

measurements. But measuring boards are large and cumbersome to use in the field and children may be restless or afraid to use them. Alternative strategies that light, portable and provide accurate measurement under field conditions should be explored. Advances in laser measuring technology make the use of lasers one promising method. We tested the Leica Disto D2 Laser Distance Meter 763495 as a tool to quantify children's height/length. The aim of the study was to determine and evaluate the instrument's accuracy and reliability within anthropometric field studies. To determine the acceptability of this method, a qualitative investigation of the proposed technology and measuring boards was assessed among field researchers.

Methods: This study was conducted in Western Kenya in primary schools and clinical settings. The production laser model was modified to suit anthropometric requirements and was tested against a Shorr Board[®]. Two experiments were carried out to systematically pilot the Leica Disto D2 Laser tool. Experiment 1 focused on the assessment of tool accuracy tested by measuring the laser tool compared the Shorr board differences. Study researcher measured (N=62) children between the ages of 0 months – 8 years old. Experiment 2 assessed reproducibility of results within trained field staff. Reproducibility was tested by field assistant (n=6) measurements of children (n=15) over 3 days between the laser and measurement board tools. 77 study participants were recruited from schools and clinics within the ages of 0 months to 8 years old. Experiment 1 differences in measurements between tools were calculated and statistically analyzed for significance. Experiment 2 variance components, reliability coefficients (R) and coefficients of variation (CV) were estimated and systematic differences of measurements between field staff and study day were assessed.

Findings: Preliminary statistical evaluations suggest that the Leica Disto D2 Laser Distance Meter 763495 represents an adequate technical alternative to the standard methods currently used.

Interpretation: This study demonstrates the importance of innovation within the field of anthropometrics. Current methods are outdated, while technological advances are available and affordable. Leica Disto D2 Laser Distance Meter 763495 could be a viable alternative that can adequately measure height/length accurately and reliably, while being an affordable and portable alternative to current measuring methods ideal for fieldwork in low-resourced countries.

Funding: National Institutes of Health, R15 AI100118-01.

Abstract #: 02ITIS003

Adaptation of new sterilization technology to facilitate sterile surgical care in low-resource settings

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Background: A significant and growing portion of the global burden of disease is attributable to conditions that can be treated with basic surgical procedures. Poor infrastructure and resource limitations in healthcare settings around the world present obstacles to the delivery of this cost-effective care. To date, one of these obstacles has been the sterilization of surgical instruments where availability of electricity and water is unreliable. Without sterilization capabilities, surgical care presents a high risk of infection, causing further morbidity and mortality. Innovation in sterilization technology has been static, and established methods have not been successfully adapted for use in low-resource settings on a large scale. The development of reliable, durable, affordable sterilization equipment that can operate independently of infrastructure would facilitate safe surgical care for the two billion people who currently lack access. This study was done to determine the appropriateness of a new sterilization

technology to meet this need. The authors believe that nitrogen dioxide technology can be adapted for reliable sterilization in low-resource settings.

Methods: Recently commercialized nitrogen dioxide sterilization technology was adapted into a form suitable for use in low-resource environments, which was then analyzed for sterilization efficacy, operator safety, and preservation of medical instrument functionality. Stainless steel surgical instruments were exposed to NO₂ within a rugged enclosure. Lab testing was conducted in microbiological testing facilities simulating low-resource environments and in accordance with the requirements of the international sterilization standard ANSI/AAMI/ISO. The hinges of the instruments, determined to be the most challenging location for sterilization, and biological indicators (BIs) were evaluated for successful sterilization.

Findings: Results of cycle efficacy testing showed that all hinges were sterile at the conclusion of the cycle. Cycle length depended on the amount of time needed for the sterilant gas to be absorbed by the scrubber medium to a safe level. This took between three to eight hours depending on cycle exposure requirements. A few of the cycles with exposure to lower concentrations of NO₂ had surviving BIs, which was attributed to the high density of spores on the BI.

Interpretation: When deployed, NO₂ sterilization technology will have the twin benefits of reducing healthcare acquired infections and limiting a major constraint for access to surgical care on a global scale. Additional benefits are achieved in reducing costs and bio-hazard waste generated by current health care initiatives that rely primarily on disposable kits, increasing the effectiveness and outreach of these initiatives. Next steps will involve testing of the adapted NO₂ form factor for ease of use in the field.

Funding: Eniware, LLC.

Abstract #: 02ITIS004

Food fortification as a strategy for alleviating micronutrient deficiencies in low- and middle-income countries: A systematic review

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Background: Currently, the World Health Organization (WHO) estimates that over 2 billion people are deficient in key vitamins and minerals. The majority of these individuals live in low and middle-income countries (LMICs), where resources are scarce and diets are not diversified. Mass food fortification refers to the process whereby one or more essential micronutrients are added during production to a staple food or condiment in order to improve its nutritional quality. This is a safe and effective strategy that has been used to prevent micronutrient deficiencies in developed countries for more than a century. The objectives of the systematic review as a whole are to evaluate the effectiveness of mass food fortification efforts with key micronutrients (iron, folic acid, iodine, vitamin A, calcium, vitamin D or multiple micronutrients) in LMICs, and to describe the various contextual and design factors that contribute towards effective implementation of food fortification programs. This abstract will pertain specifically to the effects of folic acid fortification on neural tube defects.

Methods: Study Design A comprehensive search strategy was formulated and publications systematically retrieved from a total of 15

databases. Grey literature documents were provided by the Global Alliance for Improved Nutrition (GAIN) and retrieved from non-indexed sources such as the websites of non-governmental organizations (NGOs) and fortified food manufacturers. Outcomes included both quantitative (effectiveness) and qualitative (analysis of programs/barriers/lessons) measures. As such, our search was not restricted by study design. Inclusion criteria captured studies that evaluate large scale, typically country-wide, fortification efforts in LMICs. Full text retrieval, data abstraction, and quality assessment were completed in duplicate for all studies that passed the screening process. Analysis Statistical analyses were performed using Review Manager Software version 5.3. Meta-analyses were conducted where possible.

Findings: A total of 140 quantitative studies were identified as 'included', of which 25 pertained to mass fortification with folic acid. Of these 25 studies, 14 reported a perinatal/neonatal outcome. In all cases, this referred to one or more type of NTD (spina bifida, anencephaly, or cephalocele). A meta-analysis for each outcome was conducted in order to determine to risk ratio (RR) of NTDs after folic acid fortification. When looking at total NTD rates, the combined RR was 0.65 [95% confidence intervals (CI) 0.53-0.79], demonstrating a positive association between fortification with folic acid and reduction in NTD prevalence. When examining NTD by type, this reduction in prevalence was also present. The overall RR was 0.53 [95% CI 0.42-0.66] for anencephaly, 0.67 [95% CI 0.48-0.92] for spina bifida, and 0.68 [95% CI 0.48-0.97] for cephalocele.

Interpretation: While there were some country-specific variations, the overall impact of mass food fortification led to a significant reduction in risk of NTDs when comparing pre- and post-fortification periods.

Funding: No funding listed.

Abstract #: 02ITIS005

Quality-driven programming in global surgery: A 30-year institutional experience delivering safe, timely and effective surgical care

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Program/Project Purpose: Basic surgical services are unavailable to the world's bottom billion, but still billions more lack access to surgical care of an adequate level of quality. Following the World Health Organization's definition of quality in service delivery, high-quality surgical services are those which are safe, timely and effective. The global community has made laudable steps towards increasing access to surgery, but achieving equity in surgical care delivery requires strengthening of quality in addition to accessibility. With this goal in mind, Operation Smile has cultivated a culture of quality for over 30 years.

Structure/Method/Design: Operation Smile is an international non-governmental organization dedicated to providing care for children affected by cleft lip and/or palate (CL/P) in low- and middle-income countries. The goal of quality in care delivery has become a central tenet of the organization, three core elements of which being the Global Standards of Care, the Medical Oversight program, and engagement with the community through local partnerships. The Global Standards of Care were developed by a consensus-based approach with stakeholders from more than 50 countries. The Medical Oversight department conducts monitoring and evaluation both in terms of surgical outcomes and patient satisfaction. Finally, national foundations and regional offices work with a network of community partners to identify and enroll children affected by CL/P into well-timed care.

Outcomes & Evaluation: The Global Standards of Care serve as the cornerstone of the organization and, while these may often be

more rigorous than local guidelines, they were developed based on the concept that the highest quality of care should be available to all children born with CL/P worldwide. One key feature of these guidelines is the WHO Safe Surgery Checklist, which has been shown to reduce surgical complication rates by more than half. In regards to effectiveness, Medical Oversight team monitors program and surgical outcomes to continually ensure quality in care. Lastly, engagement with community partners has greatly expanded the organization's ability to reach individuals with CL/P in a timely manner, limiting the negative sequelae, stigma and elevated mortality risk associated with CL/P.

Going Forward: These initiatives illustrate ways in which quality has been incorporated within Operation Smile's institutional structure, however, more opportunities exist to further integrate quality improvement and delivery science methods into global surgery programmatic models, both through augmentation of existing initiatives and novel innovations. The goal of essential surgery must go beyond survival, ensuring that the procedure is both safe and delivered in a way that maximizes patient benefit. This requires surgical interventions be safe, well-timed and effective. Broader international support and action are necessary to promote equitable access to high-quality surgical care as an integral part of the human right to health.

Funding: None.

Abstract #: 02ITIS006

A review of follow up of cervical cancer screening results in a primary health program in Cape Town, South Africa

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Program/Project Purpose: Cervical cancer is the second most common cancer among South African women, with one in 41 women developing the disease in her lifetime. South African National Cervical Cancer Screening Guidelines recommend results be returned in person within eight weeks for both abnormal and normal results. Despite these recommendations, barriers related to poor access, organization, education and availability in resource limited settings often disrupt the delivery of results and subsequent follow up and critical cancer prevention. The objective of this study was to determine if the primary health clinics in our study population attained the recommended test result deliver and follow-up rates.

Structure/Method/Design: A retrospective log and chart review of Papanicolaou (Pap) smear results and follow up was performed in six primary healthcare clinics in one sub-district in Cape Town, South Africa. We collected data on 616 women who underwent Pap smear evaluation from January to March 2014. We collected data on the proportion of women who received their Pap smear results, the number of abnormal results, follow up, grade of abnormal Pap result and turn around time.

Outcomes & Evaluation: 616 women had a Pap smear during the study period. 10% (62/616) were abnormal, defined as HSIL (37% (23/62)), LSIL (52% (32/62)) or ASCUS 11% (7/62)). 38% (231/616) of all women who had a Pap smear received their results and had a follow up visit; this included 36% (197/554) of normal results and 55% (34/62) of abnormal results. More specifically, 83% (19/23) of women with HSIL received their results, 44% (14/32) with LSIL received their results, and 57% (4/7) with ASCUS received their results. The turn-around-time was evaluated in a subset of patients (n=199) who received their Pap results. In this study group, the average turn-around was 52.4 days post intervention.