EMERGENCY CARE IN RESOURCE-LIMITED SETTINGS

Allen SJ, Martinez EG, Gregorio GV, Dans LF. Probiotics for treating acute infectious diarrhoea. Cochrane Database Syst Rev. 2010; (11):CD003048.

Probiotics appear to have a safe and beneficial role in the treatment of acute infectious diarrhea, but further studies are needed to yield evidence-based treatment guidelines.

Summary: In this review article, the authors performed a meta-analysis of 63 studies to assess the effects of probiotics in acute infectious diarrhea. They looked at randomized or quasi-randomized studies from 1966-2010 that specifically used a probiotic as an intervention for acute diarrhea, excluding yogurt and fermented foods as a treatment, with controls of placebo or no use of probiotic. From a pool of 120 potential studies, they selected 63 studies that included a total of 8,014 participants who were mainly infants and young children. The studies were reviewed on the basis of their primary outcomes, which included mean duration of diarrhea, stool frequency on day two after intervention, and presence of ongoing diarrhea on day four. Patients in the probiotics groups had a mean reduction of diarrhea duration by 24.8 hours (95% CI = 15.9 to 33.6) compared with controls, measured in 35 trials. Stool frequency was reduced on day two by 0.8 episodes (95% CI = 0.45 to 1.14) compared with controls, measured in 20 trials. The risk ratio for diarrhea at four days also fell by 0.41 (95% CI = 0.32 to 0.53) compared to controls, measured in 29 trials. From these data, they concluded that the use of probiotic organisms along with rehydration therapy was safe and effective for reducing duration and stool frequency in patients with acute infectious diarrhea.

Comment: This is a comprehensive and thorough meta-analysis, and is one of only six review articles published since 2001 regarding the use of probiotics in acute infectious diarrhea. In comparison to previous review articles, the authors included participants of all ages, unpublished data, and non-blinded studies. While this maximized the available data sources, it also led to a significant level of heterogeneity among the studies. There were no standard definitions for acute diarrhea, and the specific strains and treatment regimens of probiotics varied widely. As a result, the conclusions are quite generalizable, but led to no specific evidence-based treatment guidelines. The authors identify a need for larger, well-designed studies to look at specific probiotic regimens in defined settings with standard definitions. Given that acute infectious

diarrhea remains a major cause of disease burden throughout the world, especially in developing countries, these results support further investigation into probiotics as a therapeutic intervention. This review gives hope that increased use of probiotics could reduce morbidity or mortality due to infectious diarrhea, although outcomes and cost-effectiveness must be studied before recommendations can be made for widespread implementation of probiotics, especially in resource-limited settings.

By Theresa Nguyen, MD

Barros FC, Bhutta ZA, Batra M, Hansen TN, Victora CG, Rubens CE; GAPPS Review Group. Global report on preterm birth and stillbirth. BMC Pregnancy Childbirth. 2010; 10(Suppl 1):S3.

A review of the evidence for effectiveness of existing interventions on preterm birth and stillbirth in low and middle income countries.

Summary: This is the third article in a series of seven from the global preterm birth and stillbirth report. The authors review the evidence for effectiveness of 49 different interventions with the intention to treat or prevent preterm birth and stillbirth. The authors systematically evaluated 2,000 intervention studies and identified 82 interventions commonly used. They then selected 49 of those interventions to review based on five characteristics: availability of evidence, evidence of impact, limited technology required, applicability to low-income countries, and generalizability to a wide group of pregnant women. Subsequently, they assessed each intervention for its quality of evidence and level of recommendation for implementation based on an adaption of the GRADE criteria. The authors conclude that two interventions prevent preterm births (smoking and progesterone), eight interventions prevent stillbirths (balanced protein energy supplementation, screening and treatment of syphilis, intermittent presumptive treatment for malaria during pregnancy, insecticide-treated mosquito nets, birth preparedness, emergency obstetric care, cesarean section for breech presentation, and elective induction for post-term delivery), and eleven interventions improve survival (prophylactic steroids in preterm labor, antibiotics for premature rupture of membranes, vitamin K supplementation at delivery, case management of neonatal sepsis and pneumonia, delayed cord clamping, room air for

resuscitation, hospital-based kangaroo mother care, early breastfeeding, thermal care, surfactant therapy, and continuous positive airway pressure for respiratory distress syndrome).
Comment: This is an exhaustive review of interventions with significant implications for the morbidity and mortality of newborns in low and middle income countries. The article successfully reviews the existing literature to identify interventions that are supported by a sufficient quality of evidence and strong level of recommendation for their use in low- and middle-income countries. The study is a review, and is limited by the low quality of existing evidence in the current literature. The study authors acknowledge this gap in quality research and identify several areas for further research. While specifically evaluating interventions for low and middle income countries, it is important to look at cost effectiveness of the interventions, which this article does not. Despite these limitations, this is an extraordinarily instructive article for the physician interested in improving the morbidity and mortality of women and children in low and middle-income countries.
By Joshua Matthew Jauregui, MD

Blum J, Winnikoff B, Raghavan S, et al. Treatment of post-partum haemorrhage with sublingual misoprostol versus oxytocin in women receiving prophylactic oxytocin: a double-blind, randomised, non-inferiority trial. Lancet. 2010; 375(9710):217–23.
This study demonstrates that sublingual misoprostol is equivalent to oxytocin in the setting of post-partum bleeding in women who have been prophylactically exposed to oxytocin during the third stage of labor.

Summary: This randomized, double-blinded, non-inferiority trial compared the use of sublingual misoprostol to intravenous oxytocin to treat post-partum haemorrhage in women exposed to prophylactic oxytocin during the third stage of labor in five hospitals in Burkina Faso, Egypt, Turkey, and Vietnam. This trial enrolled 31,055 women on admission to the hospital; 3% (n = 809) met the eligibility criteria of blood loss exceeding 700 mL that was thought to be due to uterine atony. Eligible participants were randomized to one of two treatment groups to receive either 800 mcg of misoprostol (n = 407), or 40 IU of oxytocin (n = 402). Providers and participants were masked to the assigned treatment group. Blood loss was measured with a calibrated receptacle and funnel for 20 minutes after treatment, or until active bleeding stopped.

Providers were instructed to give standard care if bleeding continued for longer than 20 minutes. Baseline characteristics such as parity, age, gestational age at delivery, hemoglobin before delivery, and blood loss at time of treatment did not differ between the two groups. Primary endpoints for the study were control of active bleeding within 20 minutes, and loss of 300 mL or more after study treatment. Active bleeding was controlled within 20 minutes for 363 (89%) of women given misoprostol and 360 (90%) given oxytocin. In consultation with experts, the authors stopped the study after enrolling 809 patients because interim analysis demonstrated a near-zero probability of reaching statistical significance, and non-inferiority could be claimed. Thirty-four percent and 31% of women bled ≥ 300 mL after misoprostol treatment and oxytocin treatment respectively, while severe blood loss (≥1000 mL after treatment) was slightly more common in the misoprostol (3%) versus oxytocin (1%) group. Except for intrauterine exploration under anesthesia, there was not a significant difference in additional supportive care (i.e. additional uterotonic drugs, fluids, and blood transfusions) for the two groups. Significantly more women in the misoprostol group reported shivering and fever.

