

Obstetric innovations in Kabala Hospital, Sierra Leone: the Bubble Operating Theatre and Non-Pneumatic Anti-Shock Garment

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Introduction

During 2016, maternal health services at the MSF-supported Kabala Hospital in Sierra Leone were affected by building work. To enable the hospital to provide obstetric services during this period, we developed the Bubble Operating Theatre (BOT), a portable space suitable for surgical use with 99.995% pure air. We also report on use of a neoprene compression suit, the Non-Pneumatic Anti-Shock Garment (NASG), at referrals, for prevention of complications arising from hypovolaemic shock secondary to obstetric haemorrhage. Currently, obstetric haemorrhage is a major cause of maternal mortality, accounting for 25-50% of maternal deaths worldwide. The NASG is applied around the woman's legs, pelvis and abdomen, providing compression, decreasing vascular volume and expanding central circulation.

Methods

Initially, the BOT was planned to be in place for just two months during 2016, however its actual period of operation was seven months, from Apr to Oct. We documented the process of setting up the BOT to final dismantling, including maintaining records of each step, a database of surgeries performed within the BOT, and adjustments to protocols. We captured staff opinions on BOT use and effectiveness by carrying out 6 semi-structured interviews, with one logistician and five medical officers, once BOT was dismantled. Evaluation of the NASG involved documentation of the pilot in use, together with establishment of a database recording 48 data elements for each patient, including obstetric profile, case management information, and observations of the case.

Ethics

This description and evaluation of an innovation project did not involve human participants or their data; the MSF Ethics Framework for Innovation was applied to help identify and mitigate potential harms. It was conducted with permission from Jean François Saint-Sauveur, Operational Centre Barcelona, MSF.

Results

In total, 90 surgeries were performed within the BOT, of which 85 were obstetric, and the first surgery took place two days after setup was completed. Five (5.6%) post-operative infections (POPI) were reported. Four staff worked

inside the BOT during each surgery. Infection prevention and control measures within the BOT involved additional measures over and above standard procedures, including a second layer of Taporeen floor covering, general cleaning after assembling the BOT and each surgery, and use of a rubber sheet on the theatre bed for every surgery, to allow for easier cleaning and disinfection. Staff described a number of challenges with use of the BOT, including limited space, lack of a swing door, high temperatures, difficulty cleaning the structure, and insufficient lighting. With regard to the NASG, this was used for 10 patients (median age 27 years, interquartile range 9.4), with four separate indications; uterine rupture (five women), second trimester abortion (one woman), retained placenta (one woman) and abruptio placentae (three women). With regard to maternal outcomes, six women survived, three women were known to have died (one with uterine rupture, two abruptio placentae), and one woman was referred to a tertiary hospital. For foetal outcomes, there were nine stillbirths and one abortion. No major adverse effects were reported.

Conclusion

Despite challenges, the BOT provided a feasible setup, enabling surgical procedures to be continued in Kabala Hospital, with the number of surgeries and incidence of POPI within expected ranges. We consider that the BOT could have potential in future settings where operating theatre access is limited or impossible. Future modifications are needed to improve working conditions. Our experience with the NASG suggests its use in MSF field settings is feasible, with feedback from our work suggesting future improvements.

Conflicts of interest

None declared.

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Sonia Guinovart is a specialist in Obstetrics and Gynaecology. She did her residency in Spain and joined MSF afterwards, as a field gynaecologist. She has worked in diverse contexts, including Democratic Republic of the Congo, Central African Republic, and Sierra Leone during the West African Ebola outbreak. Since 2016, she has been working in Barcelona as Obstetrics and Gynaecology advisor for MSF Spain.