The Insider

VOLUME 5, ISSUE 4 NOVEMBER 29, 2018

2018 Global Child Health Conference Highlights

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SimPERLS workshop success!

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ACH hosts Helping Babies Breathe course

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A message from our Co-Directors:

On September 26, we hosted the *3rd Annual Global Child Health Conference.* More than 80 people attended the Grand Rounds presentation on medical technologies given by Dr. Mark Ansermino from UBC, and over 30 stayed for the morning conference. In addition, the 2 workshops, Helping Babies Breathe and SimPERLs, were well attended and received excellent feedback.

Healthcare is in the midst of a culture shift, transitioning from a one-sided service to mutually beneficial collaboration. Health practitioners are using technology in novel ways, from smart phone applications in hospital settings to mobile devices developed by grassroots organizations in rural Africa. The ability to collaborate on patient diagnoses across the world in low-resource settings is now a reality. Calgary's most vulnerable youth are benefitting from partnerships that address homelessness and complex health issues.

Finally, we'd like to thank each of you who attended the *3rd Annual Global Child Health Conference.* You as healthcare leaders have the vision, knowledge, and experience to help us forge into the future. Our members and partners continue to meet the challenges and excel despite some setbacks. We should all feel proud of where we are today, and excited about where we are heading. You are truly our greatest asset, and we could not accomplish what we do without your support and leadership.

Dr. Jean-François Lemay, MD CPSQ FRCPC
Dr. Nalini Singhal, MD FRCPC

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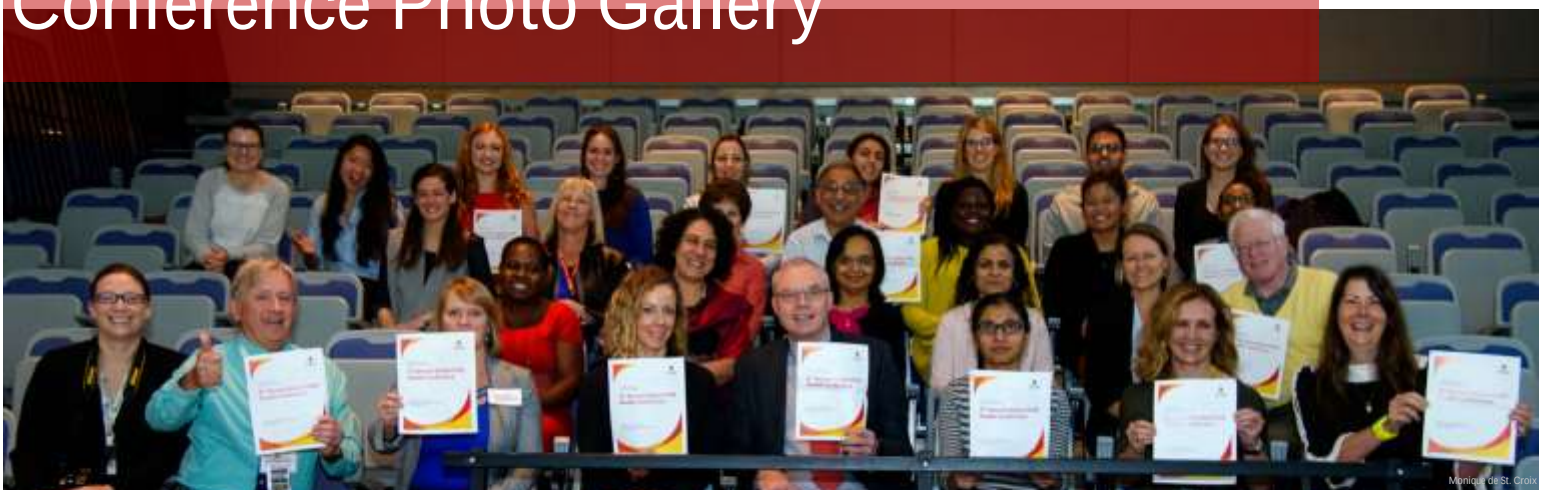


Monique de St. Croix


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One-on-one with Dr. Mark Ansermino

Dr. Mark Ansermino is a researcher and clinician in the Department of Anesthesiology, Pharmacology & Therapeutics at the *University of British Columbia*. He is Director of the *Centre for International Child Health* and Co-Director of the *Electrical & Computer Engineering in Medicine (ECEM)* research team.

Presenting at Grand Rounds

When did you become interested in the research field of medical technologies?

My interest in electronics and computing started when I was in high school. My preference was to do computer science but my parents would not hear of this. My interest in computers and other medical technologies continued throughout my medical training. This resulted in me enrolling in Master's degree in Heath Informatics after I had completed my training.

Should we embrace the use of medical technologies? Should we trust the different smart phone applications?

I think that the integration of technologies into healthcare is inevitable. I think that we clinicians should not only embrace these innovations but also lead the development and integration of these technologies to ensure optimal outcomes for our patients. I think there are a lot of unhelpful and potentially harmful smart phone applications available. We do not have good ways to know which applications we can trust. I hope we can develop a better way to integrate different applications and to know which ones we can trust.

Any thoughts about what is going to happen in 50 + years with the use of medical technologies?

I think there will be an increasing move towards automation in healthcare. This will exceed even our wildest expectations. The underpinning of this automation will data from populations, historical events and real time systems. There will be much more emphasis on health rather than healthcare and more self-reliance enabled by technologies.

What are the challenges facing heath care agencies (like Alberta Health Services) with the rapid emergence of medical technologies?

Cost is probably the most obvious. However, I think that the process of integration of technologies in a way that provides the maximum benefit to patients at the lowest cost/risk is and will be an increasing challenge. We do not have good processes for evaluating which new technologies to choose,

Answering questions after the Grand Rounds presentation

optimizing implementation, their safety or their cost effectiveness. This should be a critical pillar in our research infrastructure. We should also be much more aware of the burden these technologies place on clinicians. We need technologies that augment the performance of clinicians in seamless and integrated ways without impacting the clinician - patient interaction. A tall order and not what we have today!

You are doing research work in Africa. Can you tell us more about your research focus in this part of the world?

Our main research is on Precision Public Health. The principle behind this is that we use large historical data sets to target public health interventions to the children most at risk in real-time. Our focus has been on reducing the social, economic, morbidity, and mortality impact of sepsis in children. This is still the biggest threat to the survival of children globally, and largely preventable. Our most mature program is about "Smart Discharges". Many children who leave hospital following treatment for sepsis are at an increased risk compared to healthy children. Mortality in the 6 months is typically 5% or higher in many low resource settings. We use a data driven approach on admission to identify the children at most risk and provide a bundle of interventions to improve outcomes. This is cost effective because we do not need to intervene in all children but provide a targeted intervention only to those at highest risk.

Tell us more about your hobbies and favourite activities.

My family and I enjoy travelling. We all enjoy cooking and drinking good wine. We have combined these by travelling to many places in the world. I have been known to fish with fly but have had limited time to do this in the last few years.

Thank you for attending and presenting at this year's conference, Dr. Ansermino!

Dr. Mark Ansermino was interviewed on September 26, 2018 by Dr. Jean-François Lemay

We were pleased to host Dr. Ansermino at this year's conference!

What Mama na Mtoto students had to say...

