ensure the use of partograph to monitor all deliveries and keep records of apgar score for newborns. Ensure all tests, observations and examinations are recorded for all antenatal and postnatal cases.	88%
Ensure the provision of soap, water and paper towels/single use towels at hand washing facilities. Water should be distributed to relevant areas of the facility with the use of buckets with tap heads (veronica buckets).	83%
Make provision for a delivery table with stirrups.	79%
Make arrangements within the community for a patient transport system. Document this system and make it known to all personnel. Contact telephone numbers should be available and functional.	71%
Create a check-list of parameters and patients that require early attention and document the system for identifying and fast-tracking these patients.	71%
Obtain a referral policy from the local/state government or SURE-P. Ensure policy includes the cases to be referred, services to be referred, a list of referral centers, and details of contact persons in the referral centers.	63%
Develop a health education plan for the facility's patient population. Have a standardized method of keeping records of health education provided to each patient.	54%
Make standing orders for CHOs/CHEWs and JCHEWs available. Make LSS and MLSS guidelines available at the facility.	50%
Make provision for an angle-poise lamp for adequate lighting in the delivery room.	38%
Supply the SURE-P ANC patients files to provide a template for proper records.	21%
Provision should be made for at least 2 security personnel who can run daily shifts, covering the facility round the clock.	21%
Put in place a system to identify newborns (eg. use of wristbands). Display posters reminding mothers not to leave their babies unattended to. Ensure only authorized access to the wards.	17%

Appendix Table 1 (continued)

Standard	% of treated facilities with standard included in Safecare
Primary Health Care Services (continued)	
Ensure regular supply of all essential drugs and family planning consumables to prevent stock outs.	17%
Make available facilities and equipment for the testing of malaria.	13%
Ensure care providers write a summary of care provided to each patient whilst on admission in the facility as well as follow-up instructions.	4%
Provide perimeter fencing and ensure a lockable gate is in place.	4%
Repairs of the dilapidated sanitary facilities (toilets and bathroom) for staff and patients.	4%
Rehabilitation of the staff quarters to solve the space constraints in the clinic area and renovation of all dilapidated structures in the facility.	4%
In-Patient Care	
Make provision for more ward screens in all relevant areas (ward, examination room etc.)	50%
Operating Theatre & Anaesthetics	
Ensure the availability and use of autoclaves for sterilization of all instruments. Calico and sterility tapes should be available for the sterilization process.	100%
Make available a secure and well ventilated storage area for sterilized instrument packs. These should be stored off the ground.	50%
Ensure a clear flow and dermacation of activities in the sterilization area (decontamination, washing, drying, packing, sterilizing and storage).	50%
Obtain a storage drum/ container for disinfected instruments.	50%
Laboratory Services	
Designate an individual (with documented job descriptions) to manage the laboratory. Ensure there are policy-guided processes that foster collaborative work between the other units and the laboratory.	13%
Medication Management	
Institute a system that tracks adverse drug reactions (immunization/medication) for patients. Records with details of preventive and remedial actions taken should be kept in registers and patient records as appropriate.	54%
Develop and implement a system for the disposal of expired stock. Records of all expired stock should be kept as well as method of disposal. Expired stock should be separated from all other stock and appropriately labeled.	21%
Designate an individual (with documented job descriptions) for medication management. Ensure there are policy-guided processes that foster collaborative work between the other units and the pharmacy.	17%

Appendix Table 1 (continued)

