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CLINICAL ARTICLE

Improving maternal health and safety through adherence to postpartum hemorrhage protocol in Latin America

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ABSTRACT

Objective: To determine provider compliance with protocols for the prevention of postpartum hemorrhage and provider characteristics associated with adherence and non-adherence. *Methods:* A multicenter descriptive study was conducted involving 78 direct observations of provider-implemented protocols and 52 interviews with Peruvian maternal healthcare providers at 4 Peruvian clinical sites representing the local, regional, and national levels of care. Parturient participants planning a normal vaginal delivery were 17–49 years of age and 34–42 weeks pregnant. Primary outcomes were compared using χ^2 testing, while quantitative survey data were evaluated using means, standard deviations, and Student *t* test or analysis of variance for statistical significance. *Results:* There were 3 significant differences between the national, regional, and local levels of care: adherence to all 3 interventions ($P < 0.001$); professional experience ($P < 0.04$); and retention of healthcare providers ($P < 0.001$). There were no differences in provider training ($P < 0.097$), and the retention of experienced healthcare providers was not associated with greater adherence to protocols. There were no significant differences in parturient characteristics. *Conclusion:* Individual characteristics and institutional beliefs may have more influence than experience or training on adherence to protocols for prevention of postpartum hemorrhage; addressing these biases may improve patient safety in Peru and throughout Latin America.

1. Introduction

Since the beginning of the 20th century, the largest threat to patient safety among childbearing women has been postpartum hemorrhage (PPH), which is a leading cause of maternal morbidity and mortality in low- and middle-income countries (LMICs) and a leading cause of morbidity in high-income countries. Worldwide, severe PPH (defined as blood loss >1000 mL) affects 1.6 million women and accounts for 130 000–140 000 maternal deaths every year, meaning that there are approximately 380 deaths every 24 hours or approximately 1 maternal death for each day of the year [1]. With the brunt of the global burden falling disproportionately on lower-resource nations and with the deadline for Millennium Development Goal (MDG) 5 fast approaching [2], it is worth asking whether there is an example showcasing a simple interventional strategy, coupled with protocol implementation, that can improve health outcomes related to PPH.

The present project originated as a university-funded 3-month international research fellowship to investigate protocols used in Peru to prevent PPH at the national, regional, and local levels of care. Peru was selected owing to the recent decentralization of its healthcare system (completed in 2010), its established national clinical guidelines for active management of the third stage of labor (AMTSL) for the prevention of PPH, and because it is a middle-income country that, in the decades preceding the study, had one of the highest maternal mortality rates—largely due to PPH—in the Americas [3,4]. Importantly, over the past decade, maternal mortality in Peru has decreased by 66% to 67 deaths per 100 000 live births [4] and the country is on course to meet the MDG 5 target of a 75% reduction by 2015 [2]. During this same timeframe, maternal mortality has actually increased in some high-income countries [5,6]. However, although Peru has made impressive gains, PPH is still the cause of 40% of maternal deaths, and disparities between urban and rural indigenous areas remain [3].

The aim of the present study was to investigate the influence of these changes—specifically, determining whether maternal healthcare providers actually followed nationally recommended protocols for PPH prevention and whether differences in adherence were measurable across levels of care, perhaps offering a glimpse into a possible root cause contributing to maternal mortality and health disparities in Peru.

We hypothesized that individual providers with more training on AMTSL (defined as on-the-job clinical training opportunities) and greater clinical experience would have a higher level of adherence to the national protocols compared with less-experienced providers with

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less training on AMTSL. Based on that hypothesis, we also expected to observe higher levels of adherence at institutions with higher staff retention (estimated as the average number of years providers had been working at that institution). We also aimed to describe the views and beliefs of individual providers, as well as their institutions, on PPH prevention and AMTSL in order to ascertain any potential influences on protocol adherence. Ultimately, the objective was to highlight lessons in protocol adherence that would have a positive impact on maternal health and safety, not only within Peru and Latin America but also, potentially, in other LMICs around the world.

2. Materials and methods

Between March 15, 2010, and July 30, 2011, a multicenter cross-sectional study was conducted in order to describe the adherence of healthcare professionals to national protocols for the prevention of PPH. The 3 months of clinical research took place at 3 study sites in Cusco and 1 site in Lima between April 1 and June 30, 2011. The sites were selected to represent the national, regional, and local levels of care and included a tertiary-level university teaching hospital in the city of Lima (national level), a referral hospital in Cusco (regional level), and 2 local health centers providing obstetric care to the indigenous populations in the Andes (local level). Study sites were selected based on their patient populations, PPH statistics, and ability to formally approve the study protocol. Institutional review boards at Yale University (#1006006982), the Peruvian National Institute of Health (#108-2011-CEI/INS), and the Universidad Peruana Cayetano Heredia (#57805) approved the study protocol for completion in Peru. Additionally, an institutional review board at each study site approved the protocol as part of the final site-approval process. Consent was obtained from all participants.