Facility-based care in rural Tanzania

My name is Ania Widomska and I am a third-year Bachelor of Health Sciences student at the University of Calgary. This summer I spent three months in Mwanza, Tanzania working as an intern with Mama na Mtoto, a Maternal, Newborn and Child Health (MNCH) project currently operating in two Tanzanian Districts. This experience provided an unbeatable opportunity to learn about the multi-faceted operations involved in organizing a MNCH intervention in a Tanzanian setting. By participating in various workshops and training sessions, data collection exercises, and field-visits, I gained extremely valuable skills related to conducting both quantitative and qualitative research in rural communities. I am endlessly grateful to the Mama na Mtoto teams in Mwanza and Calgary whose generosity, kindness, and support fostered an enriching and unforgettable internship experience.

While in Mwanza I participated in a research project titled 'Facility-reported maternal care-seeking in a rural Tanzanian district pre- and post-introduction of volunteer Community Health Workers'. The goal of this project was to assess the trends in facility-based antenatal care attendance, deliveries, and postnatal care attendance quantities since project start and post-onset of Community Health Worker (CHW) activity. Data collection involved a retrospective review of relevant facility Health Management Information Systems records in 45 health facilities across Misungwi District and analysis assessed chosen indicator totals by month, and pre/post CHW introduction, considering rates and emerging temporal trends. A steady increase in deliveries and PNC visits was observed across the study period. Results from this project will inform the implementation team planning for this and a new intervention district.

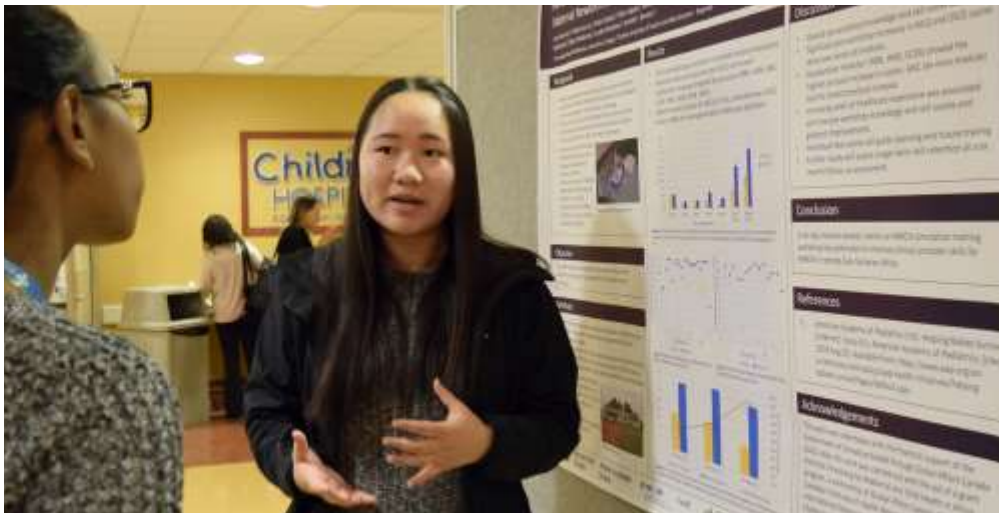
Ania's project assessed trends with Community Health Worker activity.

Ania Widomska
BHSc Student, University of Calgary

Hands on Training to Save Lives

Tyler Warnock and Katherine Liu are 3rd year Bachelor of Health Sciences students, majoring in Biomedical Science. This past summer they travelled to Mwanza, Tanzania to work as interns with the Mama na Mtoto project, which focuses on strengthening maternal, newborn and child health (MNCH). They are both passionate about sustainable development and global health, and have worked to improve student and community engagement as Co-Chairs of the University of Calgary's Sustainable Development Goals Alliance.

The project, entitled "Hands on Training to Save Lives: Analysis of Skill and Knowledge Change Following Maternal Newborn Simulation Training in Rural Tanzania", evaluated the efficacy of a simulation-based training model that aims to improve and standardize clinical and textbook-knowledge among Community Health Workers (CHW). Globally, acquiring and maintaining critical MNCH related clinical skills and knowledge for routine and emergency care remains a challenge. Clinical providers in rural Sub-Saharan Africa may lack quality initial training and experience skill attrition while working in remote, isolated facilities with minimal mentorship, thus necessitating a formal professional development program to provide adequate training. The training workshop, taking place over six days, combined clinical and knowledge -based learning in antenatal care, and three standardized modules (Helping Babies Breathe, Helping Mothers Survive, Essential Care for Every Child). The outcomes of the workshop were assessed using a multiple choice questionnaire and Objectively Structured Clinical Examinations (OSCEs) administered by trained raters. These assessments were conducted pre- and post-training to evaluate the performance of the CHWs and identify if there was an improvement in scores. Additional testing will be conducted at the six-month follow up.