Standard	% of treated facilities with standard included in Safecare
Facility Management Services	
Ensure the provision of a regular source of power supply. Ensure that a back-up system for power supply is available and functional.	92%
Make provision for a reliable and safe source of water supply to this facility. Ensure that there is a back-up source of water in case of contamination or failure.	83%
Ensure all the identified structural defects in the facility (torn mosquito netting, damaged doors and windows, etc) are fixed. Establish a facility maintenance process.	54%
Ensure all sources of electricity are functional and provision is made for the regular supplies of needed fuel. For each shift, a designated individual should be available who oversees this function.	13%
Ensure all construction debri and broken furniture which are no longer useful are kept neatly in an area of the facility, cordoned off, and arrangements put in place to clear them out of the facility.	13%
Provide mosquito nets for all the windows and external doors in the facility.	4%
Support Services	
Ensure the availability of bed linen at this facility and secure storage facilities for these.	100%
Provision should be made for the secure storage of cleaning materials and equipment (mops, brooms, buckets, etc.). Chemicals for cleaning should be kept in a dedicated and secure cabinet clearly labelled for the purpose.	96%
Make available a schedule for emptying waste from the facility to the pit as well as a schedule for burning waste in the pit. Ensure implementation of these schedules.	83%
Construct waste disposal pit with a parapet and cover and train personnel in the use of	79%
Provide training on appropriate cleaning methods, frequency of cleaning & specialized cleaning of infectious areas to all housekeeping staff. Ensure all brooms & mops are properly cleaned & dried before storage.	67%
Provision should be made for at least 2 cleaners who will be responsible for the daily cleaning of the facility, and should be guided by written service-related policies and procedures.	21%

Appendix Table 2: Classification of standards by control and effort requirement

Within PHC control / Low effort (18)	
Organizational structure chart available	Currently working towards quality improvement targets
Staff providing suggestions for improvement	Patients' rights charter visibly displayed
Have any posters been put up with clinical information last month	Flammable materials are clearly labeled
Posters put up showing waste separation	The waste bins for different types of waste are clearly marked
The facility has guidelines on health care waste management	There is a designated individual responsible for infection control
Contact phone numbers of external security sources are available	Written list of all clinical staff available
Facility submitted a request for additional staff	A partograph is available in the facility
The partograph is posted visibly (if available)	There is a poster on display describing hand-washing behavior.
There is a re-order level for drugs	There is a re-order level for vaccines
Within PHC control / Moderate effort (37)	
Any staff meetings held last month	Number of staff meetings held last month
Written summary available for the most recent meeting	Drugs and vaccines are labeled and organized by expiration date
Number (out of 7) of printed medical issue guidelines available	There is a waste bin in the clinic
Medical waste and regular waste are disposed of separately	Staff has received training in waste management
Different mops are available for high and low risk areas	There is a color system for the mops
Medical gloves are available	Staff were trained on disinfection techniques (last 6 months)
There is currently fuel for the generator available	Facility has system for measuring personnel performance
The PHC keeps individual ANC records.	Written records were used to answer questions about the number of deliveries and antenatal visits at the facility
Number of births where an "apgar" score was recorded (last 10 births)	Individual case records are kept at the PHC
Availability of individual case records were visibly confirmed by the enumerator (5)	Average completeness of the 5 patient records
Files are kept for all patients (not just selected ones)	Printed guidelines for malaria treatment available

Number of cases of malaria diagnosed via RDT/number of cases of malaria diagnosed	Number of cases of malaria diagnosed via lab/number of cases of malaria diagnosed
The facility keeps individual malaria records	There is a hand washing facility for patients
There is a hand washing facility for medical personnel	Hand washing supplies (soap and water) are visibly present
Water available in the consulting room	Water available in the waiting room
Water available in the bathrooms	Water available in the delivery room
Cleanliness of the waiting room	Cleanliness of the patient toilet rooms
Cleanliness of the stored bed linens	All essential drugs are unexpired/valid
All essential vaccines are unexpired/valid	
Outside PHC control / High effort (20)	
Number of ward screens available	Fire extinguishers are functional
There are materials for sterilization of equipment	A functional autoclave is available
A functioning electric dry heat sterilizer is available	The facility is connected to the national power grid
Average number of hours connected to the national power grid	Number of days without electricity interruptions in the past two weeks
The facility has a functional generator	Number of days without access to power last week
Clean water available all year	Number of days without access to clean water last week
Number of days without water supply interruptions in past two weeks	Facility has enough staff
Facility has system for rewarding personnel performance	Number of antenatal visits last month
Number of deliveries that took place at this facility last month	Number of deliveries without complications/number of deliveries in the PHC
All essential drugs are available	All essential vaccines are available

