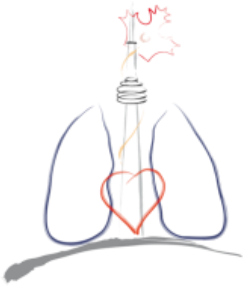
UNIVERSITY OF TORONTO | Interdepartmental Division of Critical Care Medicine



ART SLUTSKY RESEARCH DAY

Interdepartmental Division of Critical Care Medicine
University of Toronto

Tuesday June 18, 2019

Campbell Conference Facility
Munk School of Global Affairs and Public Policy
Trinity Site, 1 Devonshire Place
University of Toronto

8:00 –8:55 am Registration and Light Breakfast

8:00 – 8:45 am Poster Set-Up

Posters should be on display until **3:00 pm** so they are available for viewing both at the designated time with the authors (see below), and informally (without authors) at coffee breaks and lunch.

Please set up posters before the start of the oral presentations to avoid interruptions.

We will supply VELCRO (we are not allowed to use pins on these rented boards)

8:55 – 9:00 am **Welcome and Introductory Remarks**

IDCCM Research Director: Dr. Margaret Herridge

9:00 – 9:45 am **Oral Presentations I**

Chairs: Drs. Hannah Wunsch and Claudia Dos Santos

Each presentation is 10 min followed by 5 min discussion.

All speakers will be requested to adhere to the time limit.

9:00 – 9:15 am **Presentation 1**: **Dr. Federico Angriman**
Compliance with Evidence-Based Processes of Care After Transitions Between Staff Intensivists

9:15 – 9:30 am **Presentation 2: Dr. Aili Luo**
The Effects and Mechanisms of Optimal Epithelial Tension in Lung Repair and Regeneration

9:30 – 9:45 am **Presentation 3: Dr. Lu Chen**
A Bedside Method to Assess Lung Recruitability in Patients With Acute Respiratory Distress Syndrome

IDCCM Faculty Presentations I

Session Chair: Drs. Haifa Mtaweh and Peter Laussen

9:45 – 10:05 am **Featured Speaker: Ewan Goligher**
Diaphragmatic Myotrauma During Mechanical Ventilation: A Few Answers and Many Questions

10:05 – 10:25 am **Featured Speaker: Haibo Zhang**
Precision Medicine for Cell Therapy in ARDS

10:25- 10:30 am **Discussion**

10:30 - 11:00 am Morning Break

11:00 – 11:45 am **Oral Presentations II**

Chairs: Drs. Geeta Mehta and Lorenzo Del Sorbo

11:00 – 11:15 am **Presentation 4: Dr. Dmitry Rozenberg**
One-year Functional Outcomes in Lung Transplant Patients after 7 or more days of Mechanical Ventilation

11:15 – 11:30 am **Presentation 5: Dr. Michael Sklar**
Decreased Baseline Diaphragm Thickness Independently Predicts Increased Risk of Morbidity and Mortality in Mechanically Ventilated Patients

11:30 – 11:45 am **Presentation 6: Dr. Abdulrahman Al Fares**
Optimal Strategy and Timing of Left Ventricular Venting During Veno-Arterial Extracorporeal Life Support for Adults in Cardiogenic Shock
A Systematic Review and Meta-Analysis

11:45 am – 1:30 pm **Poster Judging/Viewing and Lunch**

11:45 am – 12:45 pm Poster Judging
Presenting authors must be with their posters
Judges' Scores due at 1 PM Sharp

11:45 pm – 1:30 pm Lunch and unaccompanied poster viewing

1:30 – 2:15 pm **Oral presentations III**

Chairs: Drs. Dominique Piquette and Niall Ferguson

1:30 – 1:45 pm **Presentation 7: Dr. Braden Waters**
Offsite and Home Visits for Survivors of Critical Illness

1:45 – 2:00 pm **Presentation 8: Dr. Rémi Coudroy**
Influence of body mass index on respiratory mechanics in acute respiratory distress syndrome: a multicenter cohort study

2:00 – 2:15 pm **Presentation 9: Dr. Christopher Yarnell**
Association Between Ethnicity and End-of-life Care

IDCCM Special Presentations

2:15 – 2:35 pm **State of Research in the IDCCM & presentation of the website**
University of Toronto
Dr. Laurent Brochard

2:35 – 3:00 pm **Featured Speaker**
Dr. Elie Azoulay
Acute Respiratory Failure in Immunocompromised Patients: What's New?

3:00 – 3:05 pm **Questions**

3:05 – 3:30 pm Afternoon Break

IDCCM Faculty Presentations II

Chairs: Drs. Christie Lee and Andrew Baker

3:30 – 3:50 pm **Featured Speaker: Dr. Andreas Laupacis**
Why is an EBM trained doc like me listening to patient stories?

3:50 – 4:10 pm **Featured Speaker: Dr. Najma Ahmed**
Gun Control, Advocacy and "Staying in Your Own Lane"

4:10 – 4:15 pm **Questions**

4:15 – 4:35 pm **Transitions- Tribute to Retiring/Transitioning Faculty**

Toronto General Hospital-	Dr. Neil Lazar (Dr. John Granton)
Toronto Western Hospital-	Dr. Wilfred Demajo (Dr. Jeff Singh)
Sunnybrook Health Sciences Centre-	Dr. Taz Sinuff (Dr. Dominique Piquette)
The Hospital for Sick Children –	Dr. Peter Cox (Dr. Peter Laussen)
	Dr. Tilman Humpl (Dr. Peter Laussen)

4:35 – 5:15 pm **Presentation of Certificates of Training Completion**

Presentation of Site Teaching Awards

Presentation of the John Granton and Simon Abrahamson Teaching Awards & the John Laffey Research Awards
Dr. David Hall

5:15 – 5:30 pm **Presentation of Research Day Prizes and Closing Remarks**
Drs. Margaret Herridge and Hannah Wunsch

Please stay for end of Year Group Photo in Courtyard- Weather Permitting

Thank you!
Have another great year of research and see you next year!

Art Slutsky Research Day 2019
IDCCM Chair: Dr. Laurent Brochard
IDCCM Director of Research: Dr. Margaret Herridge
IDCCM Associate Director of Research: Dr. Hannah Wunsch

GUEST SPEAKERS

Featured Speaker

Dr. Elie Azoulay

Dr. Elie Azoulay is Professor of Medicine. He graduated from the Paris University. He completed his training in pulmonology and critical care in 1996, and a PhD in respiratory physiology in 2002 on chemotherapy and G-CSF-related pulmonary toxicity.

Dr. Azoulay is currently the head of the medical ICU, at the Saint-Louis hospital, Paris. Professor Elie Azoulay has been part of the editorial board of several international journals and the editor in chief of Intensive Care Medicine (2012-2018). His research interests have focused on critical care management of patients with hematological malignancies, internal medicine and clinical immunology diseases, most particularly regarding advances in therapeutic management, severe life threatening conditions, and toxicity from chemotherapy and immunotherapy.

He has launched in 1996 the FAMIREA multicenter multidisciplinary study group aimed at improving effectiveness of communication with family members of ICU-patients. In 2004 he launched the Groupe de Recherche Respiratoire en Réanimation Onco-Hématologique (GRRR-OH) on the management and outcomes of acute respiratory failure in immunocompromised patients. Professor Elie Azoulay has published more than 400 peer-reviewed articles. He has been actively involved in the Société de Réanimation de Langue Française (SRLF) and the European Society of Intensive Care Medicine (ESICM).