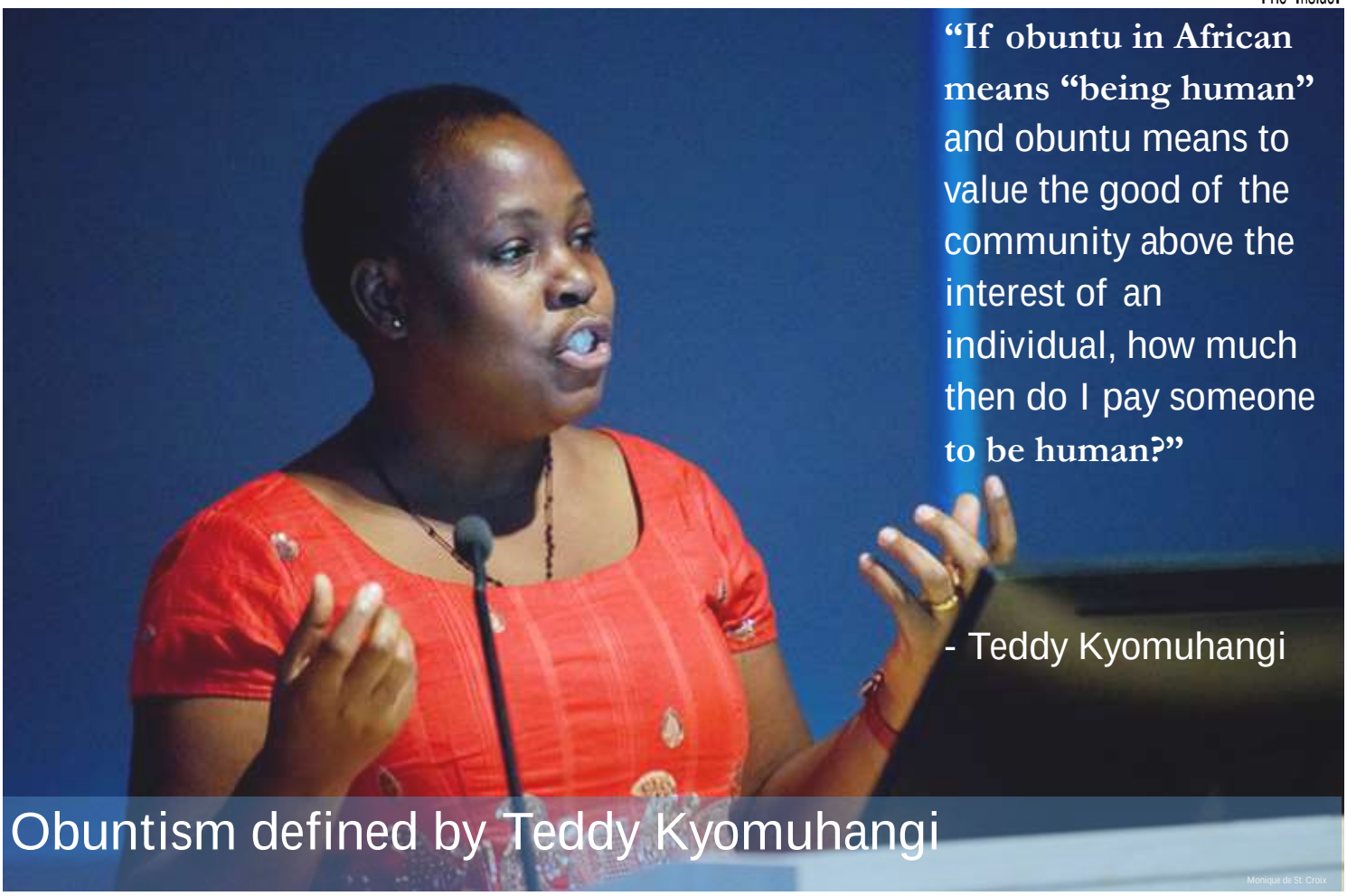


Katherine Liu explaining the Mama na Mtoto project to Roopa Suppiah

The findings show significant improvements in knowledge and clinical performance for all OSCEs, with standardized modules performing better than the *de novo* antenatal care module. These promising results support the preliminary structure of the program, with future analysis planned to identify improvements to question types and curriculum content.

Through this project, Katherine and Tyler have not only developed a stronger understanding of the use of training models, but have also strengthened their knowledge of the intricacies involved in global health projects. Through working and learning alongside local leaders in MNCH on the Mama na Mtoto team, they have gained a renewed appreciation and interest in the field of global health. They are both interested in pursuing future endeavours in the area of MNCH and are keen to continue incorporating this into their student engagement initiatives on-campus.

Tyler Warnock and
Katherine Liu
BHSc Students, University of Calgary



Obuntism defined by Teddy Kyomuhangi

I am Teddy Kyomuhangi and I work for Healthy Child Uganda, a partnership program that involves Mbarara University of Science and Technology in Uganda and University of Calgary in Canada. The program operates in rural Uganda on maternal newborn and child health promotion through policy strengthening and engagement of health systems. Healthy Child Uganda delivers at district, health facility and community levels with an entry point of Volunteer Community Health Workers.

It was exciting to participate in the Global Child Health Global Child Health Unit conference at University of Calgary in Canada where I had an opportunity to listen to brilliant research work going on in different parts of the world.

I have conducted a study on "obuntu" in relation to volunteerism, of which results I presented. Based on the ongoing debate regarding payment of community volunteer health workers, I then ask myself: 'If obuntu in African means "being human" and obuntu means to value the good of the community above the interest of an individual, how much then do I pay someone to be human? Do I need payment to be what I am supposed to be, what is expected of me by society? Has academia, research, innovation and technology misinterpreted obuntu, thus the debate on "to pay or not to pay"? Who should pay who? Who defines the obuntu boundaries?

Teddy Kyomuhangi is the Program Manager of Healthy Child Uganda at Mbarara University of Science and Technology. Teddy's presentation, entitled "Obuntism in Relation to Community Health Work in Southwestern Uganda", was well-received.

Dr. James Kellner Award in Global Child Health

The Global Child Health Unit is pleased to announce the Dr. James Kellner Award in Global Child Health. The award is to be given every 2 years, beginning in November 2019. Criteria will be made available in Spring 2019.

Dr. Kellner is a founding member of the GCHU and has provided ongoing support. Many thanks for your dedication to Global Child Health!

Dr. James Kellner, MD, MSc, FRCPC
Professor and Head, Department of Pediatrics, University of Calgary
October 1, 2008—November 30, 2018

Abstracts presented at 2018 Global Child Health Conference

Title: Obuntism in Relation to Community Health Work in Southwestern Uganda

Authors: Teddy Kyomuhangi[1], Jennifer L Brenner[2], Florence Beinempaka[1], Basil Tibanyendera[1], Jerome Kahuma Kabakyenga[1]

Affiliations: [1]Mbarara University of Science and Technology, Mbarara, Uganda; [2]University of Calgary, Faculty of Medicine, Alberta, Canada

Correspondence: Teddy Kyomuhangi (hcupmcdn@gmail.com)

Background: Obuntu is an African concept of "being human" that means to value the good of the community above the interest of an individual. Kashari County, Mbarara district, South Western Uganda in 2004, retention of volunteer CHWs in these areas stood at 80% after five years. The purpose of this study was to find out the contribution of Obuntu to the high retention among CHWs in HCU areas.

Methods: An exploratory qualitative study was conducted in Kashari County, Mbarara district in the parishes of Katyazo, Ruhunga and Mitoozo. It involved 3 CHW and community member focus group discussions (FGDs) and 6 key informant interviews. Thematic content analysis was used. Data were transcribed together with notes taken during interviews. Major themes were constructed depending on the most emerging responses from the different categories and were compared with FGD and in-depth interview guide themes.

Results: The study showed that the concept of Obuntu is understood differently. Study participants acknowledged common characteristics like good behavior, helping and sharing, supporting the weak and vulnerable, showing love, responsibility and living harmoniously. Obuntu is hereditary through actions such as okusharanaahanda (bonding), storytelling, use of parables and proverbs. Findings indicated that "genuine Obuntu" guided selection of CHWs, but Obuntu has decreased due to false promises and that "everything" is about money today. CHWs reported that Obuntu motivates them to mobilize households for improved hygiene, community improvements and immunization. CHWs noted boundaries to Obuntu, for example, if they are asked to train others or work outside their home village, then these are not voluntary Obuntu activities.

Conclusion: Obuntu drives volunteerism which is of great value in the African setting. The study recommends orientation of young generation and others to appreciate the concept and to respect the boundaries of Obuntu.

Title: The use of stories to understand maternal child health realities: Feasibility and applicability of digital storytelling in Lake Zone, Tanzania

Authors: N. Hoehn[1], W. Mweteni[2], T. Matutu[3], H. Mahindi[3], D. Matovelo[4], H. Mercader[1], M. Lang[1], J. Brenner[1]

Affiliations: [1]University of Calgary
[2]Catholic University of Health and Allied Sciences
[4]Mama na Mtoto Programme Field Office
[3]Bugando Medical Centre

Corresponding author name & E-mail address: Dr. Jenn Brenner; jennbrenner@me.com

Background: Digital storytelling (DST) is a participant-led video creation process that explores participants' lived experiences. Globally, DST has potential as a research and dissemination tool because it can capture deeply-personal experiences of marginalized community members, may be culturally relevant as a research tool in contexts where oral storytelling is used to communicate knowledge, and allows the participant to guide the messaging of a story, resulting in products with emotional impact that represent authentic experiences. However, most reports on DST reflect experiences in high-income countries with specific logistical and technological capabilities. There is a gap in understanding DST feasibility and applicability in low-income countries including Tanzania.

Objective: To report storyteller and facilitator reflections from a DST pilot conducted in Mwanza, Tanzania.

Methods: A convenience sample of three Tanzanian women involved in a maternal and child health initiative in Mwanza Region participated as storytellers. They each created one personal, digital story during four sessions technically supported by a Canadian DST facilitator. Storytellers learned about DST, drafted a story that recounted a personal life experience, and selected and ordered visual and audio content for their stories. Participants and the facilitator shared their experiences to identify themes related to feasibility and applicability.