Appendix Table 3: Classification of standards by control and effort requirement

This table lists those Quality Improvement Plan (QIP) action items that line up with questions in the main survey for this impact evaluation ("IE survey question") and the SURE-P survey ("SURE-P survey question"), as well as the individual considered to be responsible for implementing the action ("Responsible"). The numbers listed after each QIP Action link back to SafeCare's full list of quality standards.

Category	Sub-category	QIP Action	Responsible	IE survey question	SURE-P survey question
Management-leadership	Organizational Chart	Design an organizational chart or document which describes the lines of authority and accountability from governance and within the service. (1.1.1.2)	Officer in charge (OIC)	Is an organizational structure chart available in the facility?	
	Quality Management – Communication	Introduce a quality management system in the facility (appoint quality manager, train staff, organize bi-weekly quality team meetings, keep minutes of these meetings). (1.3.1.2) Institute effective mechanisms of communication and collaboration which include handover meetings, ward rounds, clinical meetings, quality team meetings, etc. Keep records. Document and implement action plans. (1.3.1.2.)	OIC	Last month, were any staff meetings held at this facility?	
				How many meetings were held?	
				In minutes, what was the duration of the last meeting? (only for meetings held LAST MONTH)	
				Do you have a written summary for the most recent meeting last month?	
Drugs and vaccines stock management	Supply of drugs	Ensure regular supply of all essential drugs and family planning consumables to prevent stock outs. (6.8.4.3, 6.8.4.4, 6.6.1.3)	SURE-P	stockout of essential drugs/vaccines	
	Expiry checks	Carry out checks on expiry date of all pharmaceutical and laboratory supplies in all areas of the facility. Ensure proper documentation of these checks. Ensure the 'first expired first out' principle is adhered to. (1.2.6.8.; 9.3.1.9.; 11.5.1.7.)	OIC	drugs/vaccines expiration date	
				Is there an expiration date on the vial?	
				Expiration date: BCG	
	New supplies	Ensure all new supplies (medication, vaccines, kits, consumables, etc.) are checked for expiry, batch number, labels, signs of tampering, potency, completeness, colour, smell etc. Keep records of action taken if required. (1.2.6.4.)	OIC	Check the VVM (vaccine vial monitor) and record the stage	
	Stock management	Implement a stock management system with definitions of maximum and reorder levels. Records of stock received should be kept as well as records of distribution to different units of the facility.(1.2.6.4, 9.3.1.10, 11.5.1.2, 11.5.1.8)	OIC	Is there a re-order level for vaccines?	
				Is there a re-order level for drugs?	
	Expired stock disposal	Develop and implement a system for the disposal of expired stock. Records of all expired stock should be kept as well as method of disposal. Expired stock should be separated from all other stock and appropriately labeled. (11.5.1.9.; 1.2.6.9.)	OIC/Pharm Tech		