Comment: This study provides evidence that sublingual misoprostol is as effective as IV oxytocin in the setting of postpartum hemorrhage in women exposed to oxytocin. However, those who took misoprostol experienced more side effects. Generalizing these results to clinical practice may be difficult, as IV oxytocin was readily available and stored properly, and providers were extremely familiar with the study protocol. Ultimately, this study shows that for women treated prophylactically with oxytocin, misoprostol and oxytocin are clinically equivalent.

By Kimberly Pringle, MD

Bouyou-Akotet MK, Ramharter M, Ngoungou EB, Mamfoumbi MM, Mihindou MP, Missinou MA. **Efficacy and safety of a new pediatric artesunate-mefloquine drug formulation for the treatment of uncomplicated falciparum malaria in Gabon. Wien Klin Wochenschr. 2010; 122(5-6):173-8.**

A novel pediatric artesunate-mefloquine formulation was found to be efficacious, safe, and well tolerated for treatment of malaria in African children.

Summary: Artesunate-mefloquine is a medication commonly used to treat malaria. This open-label phase II stratified, randomized, non-controlled clinical trial evaluated the efficacy, safety,

and tolerability of two new pediatric formulations of artesunate-mefloquine: a pediatric fixed-dose granule formulation, and a co-blister tablet formulation. A total of 71 Gabonese children aged 1-13 years suffering from uncomplicated falciparum malaria were stratified into two groups according to weight: pediatric (10 to 20 kg) and tablet (20 to 40 kg). All children were treated once daily for three days: the pediatric group received the new granule formulation, and the tablet group received the co-blister tablets. There was no reappearance of parasitemia during the follow-up period, and on day 28, the PCR-corrected cure rate was found to be 100%. Reported side effects were minimal and included vomiting (17%), headache (17%), and abdominal pain (11%).

Comment: Malaria is a leading cause of death for children, who represent 85% of all malaria deaths. Children are at risk because they lack developed immune systems to protect against the disease. Although there is frequent use of artemisinin-based combination drugs in Africa, pediatric formulations are lacking. One limitation is the abbreviated follow-up period (28 days). Another limitation is the exclusion of children with hemoglobin < 7 or symptoms of severe malaria; one may not be able to apply these results to the sickest of children. The sample size of 71 was also small. This is a good initial study, but confirmatory studies with a longer follow-up and a larger sample size, including children with severe malaria, are needed.

By Gabrielle A. Jacquet, MD

Brooks WA, Goswami D, Rahman M, et al. Influenza is a major contributor to childhood pneumonia in a tropical developing country. Pediatr Infect Dis J. 2010; 29(3):216-21.

Influenza is a significant contributor to childhood pneumonia in a tropical setting through a high influenza infection incidence and a significant association of influenza with pneumonia.

Summary: Because pneumonia and influenza are both major sources of child mortality worldwide, the authors sought to determine the epidemiology of influenza infection and its association with pneumonia among poor urban children in Bangladesh. Respiratory and febrile disease surveillance was conducted through weekly home visits by trained research assistants from April 2004 to December 2007 in a cohort of 5,000 children younger than 5 years old in Kamalapur, southeast Dhaka. They were then referred to an onsite clinic to be evaluated by a

physician if they exhibited clinical signs suspicious for a respiratory illness. Research partners collected nasopharyngeal wash (NPW) specimens on every fifth child referred to the onsite clinic. During this period they identified 7,515 cases of pneumonia and 24,696 cases of URI in 16,043 child-years, creating a pneumonia incidence of 511 pneumonia episodes/1000 child-years. Out of 2,370 NPW specimens submitted, an isolation rate of 13.5% was obtained, translating to an incidence of 101.8 influenza episodes/1000 child-years. Fever and rhinorrhea were independently associated with influenza. The authors calculate the incidence of influenza-specific pneumonia to be 28.6 episodes/1000 child-years, with Influenza A having the strongest association with pneumonia. The authors conclude that the high influenza incidence of 511 cases/1000 child-years, and the large percentage (28%) of influenza-positive children who developed pneumonia, reveal influenza to be a major contributor to childhood pneumonia in this low-income urban tropical setting.

Comment: This study investigates part of the surveillance cohort of the International Centre for Diarrheal Disease Research, Bangladesh, which has worked in Dhaka since 1998. The paper is significant as one of the rare, large-scale pediatric cohort studies of respiratory illnesses performed in an international setting with a poor urban population. The materials and methods should be carefully noted for those researchers considering undertaking a similar longitudinal prospective study. It is important to note that although 28% of influenza positive children had pneumonia, an even larger percentage (56%) of influenza-negative cases were diagnosed with pneumonia. Despite this, the authors were able to corroborate data from Thailand, India, and Hong Kong, which show a contribution of influenza to childhood respiratory infections and pneumonia across tropical and subtropical Asia. They also discuss a need for influenza vaccination availability in the region to reduce disease burden, acquiescing that the inverse annual timeframe of influenza infection as compared to the Northern Hemisphere and current production practices might complicate vaccine preparation and distribution. More research is necessary to further characterize influenza infection in tropical Asia and to define the role of influenza vaccination in this setting.

By Ambrose H Wong, MD

Geduld H, Hodkinson PW, Wallis LA. Validation of weight estimation by age and length based methods in the Western Cape, South Africa population. Emerg Med J. 2010; epub ahead of print.

The Broselow tape best estimates the weight of children under 10 years old in the Western Cape population of South Africa.

Summary: Many different methods of weight estimation exist for pediatric resuscitation. These include the Broselow tape, the Advanced Pediatric Life Support formula, the Best Guess, and the Luscombe and Owens formula. These formulas are frequently geographically or ethnically specific, and therefore may vary in how well they predict weight depending on the region. In this study, the authors assessed which method is most accurate for their population of South African children. They prospectively enrolled patients between 1 and 10 years of age who presented to the Red Cross War Memorial Children's Hospital in Cape Town. A Bland-Altman analysis was performed to compare the four different weight estimations. Outcome measures were fit (a predicted weight within 10% of the measured weight) and mean percentage error (how much the estimate deviated from the measured weight) reported. They enrolled 2,832 patients during a nine-month period. The Broselow tape emerged as the best estimator of their population (64.2% of estimates were within 10% of the measures weight, and the mean percentage error was the smallest at 0.89%).

Comment: This study answers a simple question that is a current focus of international EM research: Can we apply developed world tools to developing world populations? Geduld et al. demonstrate that weight estimations can be applied to developing countries, but should be validated for the region. Strengths of the study include its large sample size, and use of a generalizable measure of fit, which allows for easy comparison to age-matched controls in other studies conducted in the United States, India, and Hong Kong. A desirable addition would have been a graph with the breakdown of ethnicity and socioeconomic status of the study population. This would have potentially allowed other African nations to apply the Western Cape data to their own populations rather than conducting another study. In general, this study is exemplary of research we hope to see more of in developing countries in that it is cost-effective, easily implementable, and can have widespread impact.

By Elizabeth Goldberg, MD

Ghimire M, Pradhan YV, Maskey MK. Community-based interventions for diarrhoeal diseases and acute respiratory infections in Nepal. Bull World Health Org. 2010; 88(3):216–21.

A review of community-based interventions to combat two of the leading causes of worldwide child mortality in Nepal.