Faculty Speakers

Dr. Ewan Goligher

Dr. Ewan Goligher MD, PhD is Assistant Professor of Medicine in the Interdepartmental Division of Critical Care Medicine at the University of Toronto and a Scientist at the Toronto General Hospital Research Institute. After studying biochemistry and medicine at the University of British Columbia, he trained in Internal Medicine and Critical Care Medicine at the University of Toronto. His subsequent doctoral work in physiology at the University of Toronto focused on diaphragmatic dysfunction during mechanical ventilation. His research program focuses on characterizing the mechanisms and impact of injury to the lung and diaphragm during mechanical ventilation and on the use of innovative clinical trial designs to test lung and diaphragm-protective ventilation strategies.

Dr. Haibo Zhang

Dr. Haibo Zhang is a Staff Scientist in the Keenan Research Centre for Biomedical Science of St. Michael's Hospital. He is a Professor of Anesthesia, Medicine and Physiology at the University of Toronto. His translational research program focuses on the mechanisms and therapy of acute lung injury and sepsis. He has published over 220 peer-reviewed articles, and is the recipient of enormous research grants and a number of research awards, including Premier's Research Excellence Award (Ontario), New Investigator Award from the Canadian Institutes of Health Research (CIHR), and Fellow of Canadian Academy of Health Science.

He serves on a number of academic and appointment committees at the Institute of Medical Sciences (IMS), University of Toronto and at St. Michael's Hospital. He has trained over 80 MSc and PhD students, and post-doctoral fellows. He has served on the Standing Committee of Critical Care Assembly, the American Thoracic Society in 2005-2006, Associate Editor, Intensive Care Medicine in 2007-2013. He served as an external grant reviewer for European nations (Austria, Belgium, Germany, Holland, Israel, Italy and UK) in 2010-2018, and a member of College of Reviewers at CIHR in 2014-2019.

Dr. Andreas Laupacis

Dr. Andreas Laupacis is a palliative care physician at St. Michael's Hospital and Lead, Patient Involvement, Department of Medicine, University of Toronto. He is a Professor at the University of Toronto in the Faculty of Medicine and the Institute of Health Policy, Management and Evaluation.

He has published over 370 peer-reviewed articles covering a variety of topics in clinical epidemiology, health services research, health technology assessment and health policy. He founded the web sites www.healthydebate.ca and www.facesofhealthcare.ca, and holds a Canada Research Chair in Health Policy and Citizen Engagement.

He has served on numerous academic and governmental advisory committees and currently is the board chair for Health Quality Ontario. Dr. Laupacis has been awarded the Justice Emmett Hall Laureate (2010), the Health Services Research Advancement Award from the Canadian Health Services Research Foundation (2011), the CIHR's Barer-Flood Prize in Health Services and Policy Research (2013), the University of Toronto President's Impact Award (2018), the Carolyn Tuohy Impact on Public Policy Award, University of Toronto (2018) and the FNG Starr Award of the Canadian Medical Association (2018). He is a Fellow of the Royal Society of Canada (2015).

Dr. Najma Ahmed

Dr. Ahmed completed Medical School and General Surgery Residency at McGill University. She holds a PhD in Surgical Infections and Sepsis which was completed during her surgical residency. Following her residency she pursued fellowship training in Trauma Surgery and Critical Care at the University of Michigan and the University of Toronto.

Najma was recruited to St. Michael's Hospital in the Division of General Surgery in 2001. Her clinical focus and practice is in Acute Care Surgery, Trauma and Critical Care. She has been committed to clinical training processes and outcomes since the beginning of her career. From 2008 until 2018, Najma was the Residency Program Director for General Surgery, responsible for the largest and arguably most complex surgical training program in North America. Under her leadership the program became recognized as a highly functional, cohesive program focused on providing excellent learning opportunities for all learners.

Najma holds the positions of Vice Chair of education, Department of Surgery at U of T and Professor of Surgery. In this role, she provides visionary leadership for training success for medical students, residents and fellows, as well as career success of surgeon-teachers within the Department of Surgery. Her contributions to post graduate surgical education have been recognized by numerous awards, including the prestigious Royal College AMS/Donald Richards Wilson Award in 2016.

Her current scholarly activities relate to Resident duty hours, Resident wellness and the application of a competency based framework to surgical training. Recently she has become an advocate for safer gun legislation in Canada. Dr. Ahmed's daughter Izza is 14 years of age and attends Branksome Hall School.

ABSTRACT JUDGES

Basic Science Category	Dr. Haibo Zhang Dr. Warren Lee
Clinical Research/Health Services Research Category	Dr. Victoria McCredie Dr. Matteo Parotto Dr. Margaret Herridge
Physiology Category	Dr. Tài Pham Dr. Ewan Goligher Dr. Art Slutsky
Quality Category	Dr. Alberto Goffi Dr. Pat Murphy
Systematic Review/Case Report/Education Category	Dr. Laveena Munshi Dr. Briseida Mema Dr. Dominique Piquette

POSTER MODERATORS FOR ART SLUTSKY DAY

Basic Science Category I:	Dr. Haibo Zhang Dr. Claudia Dos Santos
Basic Science Category II:	Dr. Andrew Baker TBD
Clinical Research/Health Services Research Category I:	Dr. Laveena Munshi Dr. Hannah Wunsch
Clinical Research/Health Services Research Category II:	Dr. Haifa Mtaweh Dr. Matteo Parotto
Clinical Research/Health Services Research Category III:	Dr. John Granton Dr. Ewan Goligher
Clinical Research/Health Services Research Category IV:	Dr. Niall Ferguson Dr. Victoria McCredie

Physiology Category I:	Dr. Art Slutsky Dr. Gordon Rubenfeld
Quality Category I:	Dr. Gail Annich Dr. Lorenzo Delsorbo
Quality Category II:	Dr. Orla Smith TBD
Systematic Review/Case Report/Education Category I:	Dr. Shelly Dev Dr. Geeta Mehta
Systematic Review/Case Report/Education Category II:	Dr. Dominique Piquette Dr. Christie Lee

ORAL PRESENTATION JUDGES

Dr. Laurent Brochard	Dr. Elie Azoulay
Dr. Margaret Herridge	Dr. Hannah Wunsch

ORAL PRESENTATION 1

COMPLIANCE WITH EVIDENCE-BASED PROCESSES OF CARE AFTER TRANSITIONS BETWEEN STAFF INTENSIVISTS

F Angriman MD MPH1; R Pinto PhD2; JO Friedrich MD DPhil3;
N Ferguson MD MSc4,5; G Rubenfeld MD MSc1; ACKB Amaral MD1

1. Department of Critical Care Medicine, Sunnybrook Health Sciences Centre. Interdepartmental Division of Critical Care Medicine, Toronto, ON, Canada.
2. Department of Critical Care Medicine, Sunnybrook Health Sciences Centre, Toronto, ON, Canada.
3. Department of Critical Care and Medicine, St. Michael's Hospital, University of Toronto, Toronto, Ontario, Canada.
4. Interdepartmental Division of Critical Care Medicine, Departments of Medicine and Physiology, Institute for Health Management, Policy, and Evaluation, University of Toronto, Toronto, ON, Canada.
5. Division of Respirology, Department of Medicine, University Health Network and Sinai Health System, Toronto, ON, Canada.

