
# CAS 2023 Annual Meeting

## Richard Knill Competition Abstracts

# Contents

# A Reusable, Locally Manufactured, Half-Face Respirator Provides Better Protection than Fitted Disposable N95 Masks: Development and Quantitative Fit-Testing Comparison


## AUTHORS

Mbadjeu Hondieu. Arnaud Romeo[1,2,3]; Ng, William C. K.[4,5,6]; Anwari, Vahid[1,7]; Kazlovich, Kate[1,12]; Xiao, Maggie Z. X.[8]; Rozenberg, Dmitry[9,10]; Zalewski, Alan[1]; Afenu, Edem[10]; Ajami, Samareh[11]; Hiansen, Joshua Qua[1]; Mashari, Azad[1,4,5]

*[1] The Lynn & Arnold Irwin Advanced Perioperative Imaging Lab, Toronto General Hospital, University Health Network, Toronto, ON, Canada*
*[2] Department of Anesthesiology and Pain Medicine, University of Ottawa, Ottawa, Ontario, Canada*
*[3] St. Michael's Hospital, University of Toronto, Toronto, Ontario, Canada*
*[4] Department of Anesthesiology and Pain Management, Toronto General Hospital, University Health Network, Toronto, Ontario, Canada*
*[5] Department of Anesthesiology and Pain Medicine, University of Toronto, Toronto, Ontario, Canada,*
*[6] Department of Anesthesiology and Pain Management, Cardiac Division, Hospital for Sick Children, Toronto, Ontario, Canada,*
*[7] Joint Department of Medical Imaging, Toronto General Hospital, University Health Network, Toronto, ON, Canada*
*[8] Faculty of Medicine, University of Alberta, Edmonton, Alberta, Canada,*
*[9] Division of Respirology and Lung Transplantation, Toronto General Hospital Research Institute, University Health Network, Toronto, Ontario, Canada,*
*[10] Temerty Faculty of Medicine, University of Toronto, Toronto, Ontario, Canada*


## INTRODUCTION

Health care workers (HCWs) face hazardous occupational exposures to infectious organisms, many of which are spread through airborne or aerosolized droplet routes[1]. To reduce the risk of infection, the Centers for Disease Control and Prevention (CDC) recommends the use of personal protective equipment (PPE): gowns, gloves, face shields, goggles and disposable N95 respirators. The COVID-19 pandemic has led to persistent supply shortages of respiratory protective equipment in many jurisdictions. Reusable industrial respirators have been proposed and deployed as an alternative, but also face severe supply limitations. In addition, these industrial respirators do not filter the user's expired breath, a major limitation in health care settings where bidirectional protection is required.

## METHODS

In this paper, we present the development and quantitative testing of a reusable silicone respirator that can be locally manufactured using low-cost desktop infrastructure under pandemic conditions. Using standardized quantitative fit-testing (QNFT) including resting and activity components according to CSA Z94.4-18) in a cohort of 41 healthcare workers (HCWs), we compared the performance of the mask to the individually fitted disposable N95 masks that the HCWs had been assigned by our institution.QNFT include seven testing

activities performed by the participant, also referred to as “run”. These include: normal breathing, deep breathing, turning head side-to-side, nodding up-and-down, counting out loud, bending over, and ending with normal breathing again. A QNFT passing score for a half-face N95 respirator requires the subject to score an overall fit-factor of 100 or greater, with at least six individual run score fit factors of 100 or greater. All newly developed respirators must meet this international regulatory standard [8] [13].

**RESULTS**

| | Disposable-N95 | | Duo | | |
|---|---|---|---|---|---|
| | Fit-Factor Harmonic-Mean [95% CI] | Pass N (%) | Fit-Factor Harmonic-Mean [95% CI] | Pass N (%) | P-value* |
| Normal-Breathing | 86.7 [54.7-208.0] | 27 (65.9%) | 3936 [2959-5873] | 41 (100%) | P < 0.0001 |
| Deep-Breathing | 69.5 [41.9-202.3] | 22 (53.7%) | 4752 [3619-6915] | 41 (100%) | P < 0.0001 |
| Head-Side-to-side | 80.1 [50.9-188.7] | 28 (68.3%) | 4589 [3432-6923] | 41 (100%) | P < 0.0001 |
| Head-Up-and-Down | 79.0 [52.6 - 158.8] | 28 (68.3%) | 4432 [3288-6797] | 41 (100%) | P < 0.0001 |
| Talking-out-loud | 73.8 [57.3-103.7] | 21 (51.2%) | 1798 [1524-2192] | 41 (100%) | P < 0.0001 |

| | | | | | |
|---|---|---|---|---|---|
| Bending-over | 62.1 [42.0-119.2] | 23 (56.1%) | 2312 [1353-7949] | 41 (100%) | P < 0.0001 |
| Normal-Breathing | 100.2 [65.9-208.2] | 30 (73.2%) | 2087 [1165-10013] | 41 (100%) | P < 0.0001 |
| Overall | 77.4 [51.9-152.1] | 25 (61.0%) | 2959 [2228-4405] | 41 (100%) | P < 0.0001 |

## DISCUSSION

The surge in demand for N95 and comparable respirators during the current pandemic has repeatedly exceeded the capacity of manufacturing and supply chains. This has led to critical shortages even in traditionally well-resourced countries and has exacerbated the chronic shortages that are a reality for much of the world's population [17 18]. A reusable, locally-manufactured, half-face respirator provides better protection than fitted disposable N95 masks and can contribute to address the global supply systems disruption and allow a better response to future pandemics. The device requires further modification and testing to optimize exhalation flow resistance, and full conformance with technical standards required for regulatory approval.