Summary: Diarrheal disease and acute respiratory infections are leading causes of child mortality globally. This article reviews a novel community-based intervention in Nepal that employed community health worker volunteers to diagnose, treat, and appropriately refer patients to health care facilities. The stated goal of the program was to decrease child mortality from diarrheal and respiratory infections, while integrating existing community strengths into the national health care program. Health workers with minimal prior education were trained by the Ministry of Health to diagnose, assess disease severity, treat with oral rehydration, and refer when necessary to healthcare facilities. During implementation of the program, reported cases of diarrhea and pneumonia in districts with community based interventions increased, while the proportion of cases with associated dehydration decreased. The program was initially started in five districts chosen by consensus among the Ministry of Health and Population and district administrations. The program expanded to 48 districts by the end of 2007. The authors offer three main conclusions: safe, effective interventions can be integrated into community-based programs to control diarrhea and acute respiratory infections; community members with minimal prior education can be trained to assess, treat, and refer children with these illnesses by simplifying and modifying the training; and integrating existing community human and technical strengths can improve the scaling-up and retention process.

Comment: The authors briefly report on one of Nepal's programs designed to help meet the Millennium Development goal of decreasing child mortality. The program is community-centered in design, integrating community members into provision of their own health care through training and increased communication with health facilities. Although the authors attribute the decreased case-fatality rates and dehydration severity of diarrheal illness and respiratory infection to the intervention examined, without addressing other potential contributing factors, they delineate an intriguing approach to expanding access to care in remote

and under-resourced areas. The article examines the effectiveness of training local community volunteers who have minimal education to ensure more rapid identification of children at risk of severe complications from diarrheal or acute respiratory illness. The barriers to health care that plague Nepal, such as difficult terrain, large proportions of the population living remote from health care facilities, and inconsistent access to transportation, are common in many low income countries, making this intervention an intriguing alternative to reliance on the slow development of more remote health outposts. Although it offers only a brief summary of the intervention, lacking a more comprehensive discussion of the evaluation of the program undertaken, the article summarizes an intriguing approach for emergency practitioners working in severely resource-limited settings. The approach outlined emphasizes the importance of collaborating with local health officials, focusing on community-tailored education, and integrating community health worker volunteers when there is no or limited access to health care facilities and providers.
By Aditi Joshi, MD

Kabra SK, Lodha R, Pandey RM. Antibiotics for community-acquired pneumonia in children. Cochrane Database Syst Rev. 2010; (3):CD004874.
Choosing evidence-based antibiotics in community-acquired pneumonia in children results in greater treatment efficacy.

Summary: The authors of this review article sought to find the optimal antibiotic regimen for community-acquired pneumonia (CAP) in children, the leading cause of mortality internationally in children under the age of five. While World Health Organization (WHO) guidelines recommend co-trimoxazole, recent studies have suggested a higher clinical failure rate and increasing resistance. In this meta-analysis, antibiotics were compared for treatment efficacy and cure rates in CAP in children. A Cochrane database review and a MEDLINE search were performed to search for randomized control trials that compared different antibiotics in their treatment of CAP in children under the age of 18 years. Each article was accessed for relevance and bias. Twenty-seven articles, with 11,964 children, were included in the study. Direct comparison of co-trimoxazole (OR 0.92, 95% CI = 0.58 to 1.47) and amoxicillin was available in three trials where 3,952 children under the age of 5 years showed similar failure rates for non-severe pneumonia. A pooled analysis of three studies of 3,942 children with severe pneumonia

who were able to eat had a similar failure rate with oral amoxicillin (OR 0.95, 95% CI = 0.78 to 1.15) as with injectable penicillin or ampicillin. In very severe pneumonia, chloramphenicol had a higher readmission rate at 30 days than penicillin/gentamycin (OR 1.61, 95% CI = 1.02 to 2.55) and a higher five day failure rate than ampicillin/gentamycin (OR 1.51, 95% CI = 1.04 to 2.19).

Comment: The authors provide a comprehensive review of appropriate antibiotic treatment for CAP in children in low-income countries. It combines all available data and provides updated evidence-based recommendations, which allows practitioners in low-resource settings to incorporate the latest scientific evidence into their practice. However, the cost of antibiotics is only briefly addressed. Lack of microbial culture data and lack of previous antibiotic use data is a known limitation of the study. This article provides an updated review of available data, and can help guide practitioners, as well as other organizations such as WHO, in their future recommendations.

By Usha Periyanayagam, MD, MPH

Levine A, Shah SP, Umulisa I, Mark Munyaneza RB, Dushimiyimana JM, Stegmann K. Ultrasound assessment of severe dehydration in children with diarrhea and vomiting. Acad Emerg Med. 2010; 17:1035-41.

Ultrasonographic aorta-to-inferior vena cava ratio may be a useful adjunct in the diagnosis of severe dehydration in children in the developing world.

Summary: This prospective cohort study of children admitted to three district hospitals in Rwanda with vomiting and/or diarrhea compared the test characteristics of ultrasound (US) and the World Health Organization (WHO) clinical dehydration scale in the diagnosis of severe dehydration. The two methods of US volume status assessment used were the ratio of aortic and inferior vena cava (IVC) diameters, and the degree of IVC inspiratory collapse. These three methods were compared against a criterion standard of percent weight change between hospital admission and discharge. Of the 52 children included in the final analysis, 29% presented with severe dehydration according to the criterion standard. With rehydration, IVC diameter increased significantly more in patients with severe dehydration (median 30%), compared to those without severe dehydration (median 13%, $p < 0.005$). The only measure of dehydration whose

performance achieved statistical significance was aorta to IVC ratio, with a sensitivity of 93% and specificity of 59% at a cutoff aorta/IVC ratio of 1.22. IVC inspiratory collapse and the WHO scale did not perform significantly better than chance.

Comment: The authors' findings echo the bulk of existing literature from the developed world suggesting that US is a sensitive and reliable marker of volume status, and that clinical assessment of dehydration may not be as reliable as once believed. The study showed that with a relatively small amount of training, local physicians could be adequately trained in the study's US assessment methods and achieve measurements comparable to U.S.-based US fellowship-trained emergency physicians. US is proving to be an important and increasingly used tool in international EM, given its portability, ease of use, and versatility. This study offers further evidence that it can be used in clinically meaningful ways in resource-limited settings.

By David R. Anthony, MD, MPH

Munos MK, Walker CL, Black RE. The effect of oral rehydration solution and recommended home fluids on diarrhea mortality. Int J Epidemiol. 2010; 39(Suppl 1):i75-87.

A systematic review of oral rehydration solution and recommended home fluids on diarrhea mortality in children aged <5 years.

Summary: In this systematic review, the authors attempt to identify published literature that evaluates the effects of oral rehydration solutions (ORS) and recommended home fluids (RHFs) on diarrhea mortality, specifically in children younger than 5 years. After outlining their search methods, defining their terms, detailing their inclusion and exclusion criteria, and analyzing methods, the authors proceed to summarize the results by outcome, such as diarrhea mortality and treatment failure. They evaluate the quality of evidence and conduct a meta-analysis for each outcome, then grade each study according to the CHERG adaption of the GRADE technique. They included 157 papers and 12 papers for the meta-analysis of ORS outcomes and RHF outcomes, respectively. As a result of their evidence review, they estimated ORS may prevent 93% of diarrhea deaths when assuming 100% coverage. They did not estimate the effect of RHFs on diarrhea mortality because none of the studies met their study quality criteria.

Comment: This review article is the first systematic review with corresponding meta-analysis examining the effect of ORS on diarrhea specific mortality. Diarrhea, a leading cause of death for children worldwide, is almost entirely manageable by maintaining adequate hydration. In a resource-limited setting where intravenous fluids can be expensive and impractical, ORS and RHFs have become the principle method to prevent and treat diarrheal dehydration. While this study attempts to comprehensively review the existing literature, the quality of existing evidence for this practice tends to be low. While all the studies described a benefit from intervention, there was significant variability. Although ORS has proven life-saving, its use remains unacceptably low in most countries. As such, the promotion and distribution of ORS should become an ever-increasing priority for international health professionals as long as diarrhea-related mortality exists.