Introduction and objective: evidence-based processes of care are ideal elements to be minimized during handovers since protocols usually drive their implementation. We sought to evaluate the impact of transitions of care between staff intensivists on the compliance with evidence-based processes of care.

Methods: using a cohort of mechanically ventilated adult patients from 6 teaching units enrolled in the Toronto Intensive Care Observational Registry (iCORE), we explored the effects of the weekly transition of care between staff intensivists on compliance with 3 evidence-based processes of care (spontaneous breathing trials, lung protective ventilation and neuromuscular blocking agents). Two practices that are less guided by protocols (early discontinuation of antibiotics and extubation attempts) served as positive controls. We conducted the analysis using generalized estimating equations to account for clustering at the patient level.

Results: the cohort consisted of 10570 patients admitted between June 2014 and August 2018. Compliance varied for each practice (63.6%, 42.5% and 21.1% for lung protective ventilation, spontaneous breathing trials and neuromuscular blockade, respectively). There was no effect of transitions of care on compliance with spontaneous breathing trials (OR: 1.00, 95%CI: 0.95 - 1.07), lung protective ventilation (OR: 1.07, 95%CI: 0.90 - 1.26) or neuromuscular blockade use (OR: 0.95, 95%CI: 0.75 - 1.20). However, early antibiotic discontinuation was more likely (OR: 1.23, 95%CI: 1.06 – 1.42) and extubation attempts were less frequent (OR: 0.77, 95%CI: 0.65 – 0.93) after a transition of care.

Conclusions: we observed no significant impact of transitions of care between individual staff physicians on evidence-based, protocolized processes of care for mechanically ventilated adult patients. However, transitions were associated with a lower likelihood of extubation and higher odds of earlier discontinuation of antibiotics.

Supported by: Dr. Angriman is partially supported by a Research Award from the Department of Critical Care at Sunnybrook Health Sciences Centre.

ORAL PRESENTATION 2

THE EFFECTS AND MECHANISMS OF OPTIMAL EPITHELIAL TENSION IN LUNG REPAIR AND REGENERATION

A Luo[1,2], N Comtois[1], RG Kim[1], XZ Zhou[2], EM Grande[3], C Sinderby[6], MY Liu[2-5,7], J Laffey[8], BM Hogan[9], AA Slutsky[1], H Zhang[1-6]

[1]The Keenan Research Centre for Biomedical Science of St. Michael's Hospital, Toronto, Canada; [2]Institute of Medical Science, University of Toronto, Toronto, Canada; Departments of [3]Physiology, [4]Medicine, [5]Interdepartmental Division of Critical Care Medicine, University of Toronto, Toronto, Canada; [6]Department of Anesthesia, St. Michael's Hospital, Toronto, Canada; [7]Department of Surgery, University Health Network, Toronto, Canada; [8]Department of Anaesthesia and Intensive Care Medicine, National University of Ireland, Galway, Ireland; [9]Department of Cell Biology, Duke University Medical Center, North Carolina, USA;

Introduction & objective: Cellular turnover is a homeostatic process whereby dying cells in an organ is replaced by newly divided cells. Adult lung normally has low turnover rates, however, in response to injury, the lung exhibits enhanced cell division whereby endogenous lung stem and progenitor cells proliferate to repair and regenerate the damaged tissue. Recent studies have shown that alveolar type II epithelial cells (AECII) are endogenous progenitors than can also differentiate into alveolar type I epithelial cells (AECI). In a mouse model of left pneumonectomy, ACEII in the remaining right healthy lung showed compensatory regeneration properties upon a higher mechanical tension that resulted in activation of the YAP/TAZ pathway through increased work of breathing. Unfortunately, in extensive lung injuries, such as acute respiratory distress syndrome (ARDS), whereby diffuse alveolar epithelial damage takes place, the ACEII regeneration mechanisms are impaired leading to the development of irreversible lung fibrosis. To reiterate the endogenous repair mechanism, we aim to use the non-invasive continuous positive airway pressure (CPAP) to induce optimal mechanical tension to enhance AECII turnover and thus lung repair and regeneration in a murine model of ARDS. To determine the specific signaling pathway in the tension (stretch)-induced AECII renewal and lung repair, we will use an in vitro stretch model in inducible pluripotent stem cell (iPSC)-derived AECII, a highly proliferative and viable cell type as opposite to primary AECII. We hypothesize that optimal mechanical tension imposed on AECII activates the hyaluronic acid (HA) co-receptor complex, CD44 and epidermal growth factor receptor 1 (EGFR), as upstream regulators of YAP/TAZ signaling, to elicit lung regeneration.

Methods: Male C57BL/6 mice and transgenic mice carrying red fluorescent protein (RFP)-labelled AECII, Sftpc-CreER^{T2}; Rosa-Tm (SPC-Cre), were instilled intratracheally with hydrochloric acid (HCl) to induce acute lung injury. CPAP was applied to the mice 48 h later at 0, 10, 20, or 30 cmH_2O for 5h per day for 4 consecutive days. Lung histology and immunological responses were assessed 48 h after the last CPAP application. The iPSC-derived AECII were mechanically stretched in vitro at 20% elongation and 0.33Hz for up to 72 h. Cell lysates and culture medium were used for examining activation of CD44/EGFR-TAZ/YAP signaling.

Results: The HCl-induced lung injury was confirmed by 1) an increase in lung injury score; 2) a decrease in PaO_2/FiO_2 at 24 h; and 3) neutrophil infiltration at 48 h, as compared to controls. Mice receiving 20 cmH_2O of CPAP showed a significant resolution in lung injury and fibrosis in comparison to mice with spontaneous breathing or receiving other levels of CPAP by day 7. These protective effects were associated with elevated numbers of AECII expressing surfactant protein C (SPC^+) and AECI expressing aquaporin 5 ($AQN5^+$), and decreased fibrotic formation (vimentin$^+$ cells). Lineage tracing in SPC-Cre mice showed that the increased epithelial repair and regeneration originated from endogenous AECII proliferation (SPC^+&$Ki67^+$ double positive cells) and AECII-derived AECI (RFP^+&$AQN5^+$ cells) under 20 cmH_2O of CPAP. The iPSC-derived AECII have been characterized and isolated using the markers of epithelial cell adhesion protein (EpCAM) and SPC. Ongoing experiments are conducted to assess the role of CD44/EGFR-YAP/TAZ in AECII-mediated lung regeneration.

Conclusion and significance of project: We have observed the beneficial effects of using optimal CPAP in lung repair and regeneration by enhancing AECII proliferation and differentiation into AECI in a mouse model of ARDS. We are concurrently investigating the in-depth mechanism in vitro to seek for future potential drug target in lung repair and regeneration by focusing on the novel HA/CD44/EGFR-TAZ/YAP signaling pathway. Intervention approaches will be tested in vivo conditions with the hope that our research results would lead to the development of novel cell therapies saving patients from the deadly ARDS.