## REFERENCES


1. Siegel, J. D., Rhinehart, E., Jackson, M. & Chiarello, L. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Health Care Settings. *Am. J. Infect. Control* **35**, S65–S164 (2007).
2. Standards Council of Canada. CAN/CSA-Z94.4-18 Selection, use, and care of respirators. *Standards Council of Canada | Conseil canadien des normes* https://www.scc.ca/en/standardsdb/standards/29645 (2018).
3. Occupational Safety and Health Administration. *Standards - 29 CFR Appendix A to § 1910.134: Fit Testing Procedures (Mandatory)*. https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=9780&p_table=STANDARDS (2004).
4. Cohen, J. & Meulen Rodgers, Y. van der. Contributing factors to personal protective equipment shortages during the COVID-19 pandemic. *Preventive Medicine* :106263 (2020).
5. McMahon, D. E., Peters, G. A., Ivers, L. C. & Freeman, E. E. Global resource shortages during COVID-19: Bad news for low-income countries. *PLoS Negl. Trop. Dis.* **14**, e0008412 (2020).

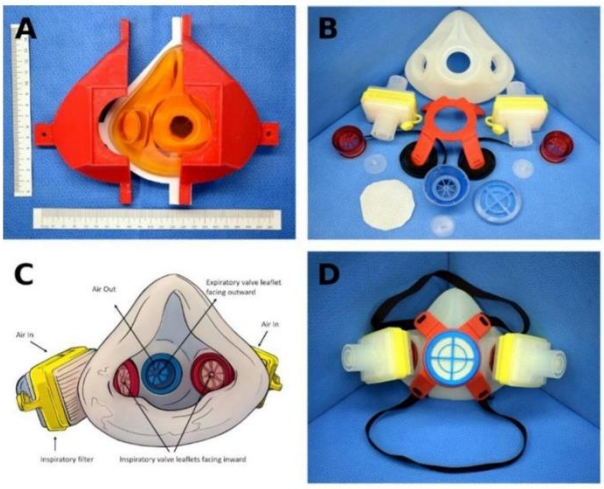


**Fig 1. Production process of the Duo silicone respirator**. A) The 4-part 3D-printed mold B) Complete set of components C) Valve assemblies D) Assembled Duo respirator.

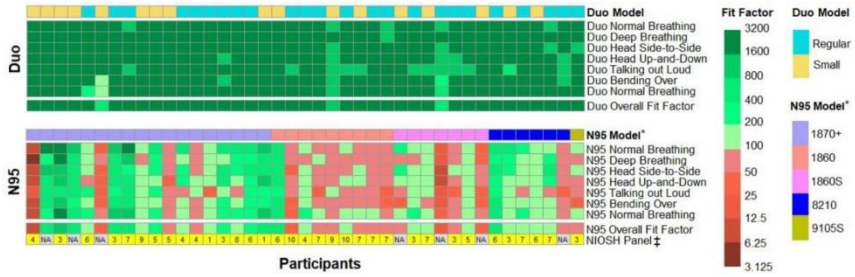


**Fig 2. Heat maps illustrating the results of quantitative fit testing (QNFT) for the Duo and disposable N95 masks.** The results for each participant are represented along each column with the Duo on top and Disposable N95 at the bottom. Rows represent the fit factors for each of the 7 maneuvers, overall fit factor, mask models (legends on left) as well as NIOSH morphometric panel number (bottom row). Participants have been ordered by their qualitatively fit-tested disposable N95 models. Fit factor values are colour coded with green values representing fit factors > 100, indicating a pass according to CSA Z94.4-18 and red boxes indicating failures.

# Breaking the Silo and Learning from our Colleagues - Evaluation of Peer Observation and Feedback for Continuous Professional Development for Staff Anesthesiologists– A Mixed Method Study.


## AUTHORS

Nabecker, Sabine[1;] Atalla, Michael[1]; Friedman, Zeev[1]

[1] *Department of Anesthesiology and Pain Management, Sinai Health System, University of Toronto, Toronto, Canada*


## INTRODUCTION

Physicians who have completed their training usually work alone or with a trainee. The clinical practices of different staff anesthesiologists may differ widely. To maintain and improve clinical skills it is important to reflect on one's own practice and to discuss with and learn from other staff physicians. However, in reality, opportunities for clinical collaboration between staff anesthesiologists are limited to clinical situations where more than one staff physician is needed, or to academic meetings, where information is verbally discussed. Peer observation and feedback is a validated tool for self-reflection. The literature almost exclusively describes peer observation in teaching situations and peer observation by trainees. While some staff physicians might consider this a "waste" of resources, the value generated from this process might outweigh the invested time and cost. This study's aim was to evaluate peer observation and feedback for staff physicians in the operating room.

## METHODS

After ethics board approval and informed consent, this mixed method study invited all staff anesthesiologists at a university-level hospital to participate in the peer observation and feedback process. For each peer observation and feedback encounter two staff anesthesiologists (one observing/one performing) were paired and randomized to either high-turnover or high-complexity surgical lists. There was no trainee or study personnel present at the time of the encounter, to ensure a private and confidential experience. Both staff anesthesiologists were encouraged to discuss similarities and differences in practice throughout the approximately two-hour-long observation period. Both were advised to treat the peer observation and feedback process as a bilateral learning experience, to ensure open communication and benefit for both sides.
After each peer observation and feedback encounter, all participants individually answered a structured questionnaire and an open-ended interview facilitated by a researcher. The primary outcome parameter was predefined as the percentage of staff participants who would either consider making any changes to their future practice and/or consider gathering more knowledge in an identified topic. Descriptive statistics were used to analyze quantitative data. A thematic analysis approach was used to analyze qualitative data.