By Joshua Matthew Jauregui, MD

Mwansa-Kambafwile J, Cousens S, Hansen T, Lawn JE. Antenatal steroids in preterm labour for the prevention of neonatal deaths due to complications of preterm birth. Int J Epidemiol. 2010; 39(suppl 1):i122-33.

This was a review of the effectiveness of antenatal steroids for reducing mortality in preterm labor neonates in low- and middle- income countries.

Summary: This study evaluated the evidence for antenatal steroid use in pre-term labor on cause-specific neonatal mortality, and specifically reviewed the evidence for use in low- and middle-income countries. The authors conducted systematic reviews and the quality of evidence was evaluated using an adapted GRADE approach. Existing meta-analyses were reviewed for relevance to low/middle-income countries. Initially 1,412 articles were identified for screening, with 44 studies selected for a meta-analysis. This analysis suggested that antenatal steroids decrease neonatal mortality among preterm infants (<36 weeks gestation) by 31% [relative risk (RR) 0.69; 95% CI = 0.58 to 0.81]. Eighteen studies were randomized control studies but only four of those were in low-income countries. A meta-analysis of those four studies showed a 53% mortality reduction and 37% morbidity reduction in pre-term infants treated with antenatal steroids.

Comment: This article evaluates a potentially very effective way to reduce pre-term infant mortality and morbidity in low and middle-income countries. Using a review and meta-analysis, a significant reduction in pre-term morbidity and mortality was obtained when antenatal steroids were administered. While the study attempted to further evaluate the effective use of antenatal steroids in low- and middle-income countries, this was limited by the lack of randomized control studies. There is also low use in general of antenatal steroids in low- and middle-income countries. More research is needed into the cost effectiveness, feasibility, and obstacles to improving the use of antenatal steroids in low- to middle-income countries to reduce pre-term infant morbidity and mortality.
By Leon Li, MD

Pilger D, Heukelbach J, Khakban A, et al. Household-wide ivermectin treatment for head lice in an impoverished community: randomized observer-blinded controlled trial. Bull World Health Org. 2010; 88:90-6.
Treating the entire household with ivermectin lengthened the amount of time free from head lice infestation in children residing in resource-limited communities.

Summary: Pediculosis capitis (head lice infestation) is a common parasitic condition in developing countries, with children bearing the highest disease burden. This paper assessed the effectiveness of household-wide prophylactic treatment with ivermectin to control pediatric head lice infestation in a resource-limited setting. The authors recruited 132 head lice-free children between 5 to 15 years old living in a *favela* (urban slum) in northeastern Brazil in February of 2007, and randomized their 78 households to treatment, with two oral ivermectin doses for all family members ten days apart, or control, with no medications. The children were then examined for head lice every 3-4 days for 60 days. Children living in families whose members had taken ivermectin remained free of head lice for a significantly longer (mean length of 24 days [IQR 11 to 45 days] versus a mean length of 14 days [IQR 11 to 25 days]) in the control group ($p = 0.01$). At the end of 60 days, 10 (16%) children in the treatment group versus 3 (4%) of the control group remain uninfected ($p = 0.03$). Female sex and lower poverty index were independent risk factors for faster re-infestation, while crowding, length of hair, and age showed no association. The authors conclude that household-wide treatment with ivermectin is effective

in delaying the infestation of household members who are free of head lice. They also suggest that mass treatment with ivermectin may benefit untreated members of the community by reducing transmission as well.

Comment: This study examined a prophylactic method to control head lice infestation, a prevalent and damaging condition that affects limited-resource and extremely poor communities worldwide. The authors show that household-wide treatment reduced in-household transmission of head lice. However, the results should be interpreted in the context of several limitations. First, all the children had just participated in a clinical trial comparing two head-lice treatments, which may have affected behavior of the children and their families. Second, 67% of the sentinel children in the study lived in a family with other sentinel children. Nevertheless, there were no significant differences in participant characteristics between the treatment and control groups, including number of sentinel children in one household. Finally, the authors report that girls and poorer children had a significantly higher risk of early re-infestation. Additional research specifically targeting these high-risk groups, perhaps by mass treatment within a community as the authors suggested in the study, may be beneficial as the next step towards controlling head lice infestation in impoverished communities.

By Ambrose H Wong, MD

Rabbani GH, Larson CP, Islam R, Saha UR, Kabir A. Green banana-supplemented diet in the home management of acute and prolonged diarrhoea in children: a community-based trial in rural Bangladesh. Trop Med Int Health. 2010; 15(10):1132-9.

Green banana is effective in decreasing the duration of illness in both acute and prolonged diarrhea for children being treated at home.

Summary: This cluster-randomized field trial evaluated the effectiveness of green bananas for in-home management of acute and prolonged childhood diarrhea. The authors identified 72 clusters in the rural Mirsarai sub-district of Bangladesh, each containing approximately 3,000 persons. Eighteen clusters were randomly chosen and assigned to standard diarrhea care based on WHO guidelines (12 clusters) and standard care plus green bananas (6 clusters). To evaluate children with prolonged diarrhea (defined as symptoms longer than seven days), the 12 standard care clusters were further randomized to standard care (6 clusters) and standard care plus green

bananas (6 clusters), commencing only after the seventh day of symptoms. Non-hospitalized children aged 6-36 months with active diarrhea were followed for 14 days by a network of local women and trained fieldworkers. Over 20 months, 2968 children were enrolled, of whom 198 were further evaluated for prolonged diarrhea. The cumulative probability of symptomatic cure was higher in the green banana group for both acute diarrhea (hazard ratio = 0.63, $P < 0.001$) and prolonged diarrhea (hazard ratio = 0.38, $P < 0.001$). Recovery rates of children receiving green bananas were significantly higher for acute diarrhea at day 3 (79.9% vs. 53.3%, $P < 0.001$) and at day 7 (96.6% vs. 89.1%, $P < 0.001$). Children with prolonged diarrhea also benefited from green bananas, with recovery rates at day 10 of 79.8% vs. 51.9% ($P < 0.001$), and at day 14 of 93.6% vs. 67.2% ($P < 0.001$).

Comment: Green banana is an inexpensive traditional remedy for childhood diarrhea, and was shown in this study to be effective in decreasing the duration of illness for children treated for diarrhea at home. The cluster randomization, large sample size, low rate of attrition (0.1% dropout rate), well-defined study protocol, and use of an intention-to-treat analysis led to very strong internal validity of the conclusions. The lack of blinding, and reliance on self-reported data from mothers were identified as potential sources of bias and addressed by the authors. Data on maternal education and breastfeeding habits, which are other known confounders in diarrheal illness, were notably missing from this study. Nevertheless, the study findings provide health care professionals in resource-limited settings with a potentially useful adjunct to the management of childhood diarrhea, which is a common source of infant and child morbidity and mortality in the developing world. Further research is necessary to determine whether other similar starch-based remedies might also be efficacious when green banana is not available. Generalizability of the findings to other regions, and the relative cost-effectiveness of the treatment compared to other therapies for diarrhea, must also be studied before widespread implementation of green banana can be recommended at the policy level.

By Timothy Tan, MD

Winnikoff B, Dabash R, Durocher J, et al. Treatment of post-partum haemorrhage with sublingual misoprostol versus oxytocin in women not exposed to oxytocin during labour: a double-blind, randomised, non-inferiority trial. Lancet. 2010; 375(9710):210-6.
Misoprostol may be a reasonable alternative to oxytocin for post-partum haemorrhage in resource-limited settings.

Summary: Post-partum hemorrhage, often caused by uterine atony, remains a common and dangerous public health problem worldwide. Its effect is particularly striking in developing countries, where high rates of unattended births and poor access to care and supplies is widespread. Administration of oxytocin, a uterotonic agent, is considered standard of care for post-partum hemorrhage. However, oxytocin requires IV access and refrigeration, making it less than ideal for resource-limited settings. In this study, misoprostol, a prostaglandin E1 analogue that is heat-stable and available in sublingual form, was compared to oxytocin for control of post-partum hemorrhage. This double-blind, randomized, controlled non-inferiority trial was undertaken at four secondary and tertiary institutions across three continents. Primary endpoints were bleeding control at 20 minutes, and hemorrhage of greater than 300 ml after treatment administration. Misoprostol was found to be less efficacious than oxytocin for both endpoints (90% vs. 96% and 30% vs. 17%). Secondary outcomes such as time to bleeding control, total blood volume loss, and need for transfusion also favored the oxytocin group. However, no patients in either group required surgical intervention, and severe bleeding (> 1,000 ml) was equivalent in both groups. The authors conclude that although oxytocin shows superiority to misoprostol for post-partum hemorrhage, misoprostol appears to be efficacious, and should be considered as a first-line agent for post-partum hemorrhage in locations where oxytocin is not available.

Comment: This well-designed trial looks at a common problem with high morbidity and mortality that disproportionately affects patients in low- and middle-income countries. While this study failed to establish the non-inferiority of misoprostol to oxytocin based on the two primary endpoints chosen, there was no increased rate of surgery or death in the misoprostol group, and the proportion of women with a drop in hemoglobin concentration of greater than 2 g/dL was similar in both groups, suggesting that misoprostol performed as well as oxytocin for more clinically significant outcomes (with the caveat that the study was not specifically powered to

determine non-inferiority for those outcomes). In addition, given that the expertise of those inserting IVs and the timely nature of medication administration may not be replicable in other resource-limited settings, the superiority of intravenous oxytocin over sublingual misoprostol in this study may actually be somewhat inflated. Overall, misoprostol appears to be a reasonable alternative for use in resource-limited settings and should be considered in cases of post-partum hemorrhage when oxytocin is not available.
By Herbie Duber, MD

Disaster and Humanitarian Response

Berger R, Gelkopf M. An intervention for reducing secondary traumatization and improving professional self-efficacy in well baby clinic nurses following war and terror: a random control group trial. Int J Nurs Stud. 2011; 48(5):601-10.
Improved clinical and psychosocial training among well baby clinic nurses working in regions exposed to war and terror decreases secondary traumatization.

Summary: Infants and children exposed to war and terror frequently develop devastating long-term mental health complications, such as post-traumatic stress disorder, anxiety, depression, and poor daily functioning. Health care providers who care for such patients are at risk of developing secondary traumatization, leading to compassion fatigue, poor professional sense of self-efficacy, and burnout. This prospective, quasi-randomized control trial evaluated a 12-week intervention for nurses at well baby clinics in war- and terror-affected regions of Israel. The intervention consisted of weekly six hour sessions designed to provide nurses with knowledge pertaining to stress and trauma in infants and young children, tools for identifying children and parents at risk of developing stress-related problems, and stress management techniques for both children and adults. The sessions also included team building, support groups, and self-maintenance skills designed to allow nurses to better cope with secondary traumatization. Nurses enrolled in the intervention demonstrated significantly improved professional self-efficacy, compassion, satisfaction, and burnout compared to nurses placed on the waiting list during the same time period. The authors conclude that training health personnel in civilian war zones to

better understand and deal with trauma and secondary traumatization can yield better professional functioning.

Comment: The issue of secondary traumatization in war and terror-affected regions is of critical importance. Nurses, particularly those working in well baby clinics, are highly affected by trauma and secondary traumatization, but are frequently overlooked. This study demonstrated a well-designed but time-intensive intervention that demonstrated improved job satisfaction and decreased burnout. However, the sample size is small, and only two regions in a single country were examined, suggesting implementation and evaluation in other locales should be completed before considering universal utilization.

By Herbie Duber, MD

Donaldson RI, Hung YW, Shanovich P, Hasoon T, Evans G. Injury burden during an insurgency: the untold trauma of infrastructure breakdown in Baghdad, Iraq. J Trauma. 2010; 69(6):1379-85.

A cross-sectional household survey assessing injury burden within the Baghdad Governorate of central Iraq in 2009.

Summary: The authors of this study attempt to quantify the injury burden from insurgent conflict to the population within the Baghdad Governorate of central Iraq. The study was conducted from October 2009 to November 2009. By describing the injury burden, including the indirect injury from the breakdown of infrastructure, the authors hope to help guide appropriate areas of injury prevention and treatment. Previous attempts to quantify injuries in the country have focused mainly on direct mortality. In this study, a two-stage, cluster sample was used and households were randomly selected for inclusion. The Iraqi Ministry of Health staff then administered a cross-sectional survey to the heads of the households. The survey asked participants to recall all injuries incurred in the last three months, and injuries resulting in death in the last year. The authors define injury as any type of physical harm to an individual that created the loss of at least one day of normal activity, or that caused the individual to seek health care treatment. The Iraqi Ministry of Health staff administered the survey to a total of 1,172 households, obtaining data regarding 7,396 individuals. For the three month recall period, there were 103 reported injuries, three of which were injury-related death. There were seven cases of

injury-related deaths within the 12 month recall period. As such, there was a 1.7% (95% CI = 0.7% to 3.5%) proportionate mortality for injuries. Of these injuries, only 8.9% were recorded as intentional. Injury incidence was much greater in men, displaced persons, and those with less education.

Comment: By describing the injury burden through the application of a cross-sectional household survey, this study emphasizes that a significant proportion of injury is related to conflict and infrastructure breakdown. Furthermore, it is evident that intentional injury, which is often publicized and discussed, makes up only a small proportion of the total injury burden. In an area of conflict, study limitations include survey responders' fear to participate, and the dynamic state of security during any specific time period. It should be noted that extremely insecure zones were deliberately avoided, providing some selection bias. Finally, this was a retrospective study based on recall and self-reporting. As such, overall injury burden, intentional injury, and mortality-related injury were all most likely underestimated. It is also important to acknowledge that a state of conflict often serves to prevent other forms of otherwise more common injuries such as motor vehicle-related injuries. This study effectively emphasizes the injury burden in an area of conflict, including the effect of social and infrastructure breakdown.

By Joshua Matthew Jauregui, MD

Feikin DR, Adazu K, Obor D, et al. Mortality and health among internally displaced persons. Bull World Health Org. 2010; 88(8):601-8.

Internally displaced persons (IDPs) were at greater risk for death due to HIV and hospital admission for childhood illness than were non-displaced persons following the post-election violence in Kenya in 2008.

Summary: Feikin et al. conducted this cohort study among people displaced by the post-election violence in Kenya in 2008. The authors used demographic surveillance survey data to classify recent arrivals to the study area as internally displaced persons (IDPs). Morbidity and mortality between the local and IDP populations were compared. The authors found that children younger than 5 years of age were 2.95 times more likely to be hospitalized (RR, 95% CI = 2.44 to 3.58), but had equivalent mortality rates. They also found that almost twice as many of the deaths due

to HIV that occurred among those age 5 years or older were IDPs compared to non-IDPs (53% versus 25% to 29%, $p < 0.001$).

Comment: The authors leveraged an existing demographic surveillance system to identify a population of IDPs, and then compared them to the pre-existing local population. Although this method may have incorrectly identified as IDPs some recent arrivals who were not displaced by the post-election violence, this over-estimation was likely small, and the method allowed for interesting analysis. The findings of this study are consistent with previous research that has shown that IDPs are often a vulnerable group – in this case evidenced by more severe presentations of childhood illness, and disproportionate mortality rate due to HIV among individuals age 5 years and older. Nevertheless, this study does give hope by suggesting that with appropriate treatment, excess mortality can be avoided among internally displaced children less than 5 years of age.

By Kevin Lunney, MD

Sadewasser J, Potter A, Ellis D. Defining a standard medication kit for prehospital and retrieval physicians: a comprehensive review. Emerg Med J. 2010; 27(1):62-71.

Based on clinical experience with an Australian air medical service, this review aims to provide a standardized, evidence-based list of essential prehospital medications.

Summary: This review article addresses the lack of standardized, evidence-based guidelines dictating what medications should be available to physicians working in a prehospital or retrieval capacity. Based on an analysis of the pathology seen by the Townsville CareFlight Medical Service in Queensland, Australia in 2006 to 2007, as well as data collected by the United Nations Emergency Service in Aceh Province, Indonesia in 2005 to 2006, the study authors compiled a list of disease processes likely to be relevant to prehospital and retrieval physicians. Based on this list, two of the study authors then performed independent literature searches and identified medications suitable for intervention in these disease processes, as best supported by current evidence or consensus guidelines. Core medications are divided into "urban/short-range" and "remote/long-range" lists, containing drugs critical to the management of a number of clinical entities, including airway obstruction, acute coronary syndrome, pulmonary edema, obstructive

lung disease, seizures, and preterm labor. A third list of non-core "special substances" includes unspecified antibiotics and antidotes, dictated by local disease patterns.

Comment: This study provides an interesting attempt to introduce an evidence-based approach to the standardization of prehospital medications. It is important to note, however, the wide variance in prehospital care delivery around the globe – from the largely paramedic-based system in North America, to the physician-based systems throughout much of Western Europe. While the evidence summarized in this review may be helpful to those designing nascent prehospital care systems, ultimately, local factors, such as the availability of certain medications and levels of provider training, may prove to be significant barriers to large-scale standardization.

By David R. Anthony, MD, MPH

Walker N, Russell RJ, Hodgetts TJ. British military experience of pre-hospital paediatric trauma in Afghanistan. J R Army Med Corps. 2010; 156(3):150-3.

In Afghanistan, prehospital helicopter-borne response teams are caring for more critical pediatric patients than they typically would see when not deployed.

Summary: This retrospective analysis describes the pediatric experiences of the helicopter-borne prehospital emergency care Medical Emergency Response Team (MERT) while on deployment in Afghanistan. During a 20-month period within 2006 and 2007, the Afghanistan MERT team transported 78 pediatric patients. A MERT team consisted of one physician, one nurse, and two paramedics. In most cases, the injury mechanisms and triage categories were significantly more severe than what the MERT team would typically see when not deployed. The distribution of triage categories, with 88% of triaged patients categorized as T1 or T2, reflects high-energy transfer mechanisms of injury. Local medical services are limited in their ability and availability, therefore help is preferentially requested for serious cases. On current deployments, the prehospital MERT team is caring for a sizeable number of pediatric patients. Familiarity with treating severely injured children can only be gained and maintained by appropriate training and continued medical practice. It is pertinent that all military prehospital emergency health care providers gain training and exposure to the care of the seriously injured pediatric patient.

Comment: Trauma is the leading cause of death in children greater than one year of age. Morbidity and mortality in this age group can be minimized if prehospital health care providers get the training they need to care for very sick children. Children's size, unique physiology, and anatomy produce different injury patterns when exposed to the same mechanisms of trauma. In order to best train providers how to triage, treat, and transport these patients, we must implement courses such as PALS (Pediatric Advanced Life Support) and PHPLS (Pre-Hospital Pediatric Life Support), both home and abroad.
By Gabrielle A. Jacquet, MD

Zraly M, Nyirazinyoye L. Don't let the suffering make you fade away: an ethnographic study of resilience among survivors of genocide-rape in southern Rwanda. Soc Sci Med. 2010; 70(10):1656-64.
The expression of resilience in two different post-genocide support groups in Rwanda varies significantly.

Summary: Rape has been used in conflicts as a tool that inflicts social, psychological, and physical trauma to its victims. This review article looks at the idea of resilience, which "refers to positive patterns of functioning or development during or following exposure to adversity, or, more simply to good adaptation in a context of risk." The purpose of this study was to define resilience in a cultural context through work with two post-genocide support groups. The groups were Abasa, comprised of young women in various states of matrimony and motherhood, and AVEGA comprised of self-identified widows. The concept of resilience through three cultural linguistic concepts: *kwihangana* (withstanding)*, kwongera kobahu* (living again)*,* and *guomeza ubuzima* (continuing life/health) were evaluated in the two groups. Overall, they found the two groups had similar ideas of what comprised resilience (based on 33 individual codes) but were different in how they embodied these concepts in their actions. The Abasa were more open and vocal about the atrocities that were committed, as demonstrated by their delivery of a political speech to the First Lady, while the AVEGA were much more private. The authors conclude that resilience is a normal human adaptation system that will continue to be on the forefront of the mental health debate.

Comment: Although this article is geared toward those who work in mental health, the concept of resilience in populations who have undergone trauma is important in the field of humanitarian response and emergency medicine. Emergency practitioners should not only be familiar with the concept of resilience, but the potential for wide variety in the expression of resilience. This study reveals that even among the women of one community who have undergone the same trauma and report a similar concept of resilience, the difference in actions can be striking. Recognition of resilience and its many expressions may aid the emergency practitioner when identifying individuals at risk of mental illness. Caring for the mental health of individuals and populations after massive psychological trauma is intricate. The authors offer a basic view of some of the attempts made to address mental health in post-genocide Rwanda among victims of rape.
By Aditi Joshi, MD

Emergency Medicine Development

Alam N, Chamot E, Vermund S.H., Streatfield K, Kristensen S. Partner notification for sexually transmitted infections in developing countries: a systematic review. BioMed Cent Public Health. 2010; 10:19.
A review of sexually transmitted infection partner notification and discussion of barriers to notification in developing countries.