Supported by: NSERC and CIHR

ORAL PRESENTATION 3

A BEDSIDE METHOD TO ASSESS LUNG RECRUITABILITY IN PATIENTS WITH ACUTE RESPIRATORY DISTRESS SYNDROM

L Chen[1], L Del Sorbo[1], DL Grieco[1], D Junhasavasdikul[1], M Sklar[1], N, Ferguson[1], E Fan[1], L Brochard[1]

1. Interdepartmental Division of Critical Care Medicine, University of Toronto, Toronto, Canada

Introduction & Objectives

Positive end-expiratory pressure (PEEP) is an essential treatment for patients with acute respiratory distress syndrome (ARDS) to reopen collapsed or flooded lung units. However, PEEP may also overdistend previously open lung units and/or worsen circulation. The individual response to PEEP varies depending on lung recruitability but assessing recruitability at the bedside is challenging (1). We have proposed a simple approach to estimate the recruited volume (ΔVrec) at the bedside, based on the hysteresis-like behavior, which requires only one prolonged expiration maneuver (2). We also propose to standardize the ΔVrec by the real change in pressure for assessing the lung recruitability, taking into account the possible presence of complete airway closure (3). This standardized ΔVrec is also defined as the compliance of the recruited lung (Crec) in our study. This study aims to validate an experimental method for measuring ΔVrec and calculating Crec; and to test whether Crec differentiate patients with different responses to PEEP.

Methods

Patients with moderate or severe ARDS were passively ventilated at two PEEP levels with a difference of 10 cmH_2O when possible (e.g., 15 vs. 5 cmH_2O). Respiratory mechanics, absolute lung volumes, and low-flow inflation pressure-volume curves were assessed at each PEEP levels. We used the multiple pressure-volume curves as the reference method (4). A reduction in lung volume between two PEEP levels at a given elastic pressure was measured as ΔVrec (4). The airway opening pressure (AOP) was also measured (3). The "real change in pressure" was not always 10 cmH2O but can be the difference between high PEEP and AOP in patients with complete airway closure (3). ΔVrec was thus standardized in mL per cmH_2O, termed as Crec. In other words, Crec was the ratio of recruited volume to the real change in pressure over which recruitment was assessed. To define lung recruitability, we arbitrarily divided patients into "high recruiters" and "low recruiters" by using the median of Crec. We then tested whether the patients have different response to PEEP in terms of gas exchange, mechanics, and circulation.

Results

Forty-five patients were enrolled. In four patients with airway closure, higher PEEP was insufficient to reopen airways and recruitment could not be assessed. In others, the experimental method (single breath) was strongly correlated with the reference method (multiple curves) in measuring ΔVrec and Crec ($P< 0.001$, $R^2= 0.798$ and 0.817, respectively). Bias in measuring Crec was -2 mL/cmH2O and limits of agreement were -14 to 10 mL/cmH2O (Figure 1). At PEEP of 15 cmH2O, only high recruiters had better oxygenation compared to lower PEEP 5 ($P = 0.020$), whereas only low recruiters experienced lower mean arterial pressure ($P = 0.009$).

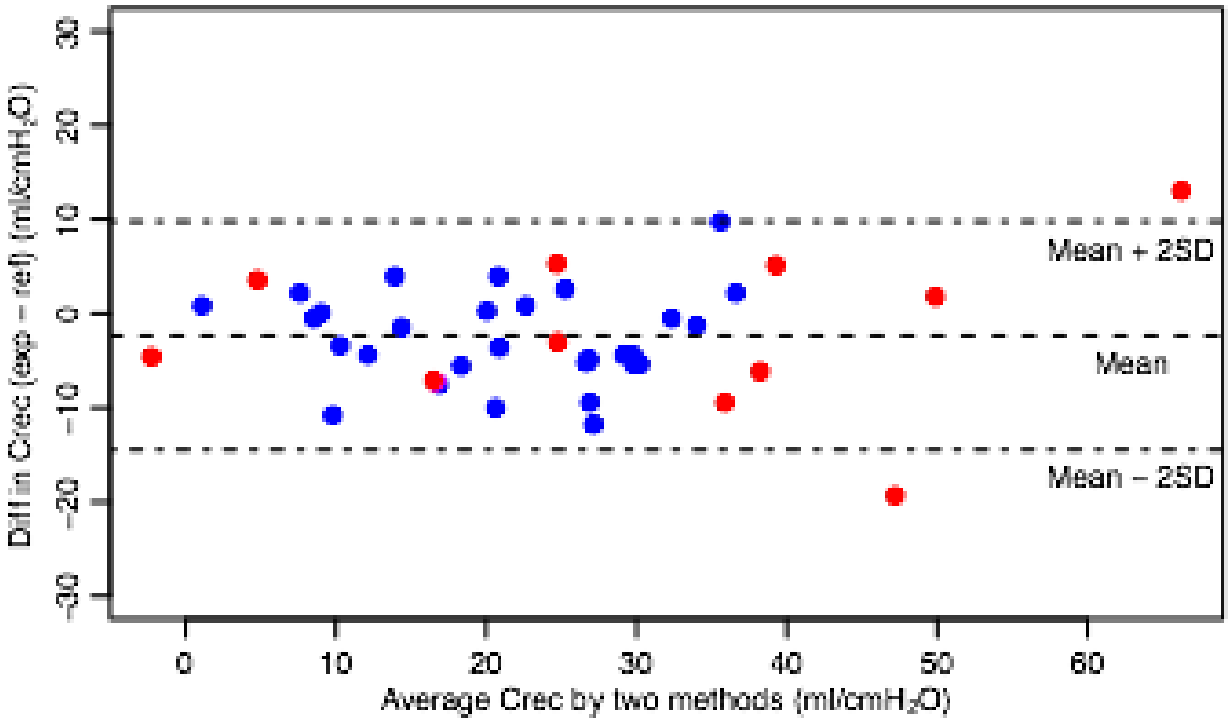
Conclusions

Our simple method can quantify both the recruited volume and the compliance of the recruited lung at the bedside, allowing clinicians to personalize PEEP based on lung recruitability.

References

1. Chen L, Brochard L. Lung volume assessment in acute respiratory distress syndrome. Curr Opin Crit Care 2015; 21: 259-264.
2. Chen L, Chen GQ, Shore K, Shklar O, Martins C, Devenyi B, Lindsay P, McPhail H, Lanys A, Soliman I, Tuma M, Kim M, Porretta K, Greco P, Every H, Hayes C, Baker A, Friedrich JO, Brochard L. Implementing a bedside assessment of respiratory mechanics in patients with acute respiratory distress syndrome. Crit Care 2017; 21: 84.
3. Chen L, Del Sorbo L, Grieco DL, Shklar O, Junhasavasdikul D, Telias I, Fan E, Brochard L. Airway Closure in Acute Respiratory Distress Syndrome: An Underestimated and Misinterpreted Phenomenon. Am J Respir Crit Care Med 2018; 197: 132-136.
4. Maggiore SM, Jonson B, Richard JC, Jaber S, Lemaire F, Brochard L. Alveolar derecruitment at decremental positive end-expiratory pressure levels in acute lung injury: comparison with the lower inflection point, oxygenation, and compliance. Am J Respir Crit Care Med 2001; 164: 795-801.

Figure 1. Bland-Altman plot for compliance of the recruited lung (Crec) measured by the experiment method vs. the reference method (N = 41). Blue dots represent patients without airway closure whereas red dots represents with airway closure.