## RESULTS

Twenty-one staff anesthesiologists (aged 44±9 years, 33% female, with 11±9 years of experience) participated in 26 encounters (64% high complexity, 36% high turnover lists). In

24 (92%) encounters, at least one of the two staff anesthesiologists reported that they would consider making changes and/or acquiring more knowledge. Fifteen (71%) of all staff anesthesiologists agreed to that statement. There was a significant difference between high-complexity and high turnover list, in favour of high-complexity lists (p=0.022). All staff anesthesiologists recommended the use of peer observation and feedback to other health care professionals and as a tool for continuous professional development. Some anesthesiologists (43%) voiced concerns about the cost of such a project. The analysis of the qualitative data revealed several themes: psychological safety, time constraints and staffing issues, changes in behaviour due to the experience, team-building opportunity, opportunity for self-reflection, and the importance of continuous professional development.

## DISCUSSION

Ninety-two percent of feedback encounters resulted in at least one staff anesthesiologist either considering making changes to their practice and/or acquiring more knowledge, which we believe is a surrogate parameter for continued learning. This supports the usefulness of this process as a tool for continuous professional development. Continuous education and self-reflection while ensuring psychological safety are critical for healthcare professionals, may have an impact as a team-building exercise, and may also have the power to ultimately improve patient care. The next step is to evaluate this simple continuous professional development intervention for the clinical teaching of trainees.

## REFERENCES


1. Cherie Lucas. More than I expected: Reflections on being observed and reviewed as a pharmacy teacher. Currents in Pharmacy Teaching and Learning 10(2018)803-806
2. Acceptability of peer clinical observation by faculty members – Borus- 2018 – The Clinical Teacher 2018; 15: 309-313.
3. Sullivan et al. Peer observation of teaching as a faculty developmental tool, BMC Medical Education 2012, 12:26
4. Somnath Mookherjee et al. Faculty Development for hospitalists: Structured Peer Observation of Teaching, Society of Hospital Medicine, Vol 9, No 4: April 2014, 244-250
5. Martineau et al: To observe or not to observe peers when learning physical examination skills; that is the question. BMC Medical Education 2013, 13:55

# Do Standard Preoperative Fasting Instructions Ensure an Empty Stomach in Diabetic Patients? A Cross-Sectional Non-Inferiority Comparative Study


## AUTHORS

Xiao, Maggie ZX[1]; Perlas, Anahi[2]; Tomlinson, George[3]; Jacob, Binu[2]; Abdullah, Sara[2]; Kruisselbrink, Richelle[4]; Chan, Vincent WS[5]

[1] *Faculty of Medicine, University of Alberta*
[2] *Department of Anesthesia and Pain Management, Toronto Western Hospital, University Health Network*
[3] *Biostatistical Research Unit, University Health Network*
[4] *Department of Anesthesia, McMaster University*
[5] *Department of Anesthesiology and Pain Medicine, University of Toronto*



## INTRODUCTION

The physiology of diabetes mellitus can increase the risk of perioperative aspiration but there is limited and contradictory evidence on the incidence of “full stomach” in fasting diabetic patients. The aim of this study is to assess the baseline gastric content (using gastric ultrasound) in diabetic and non-diabetic patients, scheduled for elective surgery, who have followed standard pre-operative fasting instructions.

## METHODS

This was a prospective, non-inferiority study of 180 patients (84 diabetics and 96 non-diabetics). Bedside ultrasound was used for qualitative and quantitative assessment of the gastric antrum in the supine and right lateral decubitus positions. Fasting gastric volume was estimated based on the cross-sectional area (CSA) of the gastric antrum and a validated model.[1] We hypothesized that diabetic patients would not have a higher baseline fasting volume compared to non-diabetic patients, with a non-inferiority margin of 0.4 mL/kg. Secondary aims included the comparison of the incidence of “full stomach” (solid content or >1.5mL/kg of clear fluid) between the 2 groups, estimation of the 95th percentile of the gastric volume distribution in both groups, and examination of the association between gastric volume, glycemic control, and diabetic comorbidities.

## RESULTS

The baseline gastric volume [SD] was similar in the diabetic (0.81 [0.61] mL/kg) and non-diabetic (0.87 [0.53] mL/kg) groups. The gastric volume was not higher in diabetic patients (mean difference was -0.07 mL/kg [95% CI: -0.24 to 0.10 mL/kg]). Thirteen (15.5%) diabetic and 11 (11.5%) non-diabetic patients presented > 1.5 mL/Kg of gastric volume ($p$>0.05). There was no correlation between the gastric volume and either the time since diagnosis or HbA1C.

## DISCUSSION

Our data suggest that the current fasting guidelines from the American Society of Anesthesiologists are equally effective in preventing a “full stomach” prior to elective surgery in diabetic and non-diabetic patients.