Summary: In this article, the authors review literature regarding issues surrounding sexually transmitted infection (STI) partner notification (PN) in developing countries. The authors searched Medline, Embase, and Google using the search terms sexually transmitted infection, STI management, sexually transmitted disease (STD), syphilis, gonorrhea, Chlamydia, trichomoniasis, partner referral, partner management, partner tracing, contract tracing, and PN from 1995 to 2007. The authors excluded HIV. One author did these searches. Thirty-nine studies met the authors' criteria and were included in the review: 28 from Africa, six from Asia, and five from Latin American or Caribbean countries. The studies covered a range of methodologies including randomized trials (RT), observational, and descriptive. The authors separated their results into five themes:

- Willingness of index patients to self-notify partners: included in seven studies, majority of studies found willingness to self-notify partners, motivations differed between sexes
- Proportion of partners notified or referred: included in the majority of studies, ranged from 0 to 94%, which was based on relationship to partner and verification; additionally, "[t]here was little correlation between the willingness of patients to notify their partners and their reported success"
- Client-reported barriers in notifying partners: included in five studies, barriers varied by sex and type of relationship included stigma, embarrassment, geographical distance, fear of rejection, disharmony, unable to contact partner, and termination of relationship
- Staff- or investigator-reported infrastructure barriers in notifying partners – "inadequate staff and lack of accurate, affordable, diagnostic services"
- Partner notification approaches that were evaluated in developing countries: included in five studies, client-centered counseling increased PN in 2 RTs, another RT found increased medication delivery with patient-delivered medication, and another study found video-based health education improved PN.

Comment: This study reviews the literature of PN in developing countries for STIs over a 13-year period. PN is essential for management of STI, and identifying barriers is critical for health departments. The authors identify a number of barriers to the review of this topic, including a syndromic approach to STIs in most developing countries, weak health systems, under-capacitated clinics, inadequately trained staff, inability to perform a formal meta-analysis, and the basis of many outcomes on self-report. Additionally, the search was done by one author, only done in English, and did not include gray literature. The review also appears to be skewed toward the African literature, as more than 70% of the articles are from that continent. This review article is pertinent to international EM providers as it reviews articles and organizes themes of PN in STI, an issue that often arises in the emergency department.
By Charles Washington, MD, MPH

Carlo WA, Goudar SS, Jehan I, et al. High Mortality Rates for Very Low Birth Weight Infants in Developing Countries Despite Training. Pediatrics. 2010; 126(5):e1072-80.
Training courses in neonatal care for birth attendants did not decrease the mortality of very low birth weight infants in the developing world.

Summary: This study examines the influence of training in neonatal care on the 7-day mortality rates for very low birth weight (VLBW) newborns (< 1,500 g) in six developing countries. Data obtained during the same study period did find a positive effect of the training on the mortality rates for newborns with a birth weight ≥ 1,500 g. Local birth attendants with varying training backgrounds (physicians, midwives, traditional attendants) were trained by local instructors who themselves had received a train-the-trainer course by experienced master trainers. Training was based on the WHO's Essential Neonatal Care course (ENC) and on a modified version of the American Academy of Pediatrics Neonatal Resuscitation Program (NRP). Data were collected by using a before/after, controlled design for the ENC training and by using a randomized controlled design for the NRP course. One thousand ninety-six VLBW infants were enrolled and born at home or at first-level health care facilities. The training intervention did not lead to any significant changes in the 7-day neonatal, perinatal, or stillbirth mortality. The authors conclude that VLBW infants should receive care in higher-level facilities with advanced techniques and skills.

Comment: This study has a robust design and enrolled a relatively large number of participants. It is important to note that structured training of birth attendants has been shown to decrease mortality in newborns with a birth weight of 1,500 g or more in earlier studies, thus it still remains relevant and useful. Nevertheless, this study reveals this training to be ineffectual in VLBW neonates, mandating the investigation of other means of meeting their immediate health needs. The study's most significant weakness is using a before/after design to examine the impact of the ENC training without examination of other changes in practice that may represent significant confounders. The authors conclude that the knowledge and technology needed for VLBW infants may only be available at higher-level health care facilities, such as referral hospitals. Future interventions should focus on the early identification of patients who may require higher-level care, and the examination of means to make that care accessible and affordable. Nevertheless, additional research is also warranted to investigate other options, such as implementing advanced technologies at health care centers and comparable first-level facilities.

By Torben Kim Becker, MD

Corbett EL, Zezai A, Cheung YB, Bandason T, Dauya E, Munyati SS. Provider-initiated symptom screening for tuberculosis in Zimbabwe: diagnostic value and the effect of HIV status. Bull World Health Org. 2010; 88:13-21.

Screening for tuberculosis based on symptoms alone could safely identify patients at very low risk for TB infection, even among individuals who are HIV positive.

Summary: This original research article assesses the diagnostic value of provider-initiated symptom screening for tuberculosis (TB), and how HIV status affects it. A population-based survey was carried out in a random sample of adults in Harare, Zimbabwe in which participants were asked to answer a questionnaire, provide blood for anonymous HIV serum testing, and provide two sputum specimens for TB culture. The authors reported that of the 8,979 participants in the study, all potential TB symptoms were significantly more common among the 1,858 HIV+ patients compared to the 7,121 HIV- participants. 21.2% of HIV+ and 9.9 of HIV- participants had at least one symptom. Symptoms included weight loss (most common), cough, hemoptysis, fever, and night sweats. A case of TB was diagnosed by either: sputum culture + for Mycobacterium tuberculosis on two or more occasions; sputum culture + for Mycobacterium tuberculosis on one occasion plus the presence of a compatible clinical illness or radiographic evidence of TB; failure to respond to broad-spectrum antibiotics and a response to TB treatment at one month; or culture - for Mycobacterium tuberculosis but radiographic evidence of TB. Seventy-nine participants were newly diagnosed with TB, of whom 47 (59%) had cough, and that was of two weeks duration or longer in 37 (47%). The next most common symptoms were weight loss in 47% and drenching night sweats in 38%. Symptoms had a similar sensitivity and specificity in HIV+ and HIV− participants, but the HIV+ participants had a higher positive and a lower negative predictive value.

Comment: This study demonstrates the complexity of screening for TB based on symptoms, especially when HIV co-infection rates are high. Nevertheless, certain symptoms evaluated (e.g. cough, drenching night sweats, weight loss) were independently predictive of TB, and when combined these symptoms had a negative predictive value of over 99% in HIV+ participants. Symptom screening alone may therefore safely identify a subset of patients who are at low risk of TB, and in whom antiretroviral therapy or isoniazid preventive therapy can be started without diagnostic testing for TB. In resource-limited settings, screening based on symptoms alone could

be cost-saving. More accurate diagnostic tests could be reserved for those patients who screen positive for any symptoms that could suggest possible TB infection. One limitation of this study was that all patients were enrolled in a single city, although the prevalence of HIV and TB found in Harare are likely similar to many other cities in sub-Saharan Africa.
By Sandeep Johar, MD

Nakahara S, Saint S, Sann S, et al. Exploring referral systems for injured patients in low-income countries: a case study from Cambodia. Health Policy Plan. 2010; 25(4):319-27.

Improvement of referral systems for traumatically injured patients in low-income countries may require both international guidelines as well as utilization of local resources.

Summary: This case study from Cambodia examines emergency trauma care systems in low- and middle-income countries by evaluating the referral system of traumatically injured patients. A cross-sectional survey of health centers (HCs) and referral hospitals (RHs) was conducted over a three month period. Staff at each facility responded to a questionnaire collecting information on the number of patients referred to higher-level care, distance to referral centers, and mode and cost of transportation. Of the 80 HCs surveyed, physicians were not available at 76 (96%), but nurses were available at nearly all 78 (98%). Of the 17 RHs, physicians were present at 16. The median distance from HCs to RHs was 25 km, and from RHs to higher level facilities was 115 km. The median number of patients referred to higher level of care from HCs was 0, and from RHs 7.5 during this three month period. Commonly used modes of transportation included taxi (76%), ambulance (56%), motorcycle (55%), and private car (26%). Transportation by taxi was the most expensive. The majority of HCs (98%) had access to cell phones or radios; however, only 21% always contacted the RH when transferring a patient. Formal referral forms sometimes accompanied patients. Most HCs could not receive treatment advice from RHs, but RHs could communicate with higher-level hospitals. The study concluded that formal referral systems were not fully functioning, and informal systems (community volunteers and traditional healers) were involved but not fully integrated into the referral network.
Comment: This study highlights the characteristics of inter-facility referral within the emergency care system of a low-income nation. It identifies strengths and weaknesses of the

existing system and also raises awareness that referral systems in countries like Cambodia may differ from Western models. The authors identified key issues (i.e. transportation); however, analysis was based on participants' subjective responses. Actual observation of the existing system did not occur. A valuable conclusion is that while international guidelines aid in the development of emergency care systems, context-specific mobilization of local resources must be incorporated.