ORAL PRESENTATION 4

ONE-YEAR FUNCTIONAL OUTCOMES IN LUNG TRANSPLANT PATIENTS AFTER 7 or MORE DAYS OF MECHANICAL-VENTILATION

D. Rozenberg[1], C. Chaparro[1], P. Robles[2], L. Chu[3], S. Burns[3], C. Thomas[3], A. Matte[3], G. Tomlinson[4], E. Merman[1], B. Andrade[1], L. Singer[1], S. Mathur[5], C. Chow[1], J. T. Granton[6], E. Fan[7], L. del Sorbo[3], S. Keshavjee[8], M. Cypel[8], J. Cameron[9], M. S. Herridge[6], and the RECOVER Program Investigators.

[1]Department of Respirology and Lung Transplant, University of Toronto and Toronto General Hospital-UHN, [2]Department of Critical Care, Toronto General Research Institute-UHN; [3]Department of Critical Care, Toronto General Hospital-UHN; [4]Departmentof Medicine- Biostatistics Research Unit, University of Toronto; 5Department of Physical Therapy, University of Toronto; [6]Department of Respirology and Critical Care, University of Toronto and Toronto General Hospital-UHN; [7] Department of Critical Care, University of Toronto and Mount Sinai Hospital; [8]Deparment of Thoracic Surgery, University of Toronto and Toronto General Hospital-UHN, Toronto; [9]Department of Occupational Therapy, University of Toronto.

Introduction & Objectives : Lung transplantation is increasingly offered to medically complex patients who may have less physiological reserve to tolerate peri-operative complications, which may result in a prolonged course of mechanical ventilation (MV). We sought to characterize the one-year functional and neuropsychological outcomes of lung transplant (LTx) recipients who sustained a prolonged course of MV (≥ 7 days). We hypothesized that LTx recipients who were older and spent a longer time in the intensive care unit (ICU) would have important functional and neuropsychological disability at one year after ICU discharge, comparable with the general medical and surgical ICU survivors from the main RECOVER multi-center Phase I cohort study.

Methods: This was a prospective study of Toronto LTx recipients (2009-2014) who had detailed functional and neuropsychological evaluations at 7 days, 3, 6 and 12 months after ICU discharge and as part of the RECOVER Program. The primary outcome was the Functional Independence Measure (FIM-comprised of 18 motor and cognitive domains of everyday activity) at 7 days after ICU discharge. Additional outcomes included: Six-minute walk distance (6MWD), Short-Form-36, Beck Depression Inventory-II (BDI-II) and Impact of Event Scale.

Results: 80 LTx recipients (49% male; median age 58 IQR [45-64] years, and 51% interstitial lung disease) were included. 72 (90%) recipients survived to ICU discharge with a median Multiple Organ Dysfunction Score of 7 IQR [5-8], 16 (22%) required renal replacement therapy, and had a median ICU length of stay of 24 IQR [17-37] days. At 7-days post-ICU, participants required maximal to total assistance (total FIM; 62 ± 23), with the greatest increase in total FIM post-ICU observed from 7 days to 3 months (62 ± 23 vs. 111 ± 21, $p < 0.0001$), with no further increase to 1 year (112 ± 21, $p = 0.86$). Patient age (β= - 6.4 95% (-9.9 to -2.9) per 10 years) and ICU length of stay (β= - 6.8 95% (-12.2 to -1.3) per log2) were the only significant determinants of the 7 day FIM. Motor tasks (climbing stairs, walking, and bathing), bowel management, and cognitive domains (comprehension and memory) were most affected at 12-months. At one-year post-ICU, 61 (76%) were alive with the mean 6MWD of 434 m (79% of predicted distance) and mean SF-36 Physical and Mental Component Scores of 38 ± 12 and 48 ± 12, respectively, with population normative scores of 50. Moderate-severe depressive symptoms were reported by 4/28 (14%) and symptoms of significant PTSD described by 5/28 (18%) LTx recipients.

Conclusion: LTx recipients who required ≥ 1 week of MV demonstrated significant functional dependency at 7 days after ICU discharge with the major determinants being patient age and ICU length of stay. Patients experienced important recovery to 3 months post-ICU, but many had limitations with daily motor and cognitive tasks at one year. These findings may help inform specific rehabilitation interventions to mitigate this disability and also aid with discussions among the transplant team, patients, and their families about the clinical implications of prolonged MV peri-operatively.

Supported by: CIHR, Ontario Ministry of Health Innovation Fund, Department of Medicine Challenge Fund-University of Toronto, John and Gail MacNaughton Family, John and Jane Luck Family, Andrea Chan and Jason Tham Family. D. Rozenberg receives support from the Sandra Faire and Ivan Fecan Professorship in Rehabilitation Medicine.

ORAL PRESENTATION 5

DECREASED BASELINE DIAPHRAGM THICKNESS INDEPENDENTLY PREDICTS INCREASED RISK OF MORBIDITY AND MORTALITY IN MECHANICALLY VENTILATED PATIENTS

MC Sklar[1], M Dres[2,3], E Fan[1,4,5,6], GD Rubenfeld[1,4,5,7], DC Scales[1,4,5,7], MS Herridge[1,4,5,8], N Rittayamai[2], D Brace[2], WD Reid[1,9], G Tomlinson[4], D Rozenberg[4], BP Kavanagh[1,10,11,12,], LJ Brochard[1,2,4], ND Ferguson[1,4,5,6,8,10] and EC Goligher[1,4,6,8,10]

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3 Respiratory and Critical Care Department, Groupe Hospitalier Pitie Salpetriere Charles Foix, Assistance Publique Hopitaux^ de Paris, Paris, France
4 Department of Medicine, University of Toronto
5 Institute for Health Policy, Management, and Evaluation, University of Toronto
6 Division of Respirology, Department of Medicine, University Health Network and Mount Sinai Hospital, Toronto, Canada
7 Department of Critical Care Medicine, Sunnybrook Health Science Centre, Toronto, Canada
8 Toronto General Research Institute, Toronto, Canada
9 Department of Physical Therapy, University of Toronto, Toronto, Canada
10 Department of Physiology, University of Toronto
11 Department of Anesthesia, University of Toronto
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Rationale: Changes in diaphragm thickness (Tdi) during mechanical ventilation (MV) are frequent and are associated with prolonged ventilation and poor outcomes (1, 2). Given that Tdi at baseline may reflect general health status or baseline diaphragm function we set out to determine whether Tdi measured soon after initiation of MV predicts clinical outcomes or changes in Tdi during ventilation We hypothesized that lower baseline Tdi was associated with worse clinical outcomes.

Methods: Prospective observational cohort study conducted in three academic intensive care units (ICU)s in Toronto. Patients were eligible for enrolment if they were ventilated <36 hours and if they were expected to remain intubated for >24 hours after screening. Right Tdi was measured at baseline and daily by validated ultrasound techniques (3). Patients were followed until hospital discharge for clinical outcomes (duration of MV, prolonged MV > 14 days, hospital and ICU length of stay, hospital and ICU mortality, reintubation and tracheostomy rates). Association between baseline Tdi and outcomes was evaluated by bivariate analyses. The association between baseline Tdi and the time to liberation from ventilation was assessed in a Fine-Gray competing risks regression model to account for the competing risk of death.