## REFERENCES

1. Perlas A, Mitsakakis N, Liu L, Cino M, Haldipur N, Davis L, Cubillos J, Chan V: Validation of a mathematical model for ultrasound assessment of gastric volume by gastroscopic examination. Anesth Analg 2013; 116:357–63

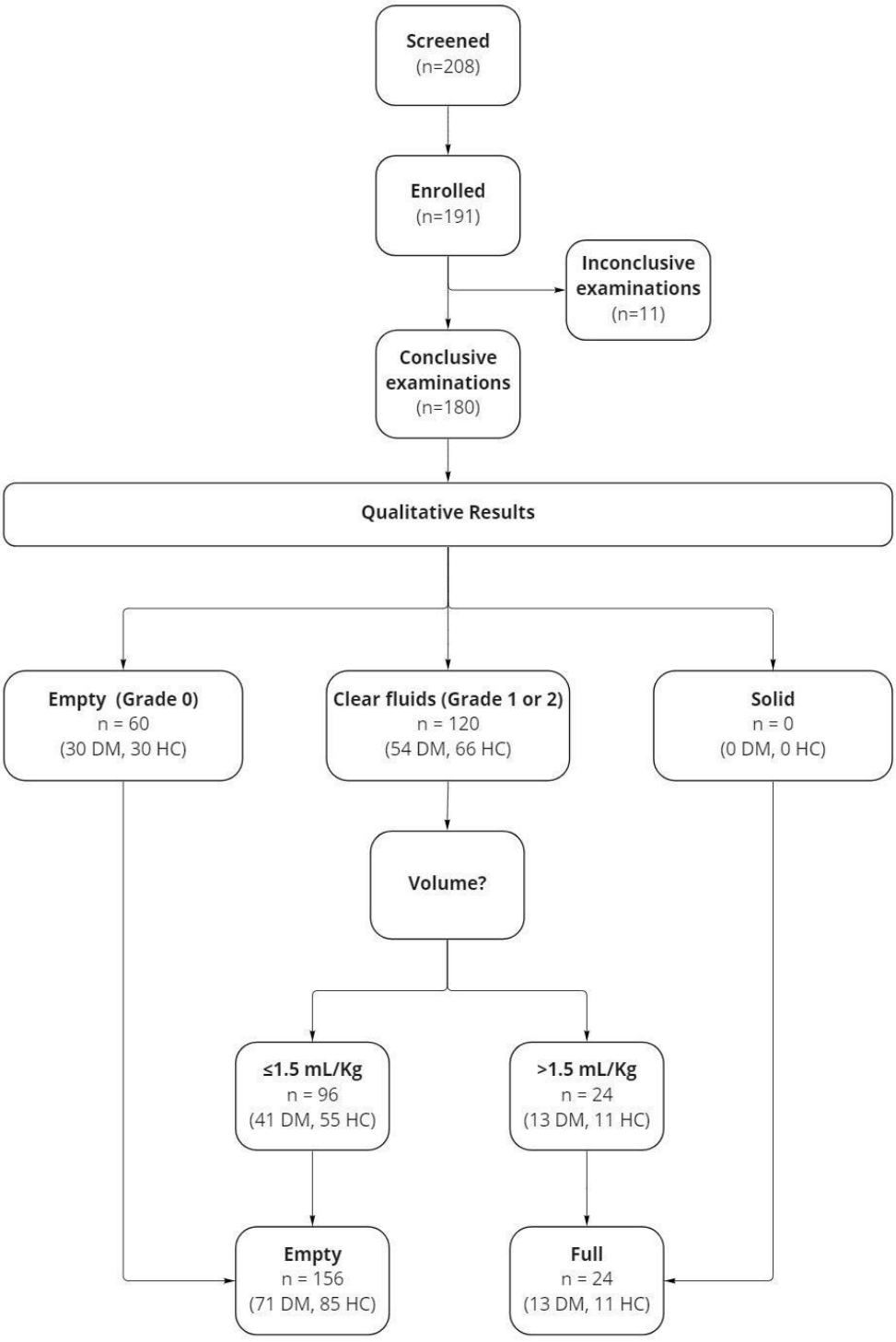
Screened
(n=208)
Enrolled
(n=191)
Inconclusive examinations
(n=11)
Conclusive examinations
(n=180)
Qualitative Results
Empty (Grade 0)
n = 60
(30 DM, 30 HC)
Clear fluids (Grade 1 or 2)
n = 120
(54 DM, 66 HC)
Solid
n = 0
(0 DM, 0 HC)
Volume?
≤1.5 mL/Kg
n = 96
(41 DM, 55 HC)
>1.5 mL/Kg
n = 24
(13 DM, 11 HC)
Empty
n = 156
(71 DM, 85 HC)
Full
n = 24
(13 DM, 11 HC)

Figure 1

# Lived Experiences of Transgender and Nonbinary People in the Perioperative Context: A Qualitative Study


## AUTHORS

MacCormick, Hilary[1,2]; Johnson, Les T[3]; Burchell, Drew[4]; Munro, Allana[1,2]; Morgan, Sarah[5]; Lorello, Gianni R[6,7,8,9]; George, Ronald B[10]; Bould, M Dylan [11]

[1] *Department of Women's & Obstetric Anesthesia, IWK Health Centre, Halifax, NS, Canada*
[2] *Department of Anesthesia, Pain Management and Perioperative Medicine, Dalhousie University, Halifax, Canada*
[3] *Centre for Learning and Teaching, Dalhousie University, Halifax, Canada*
[4] *Strengthening Transitions in Care Lab, Research, IWK Health Centre, Halifax, Canada*
[5] *College of Nursing, University of Wisconsin Milwaukee, Milwaukee, USA*
[6] *Department of Anesthesiology and Pain Medicine, University of Toronto, Toronto, Canada*
[7] *Department of Anesthesia and Pain Management, University Health Network – Toronto Western Hospital, Toronto, Canada*
[8] *The Wilson Centre, Toronto General Hospital, Toronto, Canada*
[9] *Women's College Research Institute, Women's College Hospital, Toronto, Canada*
[10] *Department of Anesthesiology and Pain Medicine, University of Toronto, Toronto, Canada*
[11] *Department of Anesthesiology and Pain Medicine, Children's Hospital of Eastern Ontario, University of Ottawa, Ottawa, Canada*


## INTRODUCTION

Trans people have "gender identities and/or gender expressions [that] are not what is typically expected for the sex to which they were assigned at birth".[1] Nonbinary people have "gender identities outside the gender binary" (i.e., gender identities other than man or woman).[1] Trans and nonbinary (TNB) people experience obstacles—historical, cultural, social, political, financial—including stigmatization, health inequities, and barriers to care in healthcare contexts.[2] In addition to the standard medical care any person may seek in their lifetime, some TNB people may also choose to medically transition with hormone therapy and/or gender-affirming surgery (GAS). We aimed to understand how TNB people experience perioperative care, and to use this information to gain insight into potential gaps in the education of perioperative care professionals.

## METHODS

This qualitative study was based in phenomenology, a methodology that allowed us to explore a phenomenon, grounded in the worldview, vocabulary, and context-specific experience of the patients themselves.[3] With institutional ethics approval, we sought to ask, "What are the lived experiences of TNB people in perioperative settings?" Eligibility criteria included people who had undergone any surgical procedure (GAS or otherwise) in Canada in the previous five years and identified as transgender or nonbinary at the time of surgery. Participants were recruited by word of mouth, primarily via posts on social media. One of the authors conducted semi-structured interviews over Zoom with each participant. Questions asked about participants' (1) identities and background, (2) surgical experiences, from the decision to have surgery through to recovery, and (3) thoughts and feelings through the perioperative process. Audio-recorded interviews were transcribed, and three researchers

from the team separately analyzed through a systematic process of open coding. These codes were then collated and grouped into themes.[4] Throughout the analysis, researchers, some who identify as nonbinary, trans, and/or queer, set aside our own experiences and beliefs affecting our interpretation of participants' narratives. Member checking was performed by allowing participants to review a transcribed version of their interview.

## RESULTS

Twenty-one participants were interviewed. Ten self-identified as male or trans men, three female or trans women, seven nonbinary/genderqueer, and one as transmasculine. Seventeen participants described undergoing GAS; other participants described surgeries unrelated to gender. Participants spoke extensively regarding their experiences accessing trans-competent healthcare, describing stress, lack of clarity, and feelings of vulnerability navigating the perioperative period. Systemic marginalization towards TNB people exacerbated these challenges. Some felt unable to participate fully in shared decision making, particularly regarding GAS, in fear of being denied access to care. While in hospital, participants described both positive and negative interactions with perioperative care professionals. Negative interactions centered on being misgendered by healthcare professionals. Several participants described a sense of depersonalization at the time of surgery, like an object on a "conveyor belt," rather than a person. However, many participants noted the sense of community and resiliency when meeting other TNB patients in the perioperative environment.

## DISCUSSION

Early findings reveal there are challenges to address within both the perioperative setting and the healthcare system overall. The stress of wading through pre-surgical bureaucracy often stood in sharp contrast to the positive feelings participants had with deciding to seek GAS. The participants described the need for self-advocacy and resiliency when interacting with healthcare professionals who had a lack of experience with or negative attitude towards TNB people. The results highlight the need for healthcare professionals to receive education specific to working with TNB patients and providing safe and competent gender-affirming care throughout the perioperative context.

## REFERENCES


1. Coleman E *et al.* Standards of Care for the Health of Transgender and Gender Diverse People, Version 8, International Journal of Transgender Health, 2022. 23:sup1, S1-S259. doi: 10.1080/26895269.2022.2100644.
2. Kcomt L. Profound health-care discrimination experienced by transgender people: rapid systematic review. Soc Work Health Care. 2019 Feb;58(2):201-219. doi: 10.1080/00981389.2018.1532941. Epub 2018 Oct 15. PMID: 30321122.
3. Crozier G, Denzin N, Lincoln Y. Handbook of Qualitative Research. *Br J Educ Stud*. 1994. doi:10.2307/3121684.
4. Clarke V, Braun V. Thematic analysis. J Posit Psychol. 2017; 12(3):297-298. doi: 10.1080/17439760.2016.1262613.

# Passive Leg Raise to Facilitate Pediatric Peripheral Intravenous Access: A Randomized Controlled Trial


## AUTHORS

Macaskill, James[1]; Emadi, Roya[1]; Zhao, Mars[1]; Barbour-Tuck, Erin[2]; Walker, Mary Ellen[2]; Valcke, Patrick[3]; Munshey, Farrukh[4]; Gamble, Jonathan[2]

*[1] College of Medicine, University of Saskatchewan, Saskatoon, SK, Canada*
*[2] Department of Anesthesiology, Perioperative Medicine and Pain Management, College of Medicine, University of Saskatchewan, Saskatoon, SK, Canada*
*[3] Department of Anesthesia & Perioperative Medicine, Western University, Schulich School of Medicine, Windsor, ON, Canada*
*[4] Department of Anesthesiology & Pain Medicine, The Hospital for Sick Children, University of Toronto, Toronto, ON, Canada*


## INTRODUCTION

Establishing pediatric peripheral intravenous (PIV) access is challenging even for skilled practitioners; such providers report an approximately 50 percent first-pass success rate.[1-3] Unsuccessful and repeated attempts at PIV access correlate with greater patient pain and anxiety scores in addition to decreased perceived quality of care by caregivers.[2] A passive leg raise (PLR), raising a supine patient's legs to 45 degrees, auto-transfuses lower extremity blood volume into the central circulation.[4] Similar to changes in internal jugular vein diameter a PLR may cause a transient increase in the volume and caliber of upper extremity peripheral veins. However, studies of this maneuver on pediatric peripheral venous diameter under anesthesia are limited.[5] This study aimed to determine if a PLR will 1) cause a significant increase in upper extremity venous diameter; 2) decrease the number of attempts until successful upper extremity PIV cannulation compared to a control group in pediatric patients.

