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CLINICAL ARTICLE

Advancing obstetric and neonatal care in a regional hospital in Ghana via continuous quality improvement

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ABSTRACT

Objective: To reduce maternal and neonatal death at a large regional hospital through the use of quality improvement methodologies. *Methods:* In 2007, Kybele and the Ghana Health Service formed a partnership to analyze systems and patient care processes at a regional hospital in Accra, Ghana. A model encompassing continuous assessment, implementation, advocacy, outputs, and outcomes was designed. Key areas for improvement were grouped into "bundles" based on personnel, systems management, and service quality. Primary outcomes included maternal and perinatal mortality, and case fatality rates for hemorrhage and hypertensive disorders. Implementation and outcomes were evaluated tri-annually between 2007 and 2009. *Results:* During the study period, there was a 34% decrease in maternal mortality despite a 36% increase in patient admission. Case fatality rates for pre-eclampsia and hemorrhage decreased from 3.1% to 1.1% ($P<0.05$) and from 14.8% to 1.9% ($P<0.001$), respectively. Stillbirths were reduced by 36% ($P<0.05$). Overall, the maternal mortality ratio decreased from 496 per 100 000 live births in 2007 to 328 per 100 000 in 2009. *Conclusion:* Maternal and newborn mortality were reduced in a low-resource setting when appropriate models for continuous quality improvement were developed and employed.

1. Introduction

Maternal mortality remains an unrelenting challenge in Africa, largely due to the disparity between best practice and the care that is typically available. Issues of access compound the problem, owing to poor transportation and late recognition of complications [1]. In several African countries, citizens avoid hospital care because of the perception of poor quality [2–4]. Healthcare systems often suffer from inadequacies in trained staff, prenatal screening, knowledge and use of evidence-based protocols, medication and blood availability, prompt cesarean delivery, multidisciplinary care, and lack of quality improvement (QI) support; inadequacies that place patients and fetuses at risk [1]. In 2007, the WHO Framework for Action identified "quality of health services" as a key component in improving outcomes [5].

Maternal and infant mortality are basic health indicators that reflect the adequacy of a healthcare system. A recent mortality survey found that 60% of maternal deaths in Accra, Ghana, occurred within hospitals [6]. In addition, the Ghana Health Service (GHS) reported a 36% increase in institutional maternal deaths from 1997 to 2007 [7]. The maternal mortality ratio (MMR) in Ghana was estimated at 350 (range 210–600) per 100 000 live births in 2008 [8], but underreporting is likely. The Accra-based survey determined an underreporting rate of 44% [6], which was substantiated by a separate review that found the MMR to be 699 per 100 000 live births [9]. Recent data indicate a perinatal mortality rate of 45 per 1000 deliveries, with 19 stillbirths and 26 early neonatal deaths per 1000 deliveries [10]. It is imperative to improve maternal and perinatal care by strengthening healthcare institutions.

Collaborative approaches to improving healthcare quality have been described; these have been focused in the United States and the United Kingdom, with few in low-resource countries [11–14]. Studies on QI collaboration are generally positive, but limited, and the effects of QI are unpredictable [11–15]. In January 2007, Kybele, a North Carolina-based NGO and the GHS began a 5-year collaboration to establish "obstetric centers of excellence" to reduce maternal and neonatal deaths. Kybele is a non-profit humanitarian organization founded in 2001 to promote safe childbirth worldwide via collaboration; it is a multinational, interdisciplinary organization with teams comprising nurses, midwives, engineers, public health practitioners,

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organizational specialists, and physicians in obstetrics, anesthesia, and neonatology. Joint identification of challenges and responses is focused at the local level to improve care in countries with sufficient infrastructure to sustain progress after training.

The first obstetric center of excellence, Ridge Regional Hospital, is a flagship obstetric referral center in Accra, which at the outset of the study had 5000 annual births, over half of which were high-risk referrals. The unit had limited capacity: namely, 6 labor and 2 delivery beds, an operating theatre 200 meters away, and vastly overcrowded wards. There was 1 consultant obstetrician, the local champion, 4 medical officers/residents and 3–4 midwives per shift.

The aim of the present study was to provide evidence regarding the effectiveness of a hospital-based QI collaboration in a low-resource country. The study model was congruous with key tenets offered by authoritative quality experts, and incorporated an interdisciplinary approach, high-level sponsorship, establishment of guidelines, measurement, feedback, leadership and teamwork coaching, training including QI training, and a multimodal focus on patients, providers, and systems [11–14].

2. Materials and methods

In 2004, Kybele was invited to consider program development with the GHS. Needs assessments were made in 6 hospitals over 2 years, and local, cultural and operational issues were determined. Multiple challenges were identified including poor communication/teamwork, scant neonatal resuscitation training, lack of emergency supplies, late referrals, minimal interdisciplinary coordination, excessive documentation, poor knowledge/use of evidence-based protocols, numerous delays, and more. In December 2006, a 5-year partnership was signed between the GHS and Kybele. In 2007, patient care processes at Ridge Regional Hospital were analyzed consecutively by 2 Kybele teams using immersive, interactive, and consultative methods, System deficiencies were jointly identified, and solutions were incorporated into a strategic template or "process map".

