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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.

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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

Table 1Comparison of clinical providers, patient characteristics, and interventions across levels of care in Peru.^a

Comparison data	National level (n = 24) ^b	Regional level (n = 30) ^b	Local level (n = 24) ^b	P value for all levels
Maternal healthcare provider characteristics				
Healthcare experience of providers, y	9.8 (0–28)	5.8 (0–28)	2.24 (3–19)	0.04
Length of time at healthcare institution, y	7.5 (0.3–23)	4.0 (0.3–21)	0.4 (0–3)	0.04
Job training on full active management ^c	88	95	86	0.62
Patient characteristics				
Age, y	27.5 ± 6.7	24.8 ± 5.6	23.8 ± 5.3	0.08
Gestational age, wk	38.8 ± 1.7	39.0 ± 1.8	38.6 ± 1.3	0.32
Gravidity	2.42 (1–7)	2.08 (1–7)	2.17 (1–8)	0.73
Parity	1.2 (0–6)	0.9 (0–6)	1.1 (0–7)	0.37
Interventions for prevention of postpartum hemorrhage				
Full active management ^c	29	3	46	<0.001
Mixed management ^d	71	97	54	<0.001
Prophylactic oxytocin	83	100	100	0.002
Controlled cord traction	100	3	54	<0.001
Uterine massage	46	83	88	<0.001
Early cord clamping	100	100	80	0.003
Delayed cord clamping	0	0	20	0.003
Horizontal delivery	100	100	29	<0.001
Vertical delivery	0	0	71	<0.001

^a Values are given as median (range), percentage, or mean ± SD unless otherwise indicated.^b Number in parentheses denotes observations.^c Full active management: in vitro oxytocin within 1 minute of fetal delivery; controlled cord traction for removal of the placenta; and uterine massage within 1 minute after placental expulsion.^d Mixed management: in vitro oxytocin 2–5 minutes after fetal delivery or placental expulsion; controlled cord traction; and uterine massage at discretion of provider.

management with controlled cord traction would improve maternal care at the regional institution.

The local level of care had the most non-physician providers (obstetras), the least experience (averaging approximately 2 years), and the lowest staff retention (averaging <6 months). However, this level had the highest proportion of adherence: 46%. Institutional beliefs did not seem to influence provider attitudes because responses and beliefs varied by individual provider. Additionally, delayed cord clamping and vertical birth procedures were observed exclusively at the local level and were implemented almost exclusively by non-physician providers.

4. Discussion

A substantial decrease in nationwide maternal mortality—and, thereby, an improvement in maternal health and safety—has been achieved in Peru through a multifactorial process including decentralization, increasing training opportunities, establishing national guidelines and protocols, and improving cultural outreach to rural areas. The aim of the study was to focus on the possible effects related to the establishment of national protocols by providing a small snapshot of adherence rates and the potential factors influencing adherence among Peruvian maternal health clinicians at different levels of care.

The efficacy of any protocol is determined not only by the rate of adherence but also by how well clinicians are monitored and held accountable to following those protocols. Within Peru, accountability has largely been left to regional administrative centers and local hospitals. The Perinatal Information System [10] represents a mechanism for standardized monitoring involving checkboxes for elements associated with active management, in addition to many other elements of perinatal health. In theory, this form is completed for each birth and reported from the local level to the regional level, and finally collated at the national level—with monitoring at each stage. In practice, the form is cumbersome, easily misplaced, and often used more as an ad hoc medical record than for reporting, resulting in many local adaptations for informal monitoring. In essence, accountability and compliance are left largely to the local level unless there are clear issues within a region that draw attention, such as a string of maternal deaths or near misses—further highlighting the importance of the study results.

The present results highlight 3 important conclusions: physician training and experience had no effect on protocol adherence; non-physician providers, who are more likely to practice at the lower levels of care, had better adherence to protocols; and institutional culture and beliefs seemed to have the greatest influence on healthcare professionals' adherence to protocols. Overall, the findings regarding protocol adherence were consistent with those from larger studies previously conducted in Peru, Latin America, and other LMICs [8,9]. Given that the current mechanisms for monitoring, accountability, and reporting are less than ideal, it is even more important to determine potential areas that can be targeted for improvement.

The results and conclusions indicate that simply establishing clinical practice guidelines and providing clinical training opportunities are not enough to improve adherence. More importantly, the results also indicate that cultural beliefs at both the individual level and the institutional level must be addressed as part of any program to improve adherence to quality of care and patient safety protocols. There could also be an argument that the main issue resides with the mechanisms for monitoring, accountability, and reporting, but by focusing on institutional cultural beliefs those specific concerns would probably be addressed. The large decrease in Peruvian maternal mortality may not be completely explained by protocol implementation and adherence alone, but adherence to AMTSL would seem to have a significant impact in conjunction with increased access to care as part of the decentralization process—with increased local job opportunities for obstetras possibly having a significant impact. To further evaluate the results and potential influencing factors on protocol adherence, a large prospective trial could be completed comparing the implementation of a quality improvement protocol that focuses on the institutional culture of safety versus usual standard training and orientation practices.

Previous studies have shown the efficacy of safety programs in improving workforce perceptions of safety, as well as the importance of protocol adherence to improving patient outcomes [14–16]. What stands to be learned is whether focusing on patient safety, rather than clinical competence, can increase protocol adherence to improve maternal health outcomes and offer lessons that can be applied in Peru, throughout Latin America, and in other LMICs around the world.

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.ijgo.2013.10.017>.

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Conflict of interest

The authors have no conflicts of interest.

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