## METHODS

Following local Research Ethics Board approval, a parallel-group, open-label, randomized controlled trial was conducted to investigate the effect of a PLR on the facilitation of PIV access in pediatric patients. Consenting eligible participants included: ASA physical status 1-3 ages 3 months to 17 years undergoing general anesthesia for elective procedures. Excluded from the study were patients with lower limb pathology limiting range of motion and those with pre-existing central or peripheral intravenous access prior to surgery.

Participants were randomized to either a PLR or control group. Antecubital vein diameter was measured by ultrasound three times: at baseline, with a proximally placed venous tourniquet, and after intervention (with tourniquet applied); PLR was maintained until successful PIV placement. Patient demographics, number of cannulation attempts, and vein diameter measurements were recorded. The primary outcome was the number of attempts to establish PIV access. Secondary outcomes included the change in peripheral vein diameter with PLR. Mann-Whitney U tests were used to examine the effect of PLR on cannulation attempts, change and percent change of vein diameter. Backward model

building also allowed for the creation of full models with all independent variables as well as reduced models that include only independent variables with significant impact.

## RESULTS

Two hundred thirty-four patients were enrolled, 117 in both the intervention and control groups. We found no significant difference between the control and PLR groups in cannulation attempts, with a median [interquartile range (IQR)] of 1.0 [1.0 to 1.0] in both groups ($Z=-1.46$, $p=0.143$). However, there was a significant difference between the control and PLR groups in relative vein diameter change between the PLR and control groups (median, [IQR]) following tourniquet placement: 9% [5%-17%] vs 4% [0%-8%] ($Z=-5.84$, $p<0.001$). Our generalized linear models show a significant difference between the control and treatment groups in all models; raw and percent changes were greater in the PLR group than the control group in both full and reduced models.

## DISCUSSION

A PLR did not significantly decrease the number of PIV attempts in the controlled operative room environment with cannulation performed by highly experienced providers, but it did significantly increase vein diameter. In situations of anticipated cannulation difficulty or less experienced providers, a PLR is a simple means of increasing vein diameter that may plausibly decrease the number of PIV attempts and time to cannulation, although further study is warranted.

## REFERENCES


1. Larsen P, Eldridge D, Brinkley J, Newton D, Goff D, Hartzog T, Saad ND, Perkin R. Pediatric peripheral intravenous access: does nursing experience and competence really make a difference? J Infus Nurs. 2010 Jul-Aug;33(4):226-35. doi: 10.1097/NAN.0b013e3181e3a0a8.
2. Eldridge DL. Alternatives to intravenous rehydration in dehydrated pediatric patients with difficult venous access. Pediatr Emerg Care. 2010 Jul;26(7):529-35. doi: 10.1097/PEC.0b013e3181e5c00e.
3. Yamazaki S, Tomita S, Watanabe M, Kawaai H, Shimamura K. Effects of a transmitted light device for pediatric peripheral venipuncture and intravenous cannulation. Med Devices (Auckl). 2011;4:189-92. doi: 10.2147/MDER.S18497.
4. Monnet X, Teboul JL. Passive leg raising: five rules, not a drop of fluid! Crit Care. 2015 Jan 14;19(1):18. doi: 10.1186/s13054-014-0708-5.
5. Valcke PM, Munshey F, Gamble J, O'Brien J, McKay W. Passive Leg Raise to Facilitate Pediatric Peripheral Intravenous Placement [abstract]. In: Kharasch ED, editor. The Anesthesiology annual meeting; 2018 October 13-17; Moscone Center, San Francisco, United States of America. San Francisco (USA): American Society of Anesthesiologists; 2018 [cited January 17, 2023]. Available from: http://asaabstracts.com/strands/asaabstracts/abstract.htm?year=2018&index=16&absnum=4673

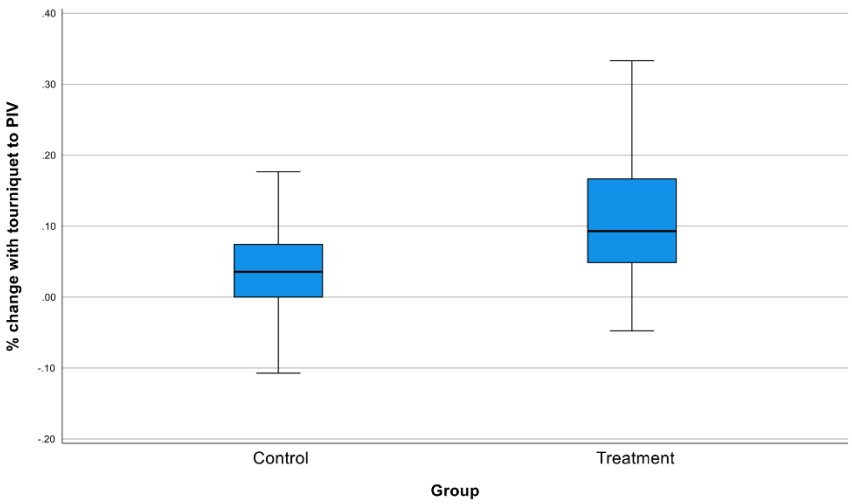


**Figure 1.** Box plots of percent change in vein diameter from tourniquet placement to successful cannulation

# PROSPR: A Peri-opeRative Opioid Stewardship Program of Research


## AUTHORS

Mc Donnell, C[1]; Caldeira-Kulbakas M[1]; Al-Mandhari M[1]; Nair S[1]; Satgunarajah S[1]; Wengle L[2]; Camp M[2]; Howard A[2]; Bordman W[3]