The primary study population consisted of Peruvian maternal healthcare providers working at study sites during the designated time periods, and included obstetricians (physicians and residents), midwives ("obstetras"), and healthcare professional students (medical and midwifery). All participants working within the labor wards were included in the selection pool for observations and interviews. Parturient participants were included if they were 17–49 years of age, 34–42 weeks pregnant, and planning a vaginal delivery at one of the selected study institutions.

Observations were selected through convenience sampling, and approximately 60% of clinical providers were randomly selected for interview. Research tools adapted from previously completed studies [7–9] and the Latin American Perinatal Information System [10] were used for data collection. B.O. conducted all interviews in Spanish (Supplementary Material S1).

The primary outcome, referred to as adherence to protocol, was defined as the proportion of observations demonstrating adherence to nationally recommended protocols for AMTSL [11] and proper implementation of the 3 primary interventions: prophylactic administration of a uterotonic drug within 1 minute of fetal delivery; controlled cord traction for removal of the placenta; and external uterine massage within 1 minute of placental expulsion [11,12]. This information was then correlated with qualitative data retrieved from surveys and interviews in order to determine individual attitudes, beliefs, and values—which could then be used to ascertain the institutional culture (attitudes, beliefs, and values) regarding AMTSL and PPH prevention.

Additionally, delayed versus early cord clamping and vertical versus horizontal birth procedures were also recorded. Traditionally, births managed by providers trained in an allopathic model occur with the woman in a supine position but Peru has implemented guidelines to manage vertical birth, whereby women deliver on their knees or while sitting vertically in a specialized chair. The practice of vertical birth seeks to increase cultural sensitivity in order to influence the indigenous populations in Peru to have institutional births. The current Peruvian guidelines from 2005 recommend that all patients should be supine for management of the third stage of labor, regardless of whether vertical or horizontal birth procedures are used [13].

The primary outcomes were compared using χ^2 testing, while quantitative survey data were evaluated using means, standard deviations, and Student *t* test or ANOVA for statistical significance when appropriate. Statistical analysis was performed using Vassar Stats (R. Lowry, New York, NY, USA). Outcomes with a *P* value below 0.05 were considered statistically significant; outcomes with a *P* value below 0.005 were considered highly statistically significant. Qualitative data were also evaluated for recurrent themes. A minimum of 20 observations of practice was required at each level, based on a power of 80% and an expected difference of 35% between providers who had received and those who had not received training on AMTSL—per previously conducted studies [8,9].

Non-identifying descriptive data for participating clinicians (referred to as "individual characteristics") were collected during the interview process, and questions adapted from a previously conducted and validated WHO survey [7] were used to describe the beliefs and attitudes regarding PPH prevention and the use of AMTSL. Non-identifying descriptive data on the parturient participants were collected during the enrollment and consent process.

3. Results

In total, there were 78 observations and 52 interviews representing the national level (24 observations with 25 interviews among 40 clinicians), the regional level (30 observations with 20 interviews among 28 clinicians), and the local level (24 observations with 7 interviews among 8 clinicians) of care. Adherence to all 3 interventions of AMTSL varied among the levels of care, and the differences were highly significant (Table 1). Overall, complete adherence occurred in 26% of observations across all institutions and varied from 3% at the regional level to 46% at the local level. There were no significant differences in AMTSL training across institutions; however, the experience of healthcare providers decreased from the national level to the local level, with significant differences. Participating parturients did not differ significantly in average age, gravidity, parity, or gestational age across institutions. Overall adherence rates were suboptimal but a pattern developed among the institutions (Table 1).

The national-level providers had an adherence rate of 29%, with the most favorable institutional beliefs regarding AMTSL—based on qualitative results—and the highest staff retention (averaging >7 years). However, they also had the greatest organizational barriers, which probably influenced the surprisingly low proportion of adherence. For example, the national-level hospital was the only institution that did not use prophylactic oxytocin in 100% of observations because, as multiple providers stated in their interviews, oxytocin was not immediately available for women unable to purchase the drug in the pharmacy prior to admission. In other words, the institution did not have an emergency reserve of medications available. The institution also practiced an aggressive form of AMTSL in which bimanual uterine massage was used 100% of the time as routine management because it was viewed as a more effective practice, while external uterine massage occurred in less than 50% of observations.

The regional-level providers practiced a mixed form of management consisting of oxytocin administration followed by physiological management of placental expulsion, resulting in the lowest proportion of adherence: 3%. This site had experienced providers (averaging >5 years) and the highest percentage of AMTSL-trained providers (95%), indicating that negative institutional beliefs (e.g. that controlled cord traction carries more risk than benefit for the patient) outweighed provider training in terms of influencing adherence. This was corroborated in the qualitative assessments—with many senior providers consistently expressing unfavorable views of AMTSL, specifically focused around controlled cord traction. By contrast, many of the residents and younger providers consistently stated that allowing full active