Findings: Storytellers described the DST process as useful, meaningful, and transformative. Compared to traditional dissemination methods (i.e. qualitative interviews, documentary video), storytellers found the participant-led DST method produced authentic stories in their own words and voices. Assigning meaning to their past life events enabled deep reflection on the experiences that have shaped participant life trajectories. DST challenges included a greater-than-expected time commitment, a lack of context-appropriate web-based media, limited and variable internet access, and difficulty communicating certain DST concepts. Identified barriers that might be especially relevant to future use in rural areas included low literacy, language, and potential to stigmatize less-empowered women who share controversial stories.

Conclusion: In Lake Zone, Tanzania, DST was a feasible and applicable tool for capturing a participant's experience and communicating the emotional content. A pilot to engage rural participants should be considered, assuming accommodations to manage language and literacy barriers, and to reduce risk of stigma.

Title: Hands on Training to Save Lives: Analysis of Skill and Knowledge Change Following Maternal Newborn Simulation Training in Rural Tanzania

Authors: Tyler Warnock, Katherine Liu, Girles Shabani, Elaine Sigalet, Nalini Singhal, Dismas Matovelo, Boniphace Maendeleo, Jaelene Mannerfeldt, Respicious Bakalemwa, Edgar Ndaboine, Lusako Mwaikasu, Jennifer L Brenner.

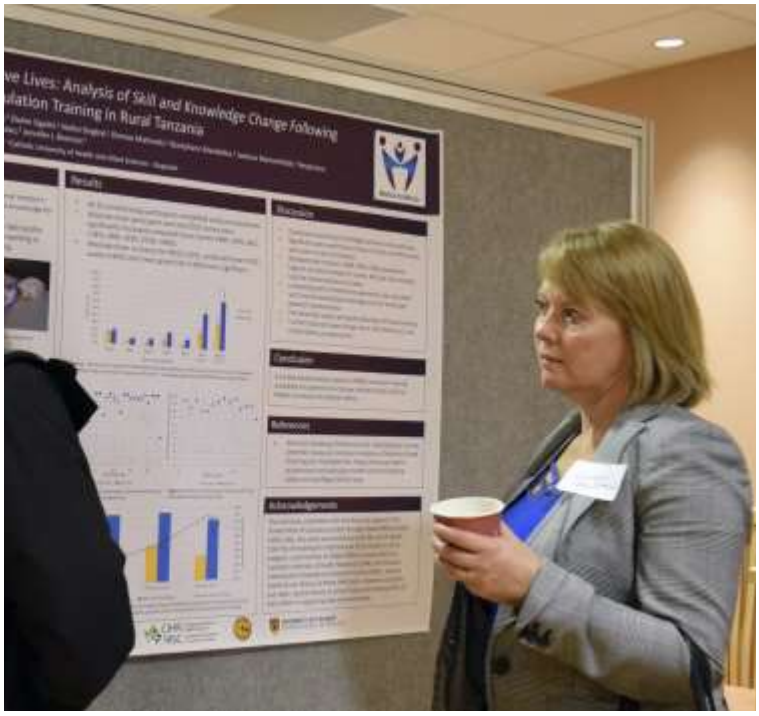
Background: Globally, acquiring and maintaining critical maternal newborn and child health (MNCH) related clinical skills for routine and emergency care remains a challenge. Especially in rural Sub-Saharan Africa, clinical providers may lack quality initial training and experience skill attrition while working in remote, isolated facilities with minimal mentorship. Mama na Mtoto is a Canadian-government funded initiative which addresses MNCH needs in rural Mwanza Region, Tanzania. Capacity building activities involve health provider refresher workshops including a six day, simulation based skills training workshop incorporating both standardized and newly developed MNCH-focused participatory modules.

Objective: To assess pre/post knowledge and skill status in simulation workshop participants.

Methods: All workshop participants were invited to participate in comprehensive pre/post evaluations conducted prior and following the six day MNCH simulation training workshop. Pre/post participant clinical skills were assessed using four Objective Structured Clinical Examination (OSCE) stations; a written multiple choice question (MCQ) test assessed knowledge. Three of 4 OSCEs were based on standardized program tests; skill raters were trained with an inter-rater reliability measure. Twenty of 25 MCQs were standardized; the remaining 5 de novo MCQs were pre-tested. A database was developed in MS Excel; analysis was descriptive using paired T-tests.

Results: Twenty of 22 workshop participants participated in both evaluation days. Absolute mean participant post test scores were significantly increased compared with pre for each OSCE station (newborn resuscitation: +50%, antenatal care: +24%, postpartum haemorrhage: +63%, preeclampsia: +48%), combined OSCE scores (+46%, range 62%-94%) and knowledge (+15%). Factors associated with increased post-training scores included female sex, those with <19 deliveries/month, and those with >20 years of clinical experience.

Conclusion: A six-day module-based, hands-on MNCH simulation training workshop has potential to provide critical MNCH training for clinical providers working in remote Sub-Saharan Africa.



Title: Facility-reported maternal care-seeking in a rural Tanzanian district pre- and post- introduction of volunteer Community Health Workers

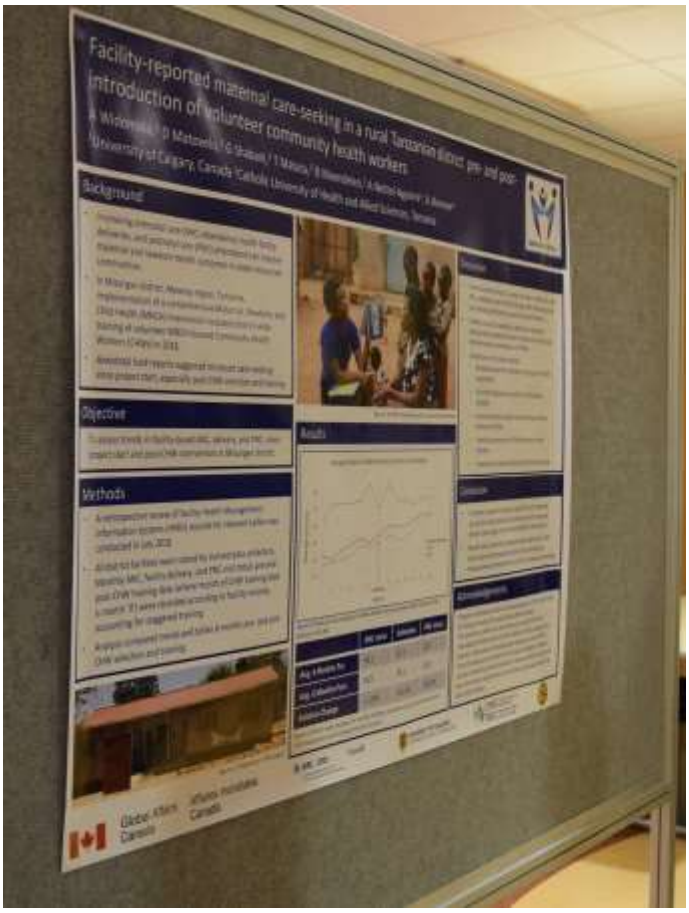
Authors: A Widomska, D Matovelo, G Shabani, T Matutu, B Maendeleo, A Nettel-Aguirre, JL Brenner

Background: Tanzania's Lake Zone has very high rates of maternal and newborn mortality. Increasing antenatal care (ANC) attendance, health facility deliveries, and postnatal care (PNC) attendance can help improve maternal and newborn health outcomes. Implementation of the comprehensive Mama na Mtoto Maternal Newborn and Child Health (MNCH) project began in early 2017 and involved district-wide training of high-density (1 per hamlet) volunteer MNCH-focused Community Health Workers (CHWs) in Misungwi district. Anecdotal field reports suggest increased care-seeking since project start, especially post-CHW initiation.