*[1] Department of Anesthesia & Pain Medicine, Hospital for Sick Children, University of Toronto, Toronto, Canada.*
*[2] Department of Orthopedic Surgery, Hospital for Sick Children, University of Toronto, Toronto, Canada.*
*[3] Hospital Commercial Pharmacy Manager, Hospital for Sick Children, University of Toronto, Toronto, Canada.*


## INTRODUCTION

From January 2016 to June 2018, more than 9,000 Canadians died from alleged opioid-related harm. In 2018, 1 in 8 Canadians were prescribed opioids[1]. A population-based study reported 7% of opioid-related deaths in Ontario were associated with prescriptions belonging to family or friends[2]. Health Quality Ontario published a report identifying the number of opioid-prescriptions following surgery were second only to dentist office visits[3]. Recent Canadian population-based cohort study identified surgical opioid-prescribing at hospital discharge as a specific focus for intervention[4], however, Canadian research & guidelines pertaining to discharge opioid-prescribing remains limited to adult populations. Pediatric opioid prescribing at surgical discharge lacks evidence-based, standardized protocols that decrease excessive opioid prescribing while ensuring children do not experience unmanaged pain at home. Following our own preliminary work[5], we designed & implemented electronic standardized discharge protocols for patients undergoing supra-condylar fracture repair (SCF) that encouraged regular acetaminophen and ibuprofen as first-line analgesics and restricted morphine prescribing (A) to 8-doses max. (0.2 mg/kg), (B) then further restricted to 4-doses max., to decrease heterogeneity in clinical practice and decrease excess opioid-prescribing while at the same time increasing unused-drug returns, all without compromising pediatric home pain management.

## METHODS

**Per IHI Model for Improvement, our SMART-AIM (Hypothesis) was: "*By end of 2022 [24 months], using two-phase structure, we will decrease opioid mg-amounts (MME) prescribed at SCF discharge by 50%, and decrease by 50% unused MME in the community at 3-week follow up*".**

To analyze impact of EHR-implementation of opioid discharge order-sets [2021:Phase 1], and introduction of part-refill scripts [2022:Phase 2], we identified the following measures to track and analyze both phases:

*Outcome:
[MME & $MME^{-1}$kg prescribed & dispensed; percentage reduction unused MME remaining in the home] To be delivered (tbd) by order-sets

*Process:
[Enrollment, orderset-compliance, simple-analgesic use, MME disposed/returned at 3-week follow-up]. TBD by family-handouts, surgeon orientation video and reminders, fracture-clinic reminder calls to families

*Balancing:
[Untreated pain, extra morphine requests/scripts]. TBD by post-op follow-up with families @ Day 5 and 21.

Iterative tests of change evaluated implementation through multiple PDSA [Plan-Do-Study-Act] cycles. SPC charts (Figure) were used to display data, demonstrate sustainable meaningful impact on outcome-process measures, and evaluate special-cause variation (SCV). SPC charts analyze process performance by plotting data points, control limits and a center line: a process is in control when common cause variation is present, SCV is absent and statistical properties do not vary over time. Other rules of analysis (Shewhart Rules) are applied automatically by QIMACROS which we employ locally for QI data analysis and reporting.

## RESULTS

***Our preliminary work[5] from 2019-2020 reported 8672 morphine MME prescribed to 110 prospectively recruited consecutive surgical patients: 67% of prescribed opioids went unused, and, 78% of those remained in the home 1-month later.***

**SCF QI Project Phases 1 & 2 [2021 & 2022]:**
*Outcome*
1. Mean MME/kg prescribed: Decrease from 3.6 to 1.9[2021], further decrease from 1.9 to 1.1[2022] – 70% TOTAL DECREASE
2. Percentage reduction in unused MME in the home 3-weeks post discharge: 83% MME dispensed in preliminary data went unconsumed/unreturned; compared to 50% in 2021 (2551 of 5095MME), and 52% in 2022 (720 of 1512MME)

*Process*
1. Enrollment Rate: Overall = 78%, [70% 2021, 85% 2022]
2. Order-set compliance: Increased from monthly mean of 38%[2020] to 84%[2021]
3. 88% use of acetaminophen, 85% ibuprofen, respectively: however, ~ 60% of use was not administered regularly as instructed
4. MME safely-disposed or returned at 3-week follow-up: Increase from 17% of total dispensed [2020] to 80% [2021-22]

*Balancing*
ZERO untreated pain declared
ZERO requests for extra opioid scripts

## DISCUSSION

Since 2020, PROSPR program iteratively decreased opioid prescribing at surgical discharge post SCF repair by 70%.
Subanalysis demonstrates Gartland Type 2 fractures consume minimal opioids and never

refill opioid scripts; we removed opioids from discharge prescribing post Type 2 repair. We effected a signficant increase in the amounts of unused opioid safely removed from the community by [A] prescribing less, [B] creating reminders and mechanisms to 'bring-back' unused drug for safe disposal.

For every SCF repair, 30MME is no longer exposed to the community, totalling 7.5 GRAMS Morphine each year for just one procedure.

Currently expanding processes to address other surgeries (cleft-palate, dental, tonsillectomies).