Drug storage	gen. Storage secure	General storage facilities should be secure, adequate, ventilated and well organised putting different groups of items in sections. (1.2.6.6.) - OIC Provide adequate storage facilities to improve the space constraints and enable better organization in the facility. (1.2.6.6)N - SURE-P	OIC / SURE-P	Is the drug storage neatly organized?	
	Med Kit/Storage	Medication/kit storage area should be well ventilated, secure and away from sunlight. Room and refrigerator temperature monitoring should be done daily and records kept. Records of corrective measures should also be kept. (11.2.1.4.)	OIC		12.1 Is there a separate pharmacy or drug storage area in the health facility?
					12.3 Enumerator: Record if the drug storage area is clean
					12.4 Are drugs protected from water and sunlight?
	Storage (instr) drum	Obtain a storage drum/ container for disinfected instruments. (8.2.5.3) Make available a secure and well ventilated storage area for sterilized instrument packs. These should be stored off the ground. (8.2.5.4.)	SURE-P/OIC	none	
HR management	Staff Orientation	Develop an orientation program for new staff at the facility. Keep appropriate records of program content and those in attendance including their signatures. (2.2.1.6.)	OIC/Midwife	none	
	Staff levels	Ensure the provision of the needed staff cadres according to the Minimum Standards for PHCs in Nigeria. (2.1.1.1,2.2.1.6) Using the Essential Staff Requirement gap analysis result, ensure the provision of the needed staff cadres (especially housekeeping and security). Provide the necessary personnel management with proper induction/orientation.(2.1.1.1,2.2.1.6)	SURE-P/LG	Given your normal patient load, do you feel this facility has enough staff?	
				What kind of staff do you need?	
				What action WOULD you take if you need additional staff? (Has this facility submitted a request for additional staff?)	
	Job descriptions	Create a mechanism that ensures that at the facility levels, job descriptions are known and facility-level performance measurement is done to inform designation and delegation of duties (2.2.2.1)	OIC/Matron	Does ${ros_name} have a written job description or performance agreement?	
				Do you have a system for MEASURING personnel performance?	
	Lab person	Designate an individual (with documented job descriptions) to manage the laboratory. Ensure there are policy-guided processes that foster collaborative work between the other units and the laboratory(9.1.1.1)	OIC	none	none
	Medication management person	Designate an individual (with documented job descriptions) for medication management. Ensure there are policy-guided processes that foster collaborative work between the other units and the pharmacy (11.6.1.1,11.8.1.1)	OIC	none	none

Patient rights	Patients rights	Obtain policy document on Patient's Right and Informed Consent and display in strategic areas of the facility. Train staff. Monitor implementation.(3.1.1.1-3.1.1.3, 3.6.1.1) btain patients rights charter. Display strategically in the facility. Train all staff on the patient's right to privacy during examinations, counselling & provision of information (OPD, wards, pharmacy, laboratory, etc). (3.1.1.2.;3.1.1.3)	OIC / SURE-P	Is there a patient rights charter posted in a public space?	
	Education plan	Develop a health education plan for the facility's patient population. Have a standardized method of keeping records of health education provided to each patient. (3.3.1.1.; 3.3.1.6.)	OIC/Midwife	none	
	Ward screens	Make provision for more ward screens in all relevant areas (ward, examination room etc.) (7.2.2.5) Ensure the availability of ward screens in relevant areas of the facility (at least 1 ward screen to 2 beds). Ensure windows in patient interaction areas have drapes & doors are kept closed during examinations & counselling. (3.2.1.1.-3.2.1.3.)	SURE-P	How many ward screens are available throughout the facility?	
Patient records	Transport	Make arrangements for a patient transport system within the community. Document this system and make it known to all personnel. Contact telephone numbers should be available and functional.(3.7.1.2)	OIC	none	1.2.20 Does this facility refer patients to other facilities?
					1.2.23 Does the facility have access to transportation for patients to take them to the referral health facility / hospital?
					1.2.24 What type of transportation for patients does the facility have access to?
	Referral Policy	Obtain a referral policy from the local/state government. Ensure policy includes the cases to be referred, services to be referred, a list of referral centers, and details of contact persons in the referral centers.(6.1.1.1)	OIC	none	
	Train staff privacy	Train all staff on the protection of the patient's right to privacy during all examinations, counselling and provision of information (OPD, in-patient ward, maternity ward, pharmacy, laboratory, etc).(3.2.1.1, 3.2.1.2, 3.2.1.3)	OIC	none	
	Patient Records	Ensure all patient records are standardised, dated, up to date, signed and contain the designation/name of personnel carrying out the assessment.(4.4.2.1)	OIC	Do you keep individual case records?	
				Case file 1: Is the following indicated...?	
				Name of patient	
				Date of visit	
				Initials or name of health worker	
				Condition (last visit)	
	Sec Patient files storage	Make available a secure cabinet/cupboard for the storage of patient files. Ensure files are neatly arranged according to colour, condition and unique identification number. Implement systems for easy retrieval of records. (4.1.1.6.)	OIC	What kind of files does the PHC keep?	
				In what form are files kept?	