Results: 213 patients were included with a mean age of 59 (SD 15) years. 61% of patients were male; the median baseline SOFA score was 10 (8-13). The median baseline Tdi was 2.3 (IQR 2.0-2.7) mm. Compared to patients with baseline Tdi >2.3mm (n= 97), those with Tdi ≤2.3mm (n=116) had increased in-hospital mortality (44% vs 25%, P=0.009), fewer ventilator-free days at 60 days (median 38 IQR (0-54) vs 52 IQR (29-56), p=0.01), higher rates of prolonged MV (>14 days) (43 vs. 20%, p=0.01), and more complications of acute respiratory failure (composite of death, reintubation, tracheostomy, MV >14 days) (66% vs 45%, p=0.004, table 1). The association with prolonged ventilation persisted after adjusting for age, comorbidity, duration of hospitalization prior to ventilation, and severity of illness (Figure 1, Fine-Gray HR for liberation 1.50, 95% CI 1.05-2.13, p=0.02). Patients with baseline Tdi > 2.3mm exhibited a progressive decrease in Tdi over time, but patients with a lower baseline Tdi did not (Figure 2, p <0.001 for difference between subgroups).

Conclusion: Higher baseline Tdi is associated with better clinical outcomes but also greater susceptibility to progressive diaphragm atrophy during mechanical ventilation. Although this association is not necessarily causal, increasing diaphragm bulk by muscle training prior to planned major surgery or transplantation may potentially shorten the duration of post-operative mechanical ventilation.

ORAL PRESENTATION 6

OPTIMAL STRATEGY AND TIMING OF LEFT VENTRICULAR VENTING DURING VENO-ARTERIAL EXTRACORPOREAL LIFE SUPPOR FOR ADULTS IN CARDIOGENIC SHOCK
A SYSTEMATIC REVIEW AND META-ANALYSIS

A Al-Fares[1,2,5], VK Randhawa[6], M Englesakis[3], MA McDonald[4], AD Nagpal[8], J Estep[6], E Soltesz[7], and E Fan[1,2]

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INTRODUCTION AND OBJECTIVE

Veno-arterial extracorporeal life support (VA-ECLS) is widely used to treat refractory cardiogenic shock. However, increased left ventricular (LV) afterload in VA-ECLS can lead to LV distension and stasis, which in turn may exacerbate myocardial ischemia, arrhythmias, pulmonary edema, thrombo-embolic phenomenon and timely myocardial recovery. The purpose of this meta-analysis was to explore the efficacy, safety, and optimal timing of adjunctive LV unloading strategies.

METHODS

A systematic search was performed of Medline, EMBASE, PubMed, CDSR, CCRCT, CINAHL, ClinicalTrials.Gov, and WHO ICTRP from inception until January 2019 for all relevant studies including LV venting in accordance PRISMA protocols. Data were analysed for mortality and wean from VA-ECLS on the basis of timing of LV venting (< 12hrs or >12hrs). All eligible studies were assessed for methodological quality using the ROBINS-I tool. Statistical heterogeneity for the outcomes among studies was assessed using the I^2-test and reporting biases using funnel plots of the treatment effect against study precision. Inverse variance, random effects model was used to account for between-study heterogeneity and assess the overall risk ratio. Pooled data were summarized using either means or medians (and interquartile range) for continuous parametric and non-parametric variables, respectively and categorical variables were reported as counts and percentages. P values < 0.05 by chi-squared test for difference in proportions or two-sided t-test for continuous variables, were considered statistically significant.

RESULTS

A total of 7,995 patients were included from 62 observational studies, wherein 3,458 patients had LV venting during VA-ECLS. LV venting significantly improved wean from VA-ECLS (OR 0.62; 95% CI 0.47-0.83; p=0.001) and reduced short-term 30-day (RR 0.86; 95% CI 0.77-0.96; p=0.008) but not in-hospital (RR 0.92; 95% CI 0.83-1.01; p=0.09) or long-term up to 6 months (RR 0.96; 95% CI 0.90-1.03; p=0.27) mortality (**Figure 1**). Early (<12h, RR 0.86; 95% CI 0.75-0.99; p=0.03) but not late (>12h, RR 0.99; 95% CI 0.71-1.38; p=0.93) LV venting significantly reduced short-term mortality. Moreover, a significant improvement in wean from VA-ECLS overall (OR 0.62; 95% CI 0.47-0.83; p=0.001) and with early (OR 0.68; 95% CI 0.50-0.91; p=0.005), but not late (OR 1.21; 95% CI 0.19-7.57; p=0.84) LV venting. Patients with LV venting spent more time on VA-ECLS (3.6 vs. 2.8 days, p<0.001), and mechanical ventilation (7.1 vs. 4.6 days, p=0.013) (**Table 1**).

