NASG
Summary of the Evidence

The NASG is a low-technology, low-cost, first-aid device that can be used to reverse shock, resuscitate, stabilize, and prevent further bleeding in women with obstetric hemorrhage and subsequent hypovolemic shock across diverse settings. The NASG buys time for the woman in shock to get transported to care and during delays in facilities that deliver emergency care.

The UCSF research team and international partners in Nigeria, Egypt, Zambia, Zimbabwe, and India have conducted studies of the NASG on over 5,500 women with severe hemorrhage and shock. We have used the NASG in diverse settings: where the maternal mortality rate is relatively low (Egypt), as well as settings where it is very high (parts of Nigeria, Zambia, Zimbabwe), and in facilities that had varying degrees of delays in obtaining definitive care, blood transfusions and/or surgery. In all settings, the NASG was used to buy time and stabilize women in shock until they could obtain definitive care.

Overall, our studies have consistently shown that use of the NASG results in positive outcomes for women with hypovolemic shock from obstetric hemorrhage. In different studies, we saw significant reductions in blood loss, fewer emergency hysterectomies required for intractable uterine atony, fewer end-organ failure morbidities (also known as MODS—multiple organ dysfunction syndrome), and decreased mortalities among women who received the NASG. Multiple studies show an approximately 50% decrease in mortality among women who received the NASG [1-3]. We pooled data from 5 studies, using meta-analytic techniques [1,2,4-6]. The result was again a statistically significant reduction in mortality, 38% (OR 0.62, 95% CI 0.44-0.86) for all women with shock and 59% (OR 0.41 95% CI 0.20-0.84) for women in more severe shock (those with a Mean Arterial Pressure < 60 mm Hg) [7]. These results indicate that the NASG is an effective tool which helps to reduce maternal mortality.

Additionally, the NASG has helped significantly decrease the amount of time a woman needs to recover from shock. In Egypt, when the NASG group was compared to the pre-intervention group, median recovery times were 75 minutes vs. 120 minutes (log rank test = 8.99, p=0.003) [8]. In Zambia and Zimbabwe, we compared the recovery times from shock between the NASG group (170 minutes, IQR 96-299) and the control group (209 minutes, IQR 114-386) and again saw significant results (HR 1.25, 95% CI 1.02-1.52, p=0.03) [9].

Between 2007-2012, we conducted a cluster randomized clinical trial in primary care facilities in Zambia and Zimbabwe. The purpose of this study was to see if earlier application of the NASG, at the community or primary health care level, also improved outcomes. Eight-hundred and eighty women were enrolled at the primary clinic level, where midwives conducted deliveries and there was no possibility of blood transfusion or surgery until after they reached the referral hospital. The results suggest that maternal mortality can be safely reduced by 54% (OR 0.54, 95% CI 0.14-2.05), when women with hypovolemic shock receive the NASG at a primary care facility prior to transportation to a tertiary care level facility for definitive care [9].

In 2012, the World Health Organization (WHO), the International Federation of Gynecology and Obstetrics (FIGO), and the Global Library of Women's Medicine (GLOWM) all recommended the NASG as a tool that can be used to stabilize a woman while she is waiting for definitive treatment.

Further, the NASG is very cost-effective; a 2013 cost-effectiveness study found that for severe shock the NASG was either cost-savings or cost-beneficial [10]. The majority of the savings came from decreased use of other resources, such as blood transfusions and medications.

For a complete list of NASG research, including cost-effectiveness analysis and links to pdfs of the original publications, please visit our website: www.safemotherhood.ucsf.edu.

1. Miller S, Hamza S, Bray E, Gipson R, Nada K, et al. (2006) First aid for obstetrical haemorrhage: the pilot study of the non-pneumatic anti-shock garment (NASG) in Egypt. BJOG 113: 424-429.

2. Miller S, Fathalla MM, Ojengbede OA, Camlin C, Mourad-Youssif M, et al. (2010) Obstetric hemorrhage and shock management: using the low technology Non-pneumatic Anti-Shock Garment in Nigerian and Egyptian tertiary care facilities. BMC Pregnancy Childbirth 10: 64.

3. Miller S, Ojengbede O, Turan JM, Morhason-Bello IO, Martin HB, et al. (2009) A comparative study of the non-pneumatic anti-shock garment for the treatment of obstetric hemorrhage in Nigeria. Int J Gynaecol Obstet 107: 121-125.

4. Maknikar SN, R; Miller, S (2012) NASG reduces mortality in Indian woman with PPH, Abstract #0429, presented at the International Federation of Gynecology & Obstetrics (FIGO) Conference. Int J Gynaecol Obstet 119: S413.

5. Magwali TB, E; Mambo, V; El Ayadi, A; Lippman, S; Bergel, E; Gibbons, L; Merialdi, M; Miller, S (2012) Non-pneumatic Anti-Shock Garment (NASG) for obstetric hemorrhage: Harare, Zimbabwe, Abstract #0421 presented at the International Federation of Gynecology & Obstetrics (FIGO) Conference. International Journal of Gynecology & Obstetrics 119: S410.

6. Mkumba GB, E; Amafumba, R; McDonald, K; DeMulder, J; El Ayadi, A; Lippman, S; Gibbons, L; Bergel, E; Merialdi, M; Miller, S (2012) Non-pnuematic Anti-Shock Garment (NASG) decreases maternal deaths in Lusaka, Zambia, Abstract #0461 Presented at the International Fegeration of Gynecology & Obstetrics (FIGO) Conference. International Journal of Gynecology & Obstetrics 119: S424.

7. Miller S El Ayadi, A. Meta-Analysis of 3,651 Women with Severe Obstetric Hemorrhage/Hypovolemic Shock Treated with Non-pneumatic Anti-Shock Garment. In: Johnson T, editor; 2012 October 7-12 2012; Rome, Italy. pp. S223.

8. Miller S, Turan JM, Dau K, Fathalla M, Mourad M, et al. (2007) Use of the non-pneumatic anti-shock garment (NASG) to reduce blood loss and time to recovery from shock for women with obstetric haemorrhage in Egypt. Glob Public Health 2: 110-124.

9. Miller S (2013) Dissemination Results Presentation: Cluster Randomized Trial of the Non-pneumatic Anti-Shock Garment (NASG) for Obsetric Hemorrhage in Zambia and Zimbabwe.

10. Sutherland TD, J; Miller, S; Bishai, D; Butrick, E; Fathalla, M; Mourad-Youssif, M; Ojengbede, O; Nsima, D; Kahn, J. (2013) Use of the non-pneumatic anti-shock garment (NASG) for life-threatening obstetric hemorrhage: A cost-effectiveness analysis in Egypt and Nigeria. PLoS ONE.