				Does the facility keep records for….	
	Registers	Ensure all national and local registers are completely filled with correct information. Designate an individual to oversee this process.(4.3.1.1)	OIC	none	6.1.1 Does the facility have an MCH register?
	Information officer	Designate an individual to be responsible for the management of information. Establish policy-guided processes and provide personnel education/training for the use of data at the facility level (4.3.1.1, 4.4.2.1)	OIC	none	
	Early attention patients	Create a list of patients who require early attention and document the system for identifying and fast-tracking these patients. (6.3.1.4, 6.3.1.5)	OIC	none	
	Summary of care	Ensure care providers write a summary of care provided to each patient whilst on admission in the facility as well as follow-up instructions(6.1.1.1,6.1.1.4)	OIC	none	none
Waste management	Waste management policy	Obtain policy on waste management. Train personnel on waste segregation & containers for collection. Keep adequate records. Monitor implementation. Display posters on waste segregation at different areas of the facility. (5.6.2.1.) Establish a policy-guided waste management system at the facility. Provide relevant tools/resources (sharps boxes, PPEs, pedaled bins, etc). Train personnel, provide reminders and monitor the adherence to protocols(5.6.1.8, 5.6.2.1, 5.6.2.2,13.3.4.4).	OIC/SURE-P/LG	Is medical waste disposed together with regular waste or separately?	
				How does this facility finally dispose of medical waste (other than sharps boxes)?	
				Are there posters showing waste separation in the clinic?	
				Does this facility have any guidelines on health care waste management?	
				Have you or any provider(s) received training in health care waste management practices in the past two years?	
				Do you have a schedule for burning waste?	
	Safety boxes	Ensure the availability of safety boxes and covered dustbins in all areas of the facility for waste collection. Dustbins should have colour coded bin liners or should be painted with the respective colour codes. (5.6.2.4.; 13.3.4.2.; 13.3.4.3.)	OIC/SURE-P	To enumerator: Are there waste bins in the clinic?	
				Are the waste bins covered?	
				Are the waste bin for different types of waste clearly marked? (for example color coded)	
	More waste bins	Make provision for more waste bins in the facility (5.6.2.3)	SURE-P	none	
Risk management	Colored mops	A colour coded system should be employed for mops & brooms in cleaning different areas of the facility (a designated mop/broom for the labour room, toilets, consulting area etc). (Std 5.6.1.)	SURE-P/Officer-in-Charge	Are there different mops available for high and low risk areas in the facilities?	
				Is there a color coded system for these mops	
	Availability of protective equipment	Ensure availability of personal protective equipment (gloves, masks, aprons e.t.c) for staff in all relevant areas.(5.6.1.8)	SURE-P/LG	Observe: are there medical gloves available?	