Objective: To assess trends in facility-based ANC, delivery, and PNC, since project start and post-CHW intervention in Misungwi district.

Methods: A retrospective review of facility Health Management Information Systems (HMIS) records for relevant tallies was conducted in 2018. All district facilities were visited by data collection teams who recorded ANC, delivery, and PNC visit totals according to the date of CHW activity onset per site, accounting for staggered training. Analysis assessed ANC, delivery, and PNC totals by month, and pre/post CHW introduction, considering rates and emerging temporal trends.

Results: Forty-five facilities were included in the analysis. While ANC remained generally stable throughout the one-year period, there was a steady, month by month increase in delivery and PNC visit quantities reported. The change in average monthly ANC visits pre- to post-CHW activity, district-wide, was 36.1 to 36.9; a 2.33% absolute change. Deliveries increased from a monthly average of 22.2 pre to 29.1 post, representing a change of 31.3%. Post CHW training, PNC visits averaged 26.1 per months, compared with 20.0 pre, representing a 30.7% change. The average % change per facility pre- and post- CHWs for the same indicators were 18.45%, 77.77% and 81.39%, respectively. Twenty-four facilities (53%) had an increase in deliveries of 50% or more following the introduction of CHWs.



Conclusions: A steady increase in deliveries and PNC visits reported during the report period are consistent with improved service use targets for the overall MNCH intervention. A similar change is not noted in ANC quantities, which show sub-target progress. Further analysis is needed to determine potential relationships between indicator trends across the study timeline and the introduction of CHWs. Results will inform the implementation planning for this and a new intervention district and may be triangulated at project end with data from a large coverage survey.

Title: Another Way to Be Involved in Global Health…

Authors: Cheri Nijssen-Jordan MD MBA FRCPC Clinical Associate Professor, Faculty of Medicine, U of C; Raghu Venugopal MD MPH FRCPC Assistant Professor Faculty of Medicine U of T

There are any number of ways that physicians and health care providers can practice or participate in the realm of Global Health. Some work in international locations as clinicians, teachers or administrators. Others support the work of those going into the field by assisting with funding, providing research expertise, working here in Canada with new immigrants, refugees and other vulnerable populations and finally, morally supporting colleagues who engage in an active Global Health practice.

With the advent of improving telecommunications throughout the world, the ability to communicate over long distances in a short time is now easily achievable. The internet allows transfer of written clinical information (histories and physicals) as well as multimedia entities including x-rays, ECGs, and pictures.

Medecins Sans Frontières initiated an internet-based telemedicine service for their field staff in 2010 and since that time have had over 9000 consultations including 3000 paediatric cases. MSF is actively looking for specialty physicians and health care providers who would be willing to provide their expertise to those in the field dealing with difficult cases. It is another very rewarding way to be involved in Global Health while remaining within the borders of one's home country.

Dr. Cheri Nijssen-Jordan has worked in many countries around the world since 1983 most recently with Doctors Without Borders in Pakistan and Syria, Friends Without a Border in Laos and Lifeline Malawi in Malawi Africa.

Title: Assessing PTSD in Haitian Children Post-Earthquake: a Pilot Study

Authors: McMahon A. MD[1,6], Blaise F. MD[1,2], Thomas Riché C.[3], Larocque C.[4], Delatour G. MD[2], Lemay J.F. MD FRCPC[5], Mérat Y.M. MD[1], Brazeau-Lamontagne L. MD FRCPC[1,4]

Affiliations : [1]Faculté de médecine et des sciences de la santé, Université de Sherbrooke, Qc, Canada;
[2]Université Notre-Dame d'Haïti
[3]GHESKIO, Haïti
[4]SPES Haïti
[5]Alberta's Children Hospital, University of Calgary
[6]CHEO, University of Ottawa

Introduction: The catastrophic earthquake that hit Haiti in 2010 has left the Haitian population and its institutions with devastating and still ongoing psychological, physical and social impacts. The short and long-term effects of these events may affect children and adolescents enough to generate anxiety and depression, which might then lead to post-traumatic stress disorder (PTSD) with major academic and social impacts.

Objectives: 1-To determine the feasibility/ acceptability of a pilot project in addressing PTSD in Haitian children post-earthquake. 2-To test the screening of PTSD in primary school children in Port-au-Prince (PAP), using, with permission, the UCLA PTSD Reaction Index for Children/ Adolescent DSM-5.3-To validate the Creole version of the questionnaire chosen. 4- To explore trauma types and manifestations amongst participants.

Methods: Study design: Cross-sectional pilot study. Haitian nurses were trained on PTSD, its signs and symptoms, and on how to administer the questionnaire. Population: Inclusion criteria: Children aged 7-12 yr. from Prince Albert II de Monaco, PAP, and Haiti, whose parents gave consent. Exclusion Criteria: Children suffering from other confounding medical conditions (sensory, motor, others) and who refused to participate on day of study.Tool used: UCLA PTSD Reaction Index for Children/ Adolescent based on DSM-5.

Results: Participation rate: 70% (73 children). Number of kids with full PTSD: 36(49.32%; and partial PTSD: 20 (27.40%). The Creole questionnaire version was validated. Translation and socio-cultural adaptation of the questionnaire was achieved. Haitian nurses were successfully trained to administer the Creole version of the questionnaire to children. Numerous type of traumas were reported by the children assessed.

Conclusions: This pilot phase was ESSENTIAL in co-creating a comprehensive, culturally-competent and relevant research. The project was feasible and well-accepted.The Creole questionnaire version was validated. Translation and socio-cultural adaptation of the questionnaire was achieved. Many kids presented PTSD features (partial or full). The larger -scale study aims to propose culturally-sensitive interventions for the care of mental health issues among affected Haitian children.

SimPERLS Simulation Preparation for Experiences in Resource Limited Settings

Photo Gallery

What our SimPERLS participants had to say...

Resident's perspective

My interest in Global Health stems from a few different places. First of all, I love to travel. Second, I completed my medical education in East London, England, at Barts and The London, where there is a huge immigrant population, and I found the medicine fascinating. (TB was often high on the differential list!). Third, I enjoyed hearing the stories of my mother's experiences working in Vietnam to improve neonatal and newborn care. I also love learning and challenging myself, so I jumped at the chance to join the ACH global health committee and to take part in the SimPERLS workshop.

The travel bug bit early. After growing up in New Zealand, I lived in the southwestern United States, Austria (briefly), England, and New Zealand again, before making what is hopefully my final move, to settle in Calgary. My travels have taken me to 28 countries throughout Europe, Africa, Asia, North America, Caribbean, and of course Australasia. Experiencing culture is much more than visiting the churches, monuments and art galleries. I value spending time people-watching, immersing myself in the local daily life, eating the local food and meeting the people.

I have not yet spent time as a physician in a global health capacity. However, hearing about my mother's experiences in Vietnam was always fascinating. As the neonatal nurse manager in our local city, her annual trips to the Binh Dinh province were often, at least partially, self-funded and used up her vacation time. Despite this, the New Zealand Vietnam Health Trust were, and still are, making gains in the local education of neonatal care, and subsequently improving outcomes for the neonates. Like most global health settings, the hospitals are under-staffed, and under-equipped to give the equivalent care we have come to expect here in Calgary. Many of the experiences my mother had were highlighted in the SimPERLS scenarios.