By Meghan Wood, MD

Ranney M, Rennert-May E, Spitzer R, Chitai MA, Mamlin SE, Mabeya H. A novel ED-based sexual assault centre in western Kenya: description of patients and analysis of treatment patterns. Emerg Med J. 2010; epub ahead of print.

An ED-based sexual assault assessment and treatment center in Kenya was able to provide high rates of HIV prophylaxis, STI treatment, and emergency contraception without the addition of significant external resources.

Summary: In sub-Saharan Africa, sexual assault and violence remains a major health issue. In this study, an ED-based sexual assault center was established to study the demographics of sexual assault in Western Kenya, and to assess whether newly established protocols could provide HIV prophylaxis, STI treatment, and emergency contraception (EC) at rates similar to those in high-income countries. Thirteen months after implementing the new protocols, the Centre for Assault Recovery-Eldoret (CAR-E) conducted a retrospective study of the demographic, assault, and treatment characteristics of the patient population served. Over 300 patients were seen at the clinic, with 94% being female. Mean age was 15.9 years, with 50% under the age of 15 years. Overall, 89% of patients received testing for HIV, 80% for syphilis, and 73% for pregnancy. The study also found relatively high rates of STI prophylaxis (84%), HIV prophylaxis (63%), and emergency contraception (70%) for eligible patients treated at the center. Only 43% of the assaults were reported to the police, and only 44% of patients received counseling, which were both lower than expected.

Comment: Sexual assault is common in sub-Saharan Africa, with Kenya being one of the few countries where sexual violence is against the law. This study shows that a community-focused, ED-based sexual assault center is not only feasible, but it can also provide effective

diagnosis and treatment for patients in a low-income country without the addition of significant external resources. Post-sexual assault counseling is likely to be the most difficult component of the CAR-E sexual assault assessment and treatment protocol to implement; this was the most resource-intensive component of their protocol, and implementation was limited by lack of availability of trained counselors, especially after hours. However, despite the low level of post-assault counseling or police reporting, this study highlights that with a little educations and concentrated effort, effective diagnosis and treatment for victims of sexual violence can be provided in a resource-limited setting.
By Sampsa Kiuru, MD

Schmucker U, Seifert J, Stengel D, Matthes G, Ottersbach C, Ekkernkamp A. Road traffic crashes in developing countries. Unfallchirurg. 2010; 113(5):373-7.
Road traffic accidents in resource-limited settings cause a large burden of disability and require multidisciplinary efforts to effectively address the problem.

Summary: This article reviews scientific articles and official statistics on road traffic crashes (RTC) in low- and middle-income countries (LMIC) in order to characterize the causes of accidents and the possible explanations for poor outcomes. Globally, more than 1.25 million people die every year in RTCs, and more than 50 million people sustain traffic-related injuries with over 90% of this morbidity and mortality occurring in LMIC. The authors point out that the available statistics on RTC likely underestimate their impact, as many LMIC have very limited abilities in adequately documenting and investigating RTC, and there are few scientific publications from LMIC that deal with the medical impact of road traffic accidents. Nevertheless, the authors identify major trends in RTC in LMIC based on the available data. The majority of lethal injuries in LMIC involve pedestrians, in contrast to high-income countries (HIC). The use of motorcycles, cars, or other means of transportation (e.g., rickshaws) varies greatly from HIC and even among LMIC. The majority of fatal RTCs are not associated with driving under the influence of ethanol; however, only 25% of LMIC implement drunk-driving limits and less than 50% of LMIC document ethanol levels in injured drivers. In addition, use of seat belts is not mandatory in half of all LMIC. The authors also point out that early emergency care is limited in most LMIC. Forty percent have neither a uniform emergency number nor an

organized EMS system. Ambulance personnel often lack even basic life support skills, such as splinting (50%), while only 6% underwent formal advanced trauma life support training. In addition, EMS are only rarely available in remote areas, while traffic conditions in urban areas interfere with adequate response times.

Comment: This article gives a short overview of the documented epidemiology of RTC, reporting the available data and attempting to identify current problems and potential biases with data acquisition and analysis on RTC. Although the authors offer information about general trends in the epidemiology of RTC, they acknowledge that the data are limited. In addition, we recommend that the general trends identified be interpreted cautiously when dealing with RTC in a particular region or country, as local circumstances may influence the relevance of some of the findings. Nevertheless, this manuscript stimulates several questions related to the field of international EM. First, it encourages further research to better understand the epidemiology of RTC, which may ultimately lead to more precise preventive measures. Preventive measures become increasingly important in view of the growing urbanization in many LMIC, and the associated surge in road traffic density. Finally, the article underlines the importance of multidisciplinary approaches to minimizing the morbidity and mortality of RTC; such as addressing the identified main causes of RTC in LMIC by means of education, engineering, and regulation, while optimizing access and quality of early emergency medical care.

By Torben Kim Becker, MD

van Lonkhuijzen L, Dijkman A, van Roosmalen J, Zeeman G, Scherpbier A. A systematic review of the effectiveness of training in emergency obstetric care in low-resource environments. BJOG. 2010; 117(7):777-87.

Training programs in emergency obstetric care may improve quality of care and overall outcomes; however, more evidence is needed to prove effectiveness.

Summary: This systematic review explores the effects of postgraduate training programs to improve skills in maternal and perinatal care in low-resource environments. After an extensive literature search, 38 papers were chosen for inclusion. Four levels of effectiveness were measured: usefulness, knowledge improvement, translation to practice, and improvement in outcomes. Analysis was difficult due to significant variability in study design, length, content,

and use of non-validated measuring instruments. Short courses reveal improved knowledge on written examination, higher quality of monitoring, and increased numbers of patients who reported having been treated with respect at the health care facilities, and improved overall outcomes. Longer courses and self-directed learning had other improvements; however, there was no change in overall outcomes. The authors also attempted to derive lessons from the reviewed papers in an attempt to help policymakers in deciding how to effectively train health care workers in low-resource environments. There is no evidence of superiority of one training method over another. Training programs may improve quality of care, but strong evidence has not yet been published.

Comment: More than half a million women die every year during pregnancy, delivery, or shortly thereafter. While this article attempts to evaluate effective training techniques for women's health providers in low-income countries, it excludes an important group of health care providers: traditional birth attendants. Professional delivery care is below 30% in many low-resource environments. Although worldwide data show that traditional birth attendants and/or family members assist 47% of births in the developing world, funding and research for traditional birth attendants training has been reduced, and moved to providing skilled birth attendants for all births. The United Nations Millennium Development Goals call for reducing maternal mortality by 75% by 2015. Organized training of traditional birth attendants and other health care professionals is essential to achieving this goal.

By Gabrielle A. Jacquet, MD