The process map evolved into a model encompassing continuous assessment, implementation, advocacy, outputs, and outcomes (Fig. 1). It identifies problems, recommends solutions, and charts progress by using a color-coded scoring system with numeric correlates. Scores are assigned in quartiles, such that red (0%) represents start or no progress, yellow represents intermediate (50%), and green (100%) represents full implementation. A printout of the process map is posted in the labor ward, updated yearly, providing feedback on progress to staff.

Primary outcomes include maternal and perinatal mortality, and case fatality rates (CFRs) for hemorrhage and hypertensive disorders. Data are collected via manual abstraction by physician and senior midwives. The model identifies 5 key outputs: appropriate referrals, patient monitoring, standardized treatments, timely interventions, and improved client responsiveness as determinants of high-quality and/or primary outcomes (Fig. 1).

The model emphasized system failures. A systems-oriented approach to QI was undertaken, in which key focus areas were grouped in bundles (Fig. 1). Interventions, changes in process, and outcomes were monitored. Data were analyzed with χ^2 or Fischer exact test, as appropriate, using SAS 9.2 (SAS Institute, Cary, NC, USA). A P value of less than 0.05 was taken to be statistically significant.

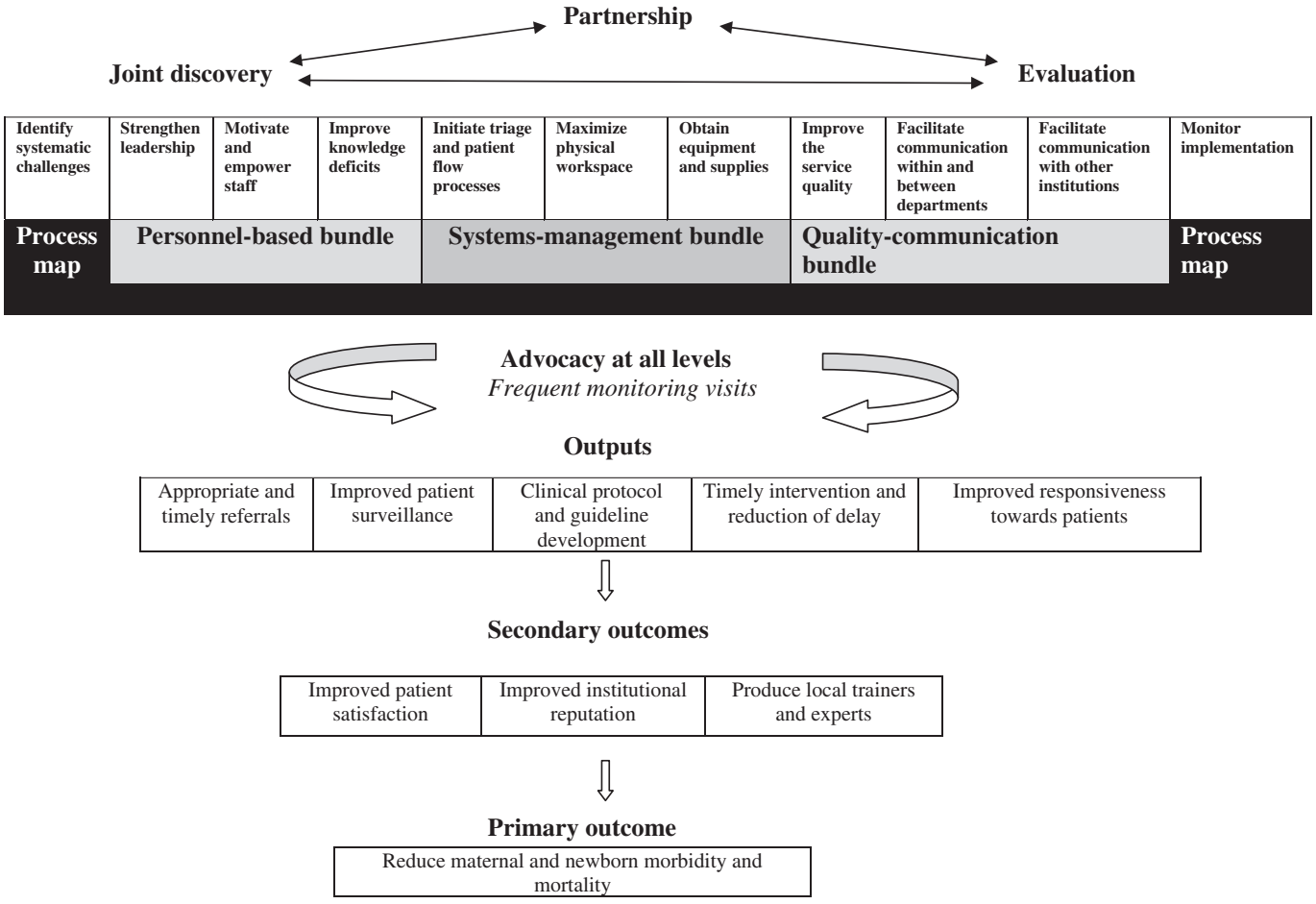

Fig. 1. Essential components of the Kybele–Ghana Health Service systems model.