Susan Knechtel and her group participating in a SimPERLS scenario

To be honest, I wasn't completely sure what I was getting into when I signed up for the SimPERLS workshop, but I'm glad I did! What better way to gain experience in the challenges of global health, than in the safety of a simulation scenario? Probably the largest take away from this course, was "get comfortable with being uncomfortable". Each simulation scenario highlighted the fact that you may have adequate clinical knowledge, but the need to be able to adapt to resource-poor settings is vital. Knowing what, where, and how to use your limited resources is essential to good patient care.

One of the most vital resources is the local staff or healthcare professionals. These valuable team members know the culture, language, protocols, and potential barriers. This means being open and respectful. Open to learning, open to trying new things, respectful of different points of view and the suggestions of others.

The importance of opportunities like the SimPERLS workshop are evident when you see the passion and commitment of the healthcare workers involved. Learning to work beyond your comfort zone makes us better clinicians. It helps bring expertise to areas of the world that need it. And most valuably, it gives those who travel to developing countries the opportunity to bring some humility back into our "normal" work lives. It reminds us how lucky we are to work in a place like Alberta Children's Hospital, where the children benefit from a resource-rich institution.

Thanks again to the SimPERLS organizers. I look forward to taking part again next year with the goal of building on these experiences and practicing global health in the future.

Dr Susan Knechtel
Pediatric R1
Alberta Children's Hospital

Alex Dunkley engaging in a "malnutrition with dehydration" scenario

RN's perspective

I decided to participate as I have done some overseas nursing and hope to do so again. I may also do some northern nursing. Although I have nothing planned in the near future, i was curious and thought the session would be interesting.

It was important to be involved in the workshop as it was a valuable lesson - both in problem solving and in being ready for the psychological challenges that could be faced in working in a low-resource environment. I found the discussion at the end was very good for this aspect of things. I also thought my being a nurse instead of a MD would bring some realism to the cases in terms of the actual doing of things, rather than just ordering.

I am an RN, with 12 years in the ACH ED and 20+ years of adult experience, in the ED, psychiatry and med surg. I have worked in small community hospitals (Chetwynd, Dawson Creek, Nelson, Trail) where there were frequent challenges in terms of supplies and workforce. I have wilderness medicine as a hobby, and have worked as a volunteer RN in Haiti during the cholera outbreak. I like challenges and problem solving!

Really enjoyed the workshop - I would ask that next year to broaden the invite, i am working at Cochrane urgent care currently and only heard about it by luck. Having some staff from the smaller facilities might bring some good insights about lower resource medicine.

Thanks you guys, it was excellent, i will be watching for it next year!

Alex Dunkley, RN
Cochrane Community Health Centre

Helping Babies Breathe Photo Gallery

Mirette Dube tells us why she took the course:

"I took the Helping Babies Breathe course to be able to facilitate this very worthwhile course! I'm a Simulation consultant for Alberta Health Services, and a research coordinator with the 'Simulation for Life' program focused in Uganda.

Helping Babies Breathe saves lives and gives frontline care providers the skills they need to resuscitate babies immediately after birth.

The workshop was excellent and I'm looking forward to teaching and sharing this course with others!"

Mirette Dube RRT, MSc
eSIM Consultant- FMC Site Lead
KidSIM Research Coordinator- SIM for Life, Alberta Health Services and University of Calgary

Dr. Khalid Aziz relates why he started teaching Helping Babies Breathe:

"I believe that I first taught the workshop in 2012. I was interested in neonatal resuscitation, neonatal resuscitation education and global health - Helping Babies Breathe tweaks all three of my interests, and more. It is fun to teach.

It is vital to the world's children that every health system have an effective education program for the immediate care of babies after birth - Helping Babies Breathe is one such program. It is not the ratio that counts - what is important is that people feel they are part of a team when they learn. So dividing participants up into relevant team sizes facilitates and accelerates learning.

It is a pleasure and honour to have such committed participants - every little bit of commitment makes a difference."

Khalid Aziz, MBBS, BA, MA, MEd(IT), FRCPC
Professor, Department of Pediatrics, University of Alberta

The Reading Corner of The Insider

Mobile cell phone technology puts the future of health care in our hands

Kumanan Wilson MD MSc

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The digital revolution has affected virtually every aspect of our lives, and health is no exception. This is particularly evident in the burgeoning area of mobile health (mHealth). A subset of the overall digital health market, which is expected to exceed half a trillion dollars in revenue by 2025,[1] mHealth refers to the use of cell phone technology to deliver health care. A linked research paper reporting on the effectiveness of a smartphone camera functioning as a de facto photoplethysmograph to evaluate the adequacy of collateral circulation in patients scheduled for cardiac catheterization via radial artery access offers an excellent example of the opportunities presented by these technologies.[2] Using doppler ultrasonography as a gold standard, Di Santo and colleagues showed that the cell phone technology had superior diagnostic accuracy compared with the modified Allen test. Despite challenges in development and scale up of such technologies, there is much to be optimistic about in mHealth.

Early mHealth applications focused on the use of short message service text messaging with standard cell phones and had some promising results, particularly in low- and middle-income countries.[3] The advent of smartphone technology and mobile applications has increased the potential impact and scope of mHealth dramatically. These applications are being designed for both health care providers and the public, thus empowering patients to take more control of their health care. Although the number of smartphone applications being downloaded is declining in general, health application usage has increased.[4] Importantly, those who have come of age in the new millennium (millennials), among whom smartphone penetration is greatest, are the largest demographic of health application users.[5] However, as the number of mHealth applications continues to increase, with over 3 billion downloads worldwide,[6] challenges associated with bringing mHealth into practice have also increased. These obstacles include moving mHealth technologies from pilot studies to broader dissemination and use, determining the degree of evidence needed for widespread adoption,[7] identifying the appropriate regulatory framework for these technologies and assessing how best to conduct research in an area where the technology being evaluated is constantly changing. Many of these obstacles are present in the case of the technology described by Di Santo and colleagues.[2]

KEY POINTS

- The advent of smartphone technology and mobile applications has increased the potential impact and scope of mobile health (mHealth) dramatically, but the challenges of bringing this technology into wider practice are substantial.
- Although downloads of smartphone applications are declining in general, health application usage has increased, particularly among millennials.
- Most mHealth applications do not undergo rigorous evaluation; indeed evaluation is difficult because of rapidly developing and changing technology.
- The health care profession and regulatory agencies should proactively address the challenges associated with bringing mHealth solutions into practice to maximize their benefits.