**REFERENCES**


1. Opioid-related harms in Canada, December 2018. Canadian Institute for Health Information. Retrieved October 21, 2021, from https://secure.cihi.ca/free_products/opioid-related-harms-report-2018-en-web.pdf
2. Characteristics of opioid-users whose death was related to opioid-toxicity: A population-based study in Ontario, Canada. Madidi P, Hildebrandt D, Lauwers AE, et al. PLoS One. 2013;8(4):e60600.
3. Opioid prescribing in Canada: How are practices changing? Canadian Institute for Health Information. Retrieved October 21, 2021, from https://www.cihi.ca/sites/default/files/document/opioid-prescribing-canada-trends-en-web.pdf
4. Association between mothers' postoperative opioid prescriptions and opioid-related events in their children: A population-based cohort study. Bethell J, Neuman MD, Bateman BT, et al. Health Reports 2020; 31(6):12-19.
5. Caldeira-Kulbakas M, Stratton C, Roy R, et al. A prospective observational study of pediatric opioid prescribing at postoperative discharge: how much is actually used? Can J Anaesth. 2020;67:866-76.

# Ultrasound-guided Transversalis Fascia Plane Blocks Provide Clinically Meaningful Post-Cesarean Analgesia in Patients with Spinal Morphine


## AUTHORS

Endersby, Ryan[1]; Walker, Andrew[1]; Yu, Hai Chuan[1]; Baghirzada, Leyla[1]

*[1] Department of Anesthesiology, Perioperative & Pain Medicine, University of Calgary, Calgary, Alberta, Canada*


## INTRODUCTION

Spinal morphine is the standard of care for postoperative analgesia after elective cesarean delivery (CD) performed under spinal anesthesia, providing effective, relatively safe, and cost-efficient analgesia up to 12-24h postoperatively.[1] Transversalis Fascia Plain block (TFP) has recently been proposed for post-cesarean analgesia as an adjunct to spinal morphine.[2] The proximal branches of T12 and L1 are targeted in the plane between the transversus abdominis muscle and the transversalis fascia facilitating cutaneous analgesia for a lower abdominal Pfannenstiel incision.[3] The purpose of this study was to evaluate the additional analgesic effectiveness of TFP block in cesarean delivery with spinal morphine. The primary outcome was opioid consumption in patients receiving a TFP block with local anesthetic compared to patients receiving a TFP block with saline.

## METHODS

Ethics approval was obtained from our local REB prior to recruitment. One hundred and six participants provided consent to participate in our prospective, double-blinded, block randomized RCT. Exclusion criteria included language barriers, BMI > 40 kg/m$^2$, multiple gestation, chronic pain, preoperative opioid use, substance abuse and allergies to medication included in protocol. All patients received spinal anesthesia according to institutional practices. Post-operatively, participants received ultrasound guided bilateral TFP blocks of either 40 mL saline (control) or 0.25% bupivacaine with 2.5 mcg/ml epinephrine 40 ml or a maximum 2.5 mg/kg (treatment). Standardized postoperative analgesia with acetaminophen and diclofenac was administered to all participants. Pain scores and opioid consumption in morphine milliequivalents (mmeq) was assessed at 6-, 12-, 24- and 48-hours following CD. Additionally, data was collected on quality of recovery score and time to first opioid administration post-block. Analysis was completed using both intention to treat (ITT) and per protocol (PP) participants. Complete case and imputed case analyses were completed for our primary outcome of 24-hour post-block administration mmeq consumption. Results are presented as outcome (95% confidence interval).

## RESULTS

One-hundred and six and ninety-four participants were included in ITT and PP analyses, respectively. Complete and imputed case ITT analyses presented with adjusted 24-hour mmeq decreases of -17.1 (-26.3 to -8.0, P < 0.001) and -14.4 (-23.8 to -5.0, P = 0.003) with TFP block administration, corresponding to 51% and 44% reductions in 24-hour opioid

consumption, respectively. Similar decreases were found with PP analysis. ITT median time to first opioid administration was 3.0 (2.3 to 5.6) hours and 8.2 (4.4 to 17.5) hours in control and TFP block groups, respectively (P = 0.054). The overall adjusted post-operative TFP block effect was a reduction in NRS pain scores at rest and movement of -0.9 (-1.6 to -0.2, P = 0.013) and -1.2 (-2.1 to -0.4, P = 0.004), respectively. QoR-15 scores 30-days post-block were higher in the TFP block group (P = 0.006). No block related complications were observed.

## DISCUSSION

Administration of a TFP block was associated with a significant and clinically meaningful reduction in 24-hour post-block opioid consumption. This agrees with other studies in similar patient populations where a 33% reduction in mmeq of opioid consumption was considered clinically significant.[4] As well, time to first opioid request was extended into those who received a TFP block. Although QoR-15 scores supported improved recovery in the TFP block group 30-days post-administration, this improvement was likely not clinically important.[5] Administration of a TFP block shows good potential as a useful adjunct to spinal morphine for post-CD analgesia.

## REFERENCES


1. Sultan P, Halpern SH, Pushpanathan E, et al. The effect of intrathecal morphine dose on outcomes after elective cesarean delivery: A meta-analysis. Anesthesia & Analgesia 2016; 123:154–64
2. Serifsoy TE, Tulgar S, Selvi O, et al. Evaluation of ultrasound-guided transversalis fascia plane block for postoperative analgesia in cesarean section: A prospective, randomized, controlled clinical trial. Journal of Clinical Anesthesia. 2020; 59:56-60.
3. Hebbard PD. Transversalis fascia plane block, a novel ultrasound-guided abdominal wall nerve block. Canadian Journal of Anesthesia. 2009; 56:618–20.
4. Carvalho B, Mirza F, Flood P. Patient choice compared with no choice of intrathecal morphine dose for caesarean analgesia: a randomized clinical trial. British Journal of Anaesthesia 2017; 118:762-71.
5. Myles PS, Myles DB, Galagher W, Chew C, MacDonald N, Dennis A. Minimal clinically important difference for three quality of recovery scores. Anesthesiology 2016; 125:39–45.