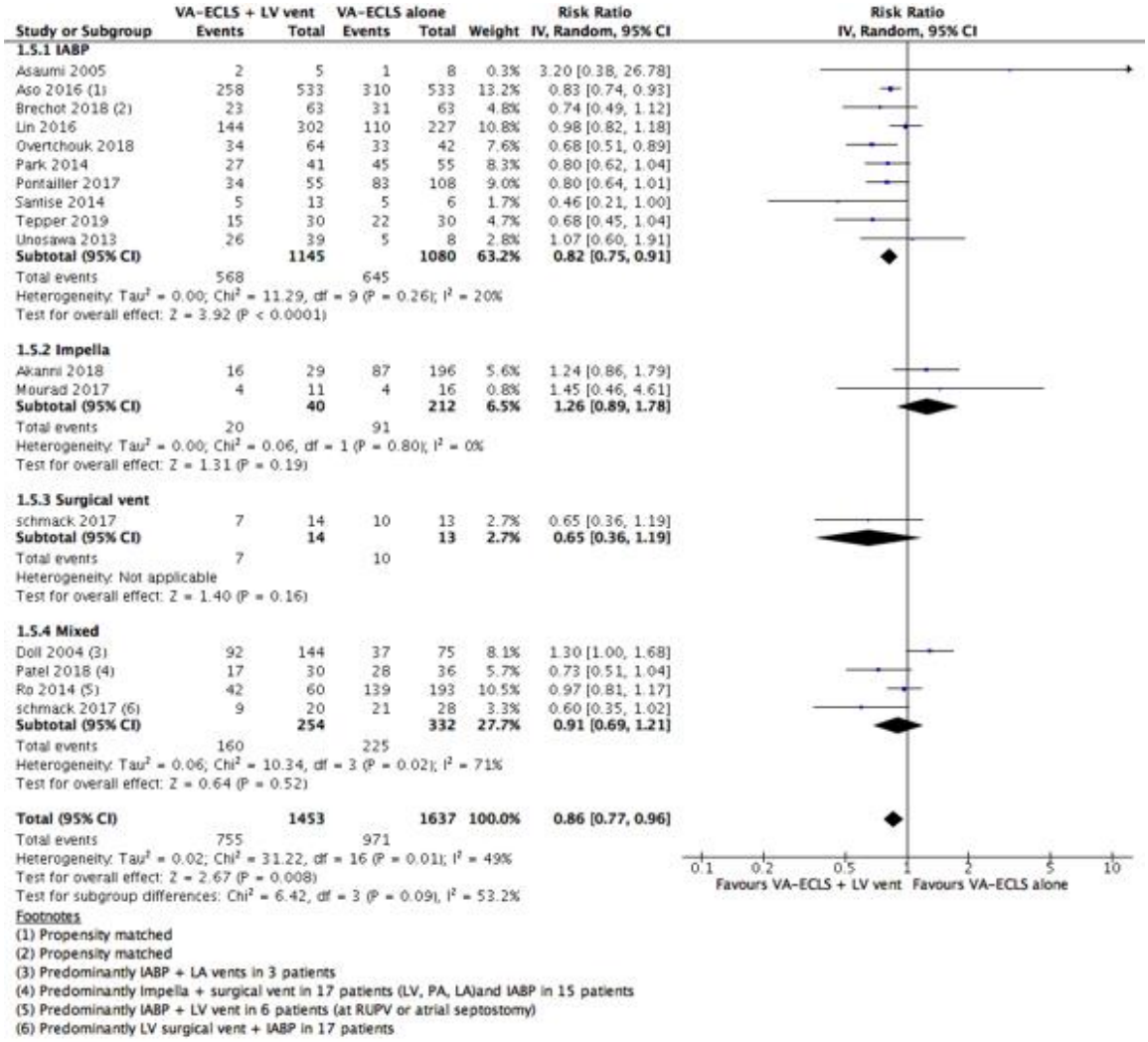
CONCLUSIONS

LV venting, especially if done early (<12h), appears to improve wean from ECLS and reduce short-term but not in-hospital or long-term mortality. Future studies are required to explore the full impact of any or early LV adjuncts on mortality and morbidity outcomes.

Table 1 - Baseline characteristics, destination therapy, and mortality in patients on VA-ECLS with or without LV venting

	Studies reporting on venting only (n. 25)	Studies reporting on venting vs. non- venting (n. 36)			P value[†]
		Total	Vent	non-vent	
Number of patients, n (%)	666/1523 (44%)	6472	2792/6472 (43%)	3680/6472 (57%)	
Gender (male), n (%)	392/526 (74.5%)	2874/4071 (70.6%)	1256/1684 (74.6%)	1618/2387 (67.8%)	<0.01
Age, mean years (n)	54.3 (550)	55.6 (1892)	56.1 (715)	55.1 (1177)	0.001
Weaned from VA-ECLS, n (%)	208/408 (51%)	2091/3753 (55.7%)	1068/1562 (68.4%)	1023/2191 (46.7%)	<0.01
Duration of VA-ECLS, mean days (n)	6.0 (480)	3.2 (4052)	3.6 (1758)	2.8 (2294)	<0.01
Duration of MV, mean days (n)	8.4 (97)	5.8 (594)	7.1 (264)	4.6 (330)	0.01
ICU Length of Stay, mean days (n)	15 (221)	12.6 (1124)	13 (574)	12.3 (550)	NS
Bridge to, n (%)					
Recovery	172/393 (43.8%)	692/1644 (42.1%)	339/715 (47.4%)	353/929 (38%)	0.001
VAD	56/424 (13.2%)	195/1453 (13.4%)	85/599 (14.2%)	110/854 (12.9%)	NS
Transplant	22/330 (6.7%)	40/631 (6.3%)	20/347 (5.8%)	20/284 (7%)	NS
All-cause mortality, n (%)					
Short-term	163/298 (54.7%)	2157/3825 (56.4%)	797/1565 (50.9%)	1360/2260 (60.2%)	<0.01
In-hospital	229/377 (60.7%)	3409/5424 (62.9%)	1308/2173 (60.2%)	2101/3251 (64.6%)	0.001
Long-term	90/142 (63.4%)	685/830 (82.5%)	416/510 (81.6%)	269/320 (84.1%)	NS

[†]chi-squared test for difference in proportions, two-sided t test for continuous variables
VA-ECLS = veno-arterial extracorporeal life support, LV = left ventricle, VAD = ventricular assist device, MV = mechanical ventilation, ICU = intensive care unit.



Footnotes
(1) Propensity matched
(2) Propensity matched
(3) Predominantly IABP + LA vents in 3 patients
(4) Predominantly Impella + surgical vent in 17 patients (LV, PA, LA)and IABP in 15 patients
(5) Predominantly IABP + LV vent in 6 patients (at RUPV or atrial septostomy)
(6) Predominantly LV surgical vent + IABP in 17 patients