	Use of protective	Ensure that personnel make correct use of personal protective equipment(gloves, masks, aprons). (5.6.1.8)	OIC	none	
	Use of protective	Obtain the Government policy for the provision of Post Exposure Prophylaxis. Train staff on the policy and how to access these services. (5.2.1.7)	OIC	none	
	Infection ctrl	Designate an individual to be responsible for infection control and ensure the provision of continuous in-service training on infection control to all personnel. Keep records of all training(content of training and attendance list). (5.6.1.1, 5.6.1.4)	OIC	Is there a designated individual responsible for infection control at this facility?	
	Retrain on disinfection	Retrain staff on disinfection techniques.(5.6.1.4)	OIC	Were staff trained on disinfection technqiues? (last 6 months)	
				If yes, have you kept a record of the training?	
	Fire fighting	Provision for fire fighting equipment should be made. Staff should be trained on how to use these equipment and regular servicing of fire-fighting equipment should be done.(5.4.1.3, 5.4.1.7)	SURE-P/ LG	Are there fire extinguishers (functional)?	
	Flammable labled	Ensure all flammable materials (fuel, kerosene, methylated spirit, etc.) are clearly labelled and have appropriate signage in its environs.(5.4.1.4)	OIC	Are flammable materials clearly labelled? (fuel, kerosene, meth spirit, etc.)	
Handwashing	Hand washing poster	Display posters addressing hand washing at different areas of the facility. (5.6.1.7)	OIC	Is there at least one poster on display describing hand-washing behavior?	
	Soap/Water	Ensure the provision of soap, water and paper towels/single use towels at hand washing facilities. Water can be distributed to relevant areas of the facility with the use of buckets with tap heads (veronica buckets).(5.6.1.6)	OIC/SURE-P/WDC	Visible presence of hand washing supplies (soap and water)	
Safety and security	Security (external)	Develop a mechanism for summoning the assistance of external sources of security in case of an emergency (eg. Police, community guards, etc.). Document this mechanism and make it known to all personnel.(5.3.1.5)	OIC	Do you have contact phone numbers of any external security sources e.g. police, civil defence and vigilantee?	
	Security personnel	Provision should be made for at least 2 security personnel who can run daily shifts, covering the facility round the clock.(5.3.1.3)	LG/WDC	none	
	Assault safety	Develop a process that protects personnel & patients from assault. Ensure staff are aware. Control access to the facility & restricted areas. Display posters on no-tolerance for violence. Ensure no dark areas are within & around the facility. (5.3.1.5.)	OIC/CHC	none	
	Access control	Ensure access control measures are in place at the pharmacy, laboratory, labour room and other restricted areas. Ensure doors are lockable and have appropriate signage eg. "authorized entry only", "restricted area", etc. (5.3.1.2.)	OIC/CHC		12.2 Can the doors and windows be locked to keep the drug storage area secured?
	Rails	Guiding/supporting rails should be fitted for all staircases and along the high corridors. (Std. 5.1.1.)	CHC/SURE-P/LG	none	
	Repair Gate	Repair the gate at the entrance to the compound of the facility for security reasons. (5.3.1.1, 5.3.1.3) Provide perimeter fencing and ensure a lockable gate is in place. (5.3.1.1, 5.3.1.3)	SURE-P	none	
Deliveries	Partographs	Ensure the availability and use of partographs to monitor all deliveries at the facility. (6.6.5.4) - SURE-P Ensure the use of partograph to monitor all deliveries and keep records of apgar score for newborns. Ensure all tests, observations and examinations are recorded for all antenatal and postnatal cases. (6.6.2.4.; 6.6.3.6.; 6.6.5.4.; 6.6.6.3.)	LG/SURE-P/OIC	Is there a partograph available in the facility?	
				Is it posted visibly?	

	Newborn identification	Put in place a system to identify newborns (eg. use of wristbands). Display posters reminding mothers not to leave their babies unattended to. Ensure only authorized access to the wards. (6.6.5.6.)	OIC/Midwife	none	
	Apgar	Record the Apgar score for each newborn baby in the respective patient's card and delivery register.(6.6.5.4) Ensure the use of partograph to monitor all deliveries and keep records of apgar score for newborns. Ensure all tests, observations and examinations are recorded for all antenatal and postnatal cases. (6.6.2.4.; 6.6.3.6.; 6.6.5.4.; 6.6.6.3.)	OIC	Check the records for the 10 most recent births. How many have an "apgar" reported?	
	Lamp	Make provision for an angle-poise lamp for adequate lighting in the delivery room (6.6.4.1)	SURE-P	none	Delivery light: 11.7
	Delivery table	Make provision for a delivery table with stirrups (6.6.4.2)	SURE-P	none	Delivery table: 11.7
	Delivery room equipment	Provide the necessary tools and equipment required in the labor room (delivery table with stirrups, angle poise lamps, delivery kits). Provide documented training for the relevant personnel in the use of these (6.6.4.1)	SURE-P/WDC	none	generate an index from SURE-P data for all available and functional delivery equipments
					11.7 Is the following equipment Available and Functioning/Working (AF), Available but not Functioning/Working (ANF), or Not Available (NA)?
	ANC PNC records	Ensure all records of ANC, labour and post-natal care are kept for each patient in their respective patient cards. Provide individual patient records template for Labour, Postnatal & Inpatient care. (6.6.2.4, 6.6.3.6, 6.6.6.3)	OIC	Last month: how many antenatal visits did this facility receive?	
	SUREP records	Supply the SURE-P ANC patients files to provide a template for proper records. (6.6.2.4)	SURE-P	none	none
Equipments and guidelines	Equipment	Implement a system that ensures all equipment and supplies are available, properly stored and distributed to all relevant areas of the facility. A list of all equipment and supplies should be available.(1.2.6.5, 1.2.6.6, 1.2.6.7)	OIC	only sterilization equipment	generate an index from SURE-P data for all available and functional outpatient/lab equipments
					11.1 Where is the outpatient equipment located?
					11.4 Where is the lab equipment located?
					11.6 Where is the delivery and neonatal equipment located?

	Standing orders	Make standing orders for CHOs/CHEWs and JCHEWs available. Make LSS and MLSS guidelines available at the facility. (6.6.1.1.) Obtain the national treatment guidelines and standing orders to guide all staff in their clinical practice. (1.2.1.4)	OIC/LG/SURE-P	Do you have printed guidelines for the treatment of the following medical issues?	
Malaria	Malaria guidelines	Obtain national guidelines for the treatment of Malaria and ensure compliance these guidelines. Keep complete records for the malaria cases managed. (6.8.4.1) Obtain national guidelines for the treatment of Malaria. Ensure that the management of malaria accords with national guidelines. Keep appropriate records of cases receiving ACT following a Laboratory confirmation. (6.8.4.1	OIC	Do you have printed guidelines for the treatment of the following medical issues?	
	Malaria testing records	Keep appropriate records of malaria cases treated on the basis of clinical diagnosis only. (6.8.4.1)	OIC	How many patients were diagnosed with malaria last month?	
				How many of those were diagnosed via rapid diagnostic test (RDT)?	
				How many were diagnosed with other lab testing methods? (for example microscope)	
				How were malaria patients treated?	
				"Silent question": Did the respondent use written records to answer any of the questions?	
	Malaria Testing Equipment	Make available facilities and equipment for the testing of malaria. (6.8.4.2.)	OIC/SURE-P/LG	none	none
Sterilization	Flow and Demarcation	Ensure a clear flow and demarcation of activities in the sterilization area (decontamination, washing, drying, packing, sterilizing and storage). (8.2.5.1.)	OIC/Midwife		
	Sterilization process	Establish an effective sterilization process (with regular testing) and provide the appropriate training for the personnel.	OIC		
	Autoclave	An autoclave should be provided & installed and used for sterilizing instruments. Staff should be trained on how to use the autoclave (8.2.5.6) Where autoclaves/pressure pots are present, these should be installed and used for sterilizing instruments. Provide training on the use.(8.2.5.6)	SURE-P/OIC	autoclave: Which of the following items are FUNCTIONAL?	
Facility characteristics - infrastructure	Toilets	Ensure the provision of a minimum of 2 functional sanitary facilities (patient and staff) in the facility.	SURE-P/WDC	Questions for in-charge (or main respondent): Which rooms do you have in this facility? Room11: toilet	
				Are the PATIENT toilet rooms clean? Please rate	
Other	Ward Development Committee (WDC)	Strengthen the community involvement process through establishing goals for the WDC and incorporating quality improvement indicators in the performance review for the unit(1.2.3.3,1.2.4.1)	OIC/SURE-P	none	