The findings of the linked study are promising in many respects. Cell phone technology provides an easily accessible and superior alternative to physical examination to assess radial collateral circulation. The study's authors should be congratulated for conducting a rigorous evaluation of the application of their technology, because most mHealth applications do not undergo any evaluation. As the authors point out, in addition to its potential health benefits, this technology could have important implications from a resource perspective; given the ubiquity of smartphone technology, the cost of its application would be minimal. However, like many mHealth innovations, this proof-of-concept pilot will face many obstacles to widespread clinical adoption.[8]

The speed of development and change in the technology being evaluated means that mHealth applications, and digital health in general, face an issue not usually encountered in evaluations of traditional pharmaceutical interventions. For example, in the linked study, the camera used was from an iPhone 4S, likely state of the art at the time. However, from the study's inception to its publication, the iPhone camera's megapixel quality increased from 8 for an iPhone 4S to 12 for an iPhone X. Presumably, this change would improve the accuracy of the assessments in this

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case, but in other instances, technological changes could qualitatively alter the intervention to such a degree that the original study becomes irrelevant. For many mobile technologies, and applications in particular, development is continuous, in what is referred to as an agile process. Agile development refers to the creation of a minimally viable product and then rapidly iterating that product based on performance and feedback.[9] Consequently, the product being evaluated at the outset of a trial is likely to be constantly changing, with numerous features added, removed or altered as the trial progresses. Alternative clinical trial methods, such as adaptive designs that permit iteration as the trial proceeds, may offer opportunities to evaluate such dynamic products more effectively.[10]

A previous analysis of US Food and Drug Administration regulatory studies showed that few mHealth technologies receive approval for clinical study.[11] Arguably, the use of a smartphone for the purposes described in Di Santo and colleagues' study meets the standards of a medical device — a health or medical instrument used in the treatment, mitigation, diagnosis or prevention of a disease or abnormal physical condition. However, uncertainty remains over the regulatory standards governing many mHealth applications, and, as previously discussed in *CMAJ*, it is not clear which mHealth medical devices are low or high risk and, therefore, what the process should be for achieving regulatory approval.[12]

On a positive note, the linked study represents an excellent example of the democratization of innovation. With traditional pharmaceuticals, the process from idea to innovation is long and arduous, with substantial barriers to entry and low likelihood for success. Digital technology has opened up the innovation space to a whole new generation of health care entrepreneurs. Whether coming up with ingenious novel applications of existing technology on phones, taking nascent ideas to developers or hack-a-thons to create α/β versions, or learning coding themselves, health care providers and patients can now more easily champion innovation. These will be the people who have the best understanding of and commitment to the needs of the public.

Referred to as a new industrial revolution, the impact of digital technologies will be both disruptive and transformative. The continued maturation of technologies, such as artificial intelligence, virtual reality and blockchain, will further expand the possibilities for mHealth in both diagnosis and treatment in health care. It is incumbent upon the health care profession to address proactively the many challenges mHealth presents to best maximize its benefits.

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Photoplethysmography using a smartphone application for assessment of ulnar artery patency: a randomized clinical trial

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ABSTRACT

BACKGROUND: Radial artery access is commonly performed for coronary angiography and invasive hemodynamic monitoring. Despite limitations in diagnostic accuracy, the modified Allen test (manual occlusion of radial and ulnar arteries followed by release of the latter and assessment of palmar blush) is used routinely to evaluate the collateral circulation to the hand and, therefore, to determine patient eligibility for radial artery access. We sought to evaluate whether a smartphone application may provide a superior alternative to the modified Allen test.

METHODS: We compared the modified Allen test with a smartphone heart rate–monitoring application (photoplethysmography readings detected using a smartphone camera lens placed on the patient's index finger) in patients undergoing a planned cardiac catheterization. Test order was randomly assigned in a 1:1 fashion. All patients then underwent conventional plethysmography of the index finger, followed by Doppler ultrasonography of the radial and ulnar arteries (the diagnostic standard). The primary outcome was diagnostic accuracy of the heart rate–monitoring application.

RESULTS: Among 438 patients who were included in the study, we found that the heart rate–monitoring application had a superior diagnostic accuracy compared with the modified Allen test (91.8% v. 81.7%, $p = 0.002$), attributable to its greater specificity (93.0% v. 82.8%, $p = 0.001$). We also found that this application had greater diagnostic accuracy for assessment of radial or ulnar artery patency in the ipsilateral and contralateral wrist (94.0% v. 84.0%, $p < 0.001$).

INTERPRETATION: A smartphone application used at the bedside was diagnostically superior to traditional physical examination for confirming ulnar patency before radial artery access. This study highlights the potential for smartphone-based diagnostics to aid in clinical decision-making at the patient's bedside. **Trial registration:** Clinicaltrials.gov, no. NCT02519491.

The radial artery is used commonly for coronary angiography, percutaneous coronary intervention and invasive hemodynamic monitoring. Transradial access for coronary and peripheral interventions is used increasingly because of a lower incidence of vascular complications, patient preference and reduced mortality in patients with acute coronary syndrome.[1–4] Many of these benefits are attributed to superior postprocedural hemostasis given the superficial course and small calibre of the radial artery relative to the deeper and larger femoral vessel. However, this small calibre also renders the radial artery prone to occlusion if proper anticoagulation and hemostatic practices are not followed[5,6] — a complication that is reported to occur in up to one-third of patients.[7] Despite dual blood supply to the hand via the ulnar and radial arteries, rare cases of substantial limb compromise have been reported after catheterization of the radial artery.[8–10] Evaluating the competency of this dual blood supply before radial artery instrumentation continues to be performed routinely,[11] despite questions raised about its value,[12] and it

remains endorsed by current interventional cardiac societies,[13,14] as well as the World Health Organization.[15]

Colour Doppler ultrasonography imaging is the gold standard method for assessing arterial patency and collateral competency in this setting,[16] but it is relatively resource-intensive and, therefore, seldom feasible or cost-effective in routine clinical practice. Assessment at the bedside using the modified Allen test is widely accepted as the clinical standard. Despite this test's known diagnostic and prognostic shortcomings[16,17] and the low incidence of clinically significant ulnar artery occlusion,[18] results from modified Allen tests have served to exclude as many as 27% of patients from transradial approaches for cardiac catheterization, and an abnormal modified Allen test remains a relative contraindication for placement of invasive hemodynamic monitoring.[19] Plethysmography, which is the measurement of changes in amplitude of a photoelectric signal based on changes in blood volume pulsations,[20] and pulse oximetry (commonly referred to as the Barbeau test) have been described as alternatives; however, the need for a dedicated oximeter has precluded its widespread use. Therefore, the modified Allen test remains the preferred method for assessment of dual circulation.[11,21]

Because of the widespread availability of smartphones, they are being used increasingly as point-of-care diagnostics in clinical settings with minimal or no cost. For example, built-in cameras with dedicated software or photodiode sensors using infrared light–emitting diodes have the potential to render smartphones into functional plethysmographs. However, robust evaluation of these technologies in clinical settings is lacking. We sought to evaluate the diagnostic accuracy of a smartphone-based heart rate–monitoring application compared with the modified Allen test for assessing dual circulation to the hand (ulnar artery patency) for transradial angiography.

Methods

Study design and participants

The CAPITAL iPhone-based evaluation of dual circulation before transRadial Access for Diagnostic Angiography triaL (CAPITAL iRADIAL) was a prospective randomized clinical trial (RCT) conducted at the University of Ottawa Heart Institute between July 2015 and March 2016. We recruited patients from the hospital's coronary care unit, inpatient cardiology service and Regional Referral Centre/Day Unit if their clinical care plan included assessment for cardiac catheterization that included possible transradial access (Figure 1). Patients with a planned cardiac catheterization were eligible for inclusion. We excluded patients if hemodynamic instability was present, there was a need for emergent angiography (ongoing cardiac ischemia or ST-segment elevation myocardial infarction), the patient could not or would not provide informed consent or the patient had undergone previous surgical removal of the radial or ulnar artery. All participants provided written informed consent.

Randomization and masking

We randomly assigned participants 1:1 to either the modified Allen test or heart rate–monitoring application by using concealed envelopes prepared with a computer random sequence generator. Either the modified Allen test or heart rate–monitoring application were performed as the initial assessment based on group allocation. Subsequently, all participants underwent 3 additional assessments: either a modified Allen test or heart rate–monitoring application (whichever was not performed first), followed by plethysmography (Barbeau and reverse Barbeau) and Doppler ultrasonography of the radial and ulnar arteries. All assessments were conducted by the same co-investigator, and, therefore, blinding was not performed.

The modified Allen test was performed on all participants by having the patient make a fist for 30 seconds and with pressure applied over the radial and ulnar arteries to occlude them. The participant was then instructed to open the fist, and the ulnar artery was selectively released while the co-investigator monitored for return of colour to the hand (Figure 2, supplementary video 1 [Appendix 1, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.170432/-/DC1]). We coded the result as either ulnar artery patent (maximal palmar blush ≤ 5 s) or occluded (maximal palmar blush occurring > 5 s). This technique was then repeated by maintaining compression over the ulnar artery and releasing the compression over the radial artery ("reverse modified Allen test") and using the same coding criteria. A 5-second cut-off for arterial patency was chosen because it has been shown to maximize diagnostic accuracy (79.6%), with a sensitivity of 75.8% and specificity of 81.7%.[16]

We conducted the smartphone-based evaluation by using the Instant Heart Rate application (version 4.5.0; Azumio) on an iPhone 4S (Apple). We selected this application because it permits direct visualization of the photoplethysmography tracing on the screen, is commercially available free of charge on both Apple and Android operating systems and is the most downloaded heart rate–monitoring application worldwide. The application software was initially developed for tracking heart rate in individuals without the need for dedicated equipment, using a proprietary algorithm by Azumio that was validated by comparing data collected via the application to electrocardiograms. The software utilizes the smartphone's camera light and lens to reflect light on an individual's finger, resulting in colour and brightness changes that are then extracted by the camera lens and interpreted as changes in pulse, reflected both as a numerical value (i.e., heart rate) and as a photoplethysmography tracing on the phone's screen.

We acquired photoplethysmography readings by placing the camera lens over the pulp of the participant's index finger with the hand resting on a firm surface and light pressure applied over the back of the camera (Figure 2, supplementary video 2 [Appendix 2, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.170432/-/DC2]). Readings were recorded before and immediately after isolated radial artery compression for 2 minutes or less and were divided into 4 categories as previously described by Barbeau and colleagues[21] (i.e., A, no damping of pulse tracing immediately after radial artery compression; B, damping of pulse tracing; C, loss of pulse tracing followed by recovery of pulse tracing within 2 minutes; D, loss of pulse tracing without recovery within 2 minutes). Readings categorized as A or B indicated

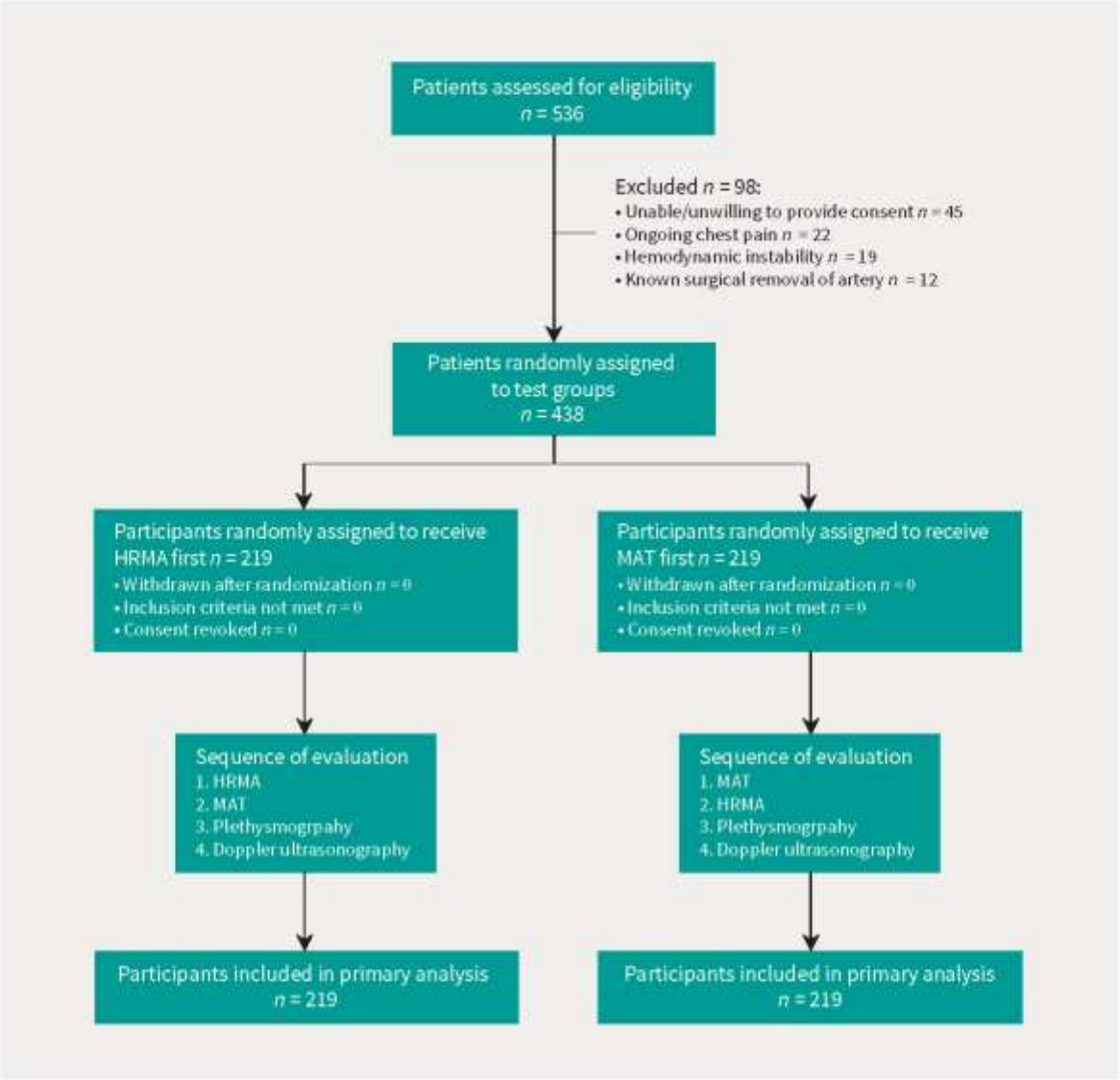

Figure 1: Participant recruitment and allocation. HRMA = heart rate–monitoring application, MAT = modified Allen test.

adequate flow, whereas those characterized as C or D indicated inadequate circulation.

We used a portable plethysmograph and pulse oximeter (Summit DME) for all participants after the assessments using the modified Allen test and heart rate–monitoring application, and before the assessments conducted with Doppler ultrasonography. We classified readings from plethysmography by using the same criteria as for the heart rate–monitoring application. We performed Doppler ultrasonography by using a linear transducer probe at both left and right wrists (Hitachi Noblus). We used both short and long axis views to visualize and measure radial and ulnar arteries. We measured maximum lumen diameter, intimal thickness and colour Doppler with pulse wave velocities at 1 cm proximal to the styloid process of the radius.[22]

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Happy Holidays from the Global Child Health Unit

The holiday season is here;
We wish you good food and cheer!
Enjoy your time with friends and kin;
Relax amid the merry din.

Be sure to wash your hands a lot,
So viral infections are not caught.
Healthy children are important too,
Please don't give your kids the flu!

Wishing you a wonderful holiday season and a Happy New Year
We will continue to be in contact with you in 2019!

Sincerely,
JF, Nalini and Connie