Figure 1a - Short-term (up to 30 days) mortality

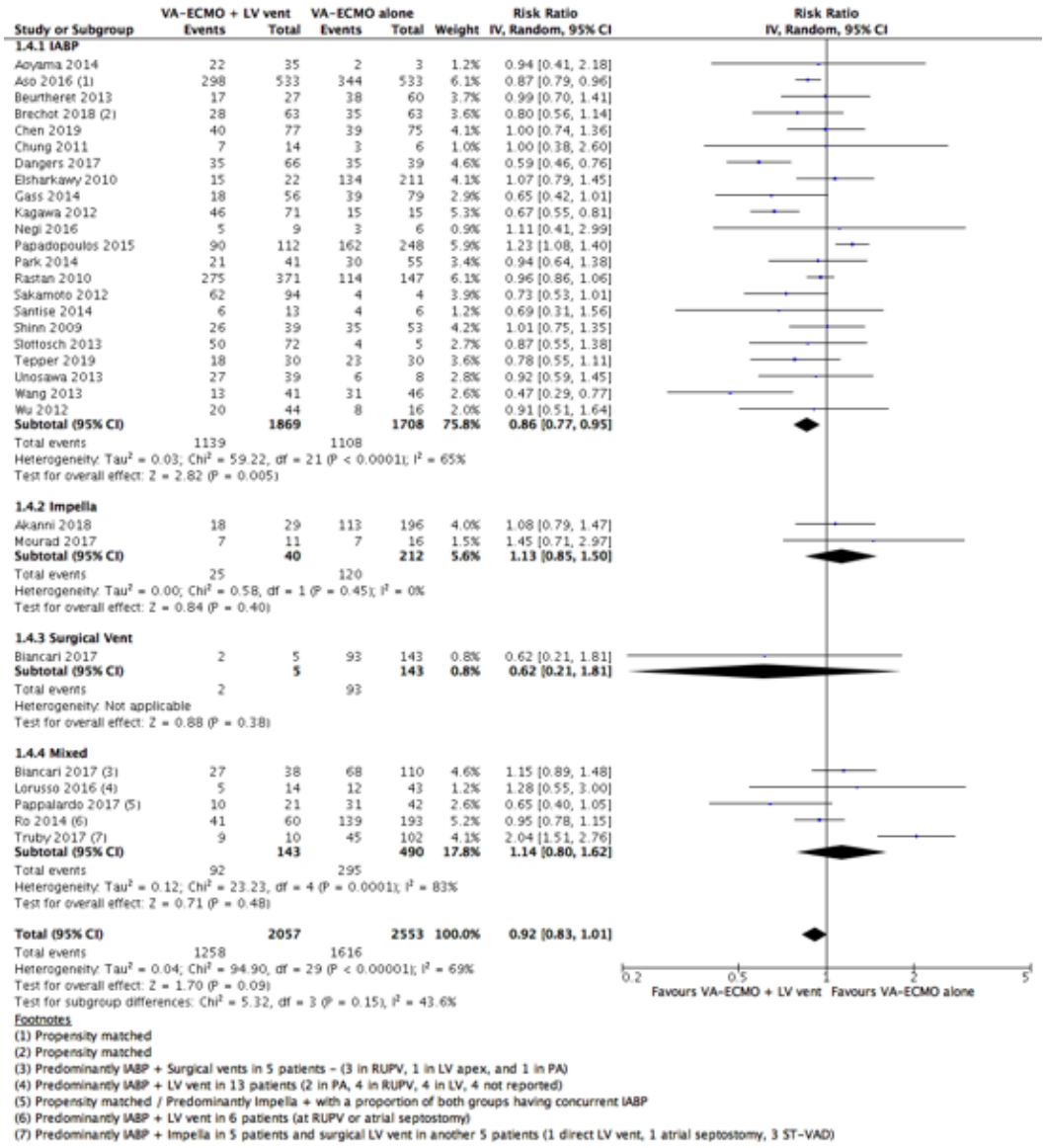


Figure 1b – In-hospital mortality

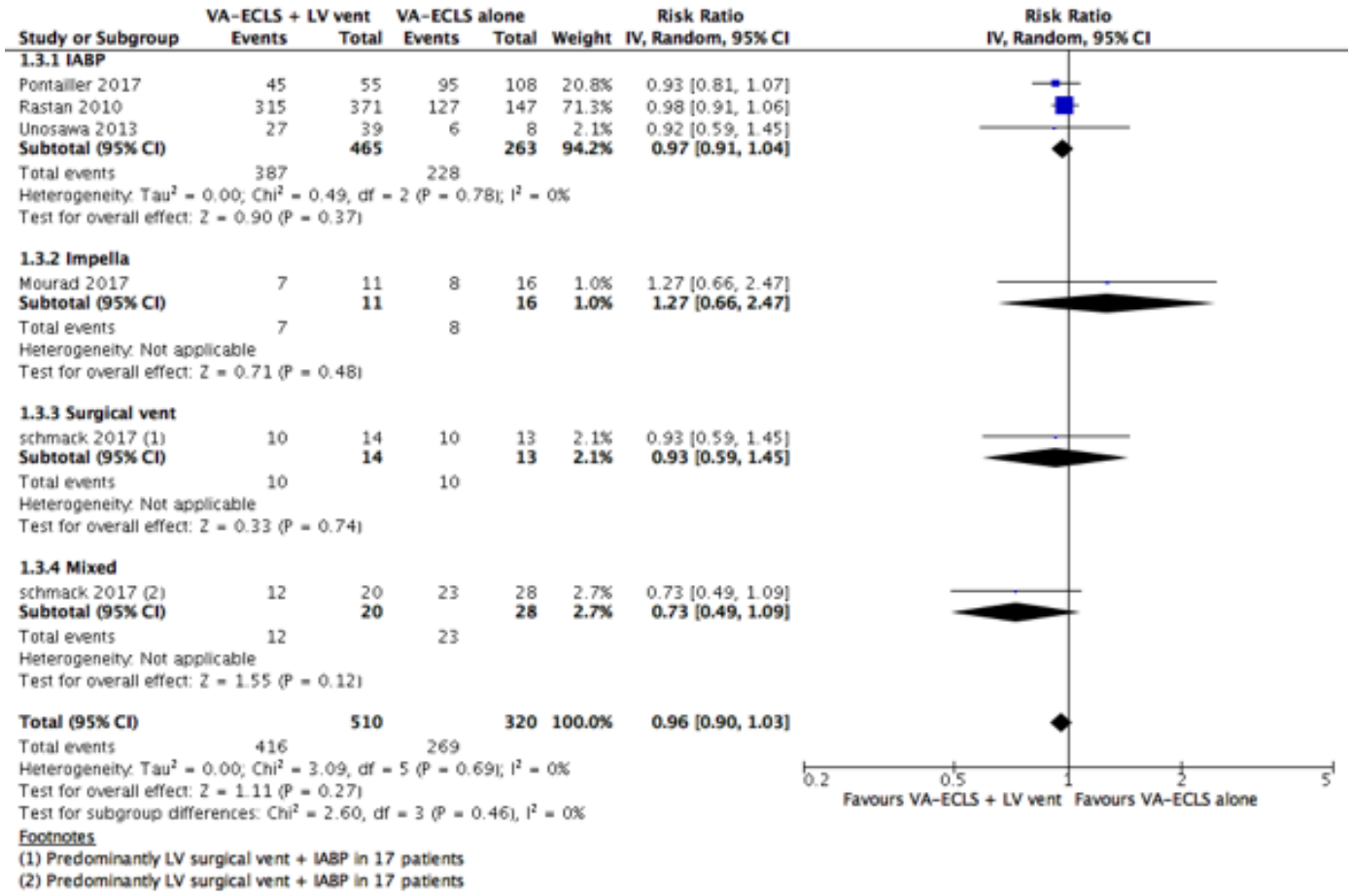


Figure 1c - Long-term (up to 6 months) mortality

Figure 1 illustrates the all-cause mortality outcomes in relation to LV venting during VA-ECLS.

ORAL PRESENTATION 7

OFFSITE AND HOME VISITS FOR SURVIVORS OF CRITICAL ILLNESS

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Introduction and Objective: Survivors of critical illness have long-term functional limitation and neuropsychological dysfunction described in many international cohorts including the Toronto 5-Year ARDS outcomes study and Canadian RECOVER Program. Patients may benefit from a continuum of care that includes follow up after ICU and hospital discharge. However, attending office visits may be challenging given patients' functional dependency and limited financial or social resources. We hypothesized that patients who are unable to attend clinic visits and who require an off-site visit will be older, have greater ICU severity of illness, longer ICU and hospital length of stay (LOS), more functional dependency, and compromised health-related quality of life (HRQOL) and exercise capacity.

Methods: We conducted a post hoc subgroup analysis using the RECOVER Program (Phase I) dataset (n=391). ICU survivors who received at least one off-site visit at 3 and 6 months after ICU discharge were characterized and compared to those who received on-site visits with respect to the following: sex, level of education, Charlson Comorbidity Index (CCI), APACHE II, exercise capacity (6-minute walk test; 6MWT), functional dependency (Functional Independence Measure; FIM), and HRQOL (Short-Form 36 Survey; SF-36). Continuous and categorical variables were assessed with the Wilcoxon Rank-Sum Test and the Chi-Squared Test, respectively. Data are expressed as median values with interquartile ranges.

Results: At 3 months after ICU discharge, patients requiring offsite visits (n=85) compared to those able to attend clinic visits (n=124) had higher APACHE II scores (20 vs 22, p=0.03), greater functional dependency (FIM, 51 vs 84, p<0.0001), and more compromised HRQOL (SF-36, 30.1 vs 34.8, p=0.02). Similarly, at 6 months following ICU discharge both FIM (34 vs 85.5, p<0.0001) and SF-36 (27.2 vs 36.5, p=0.01) were more compromised in patients receiving off-site visits compared to on-site. There were no between-group differences in education, ICU LOS, and the CCI at these same follow-up times and, of interest, 6MWT did not discriminate between these groups.

Conclusions: These data provide potentially valuable insight into factors influencing patient retention in longitudinal follow-up care. Indeed, the need for off-site/home visits may identify patients with the most functional dependency and medical complexity - not exercise restriction in isolation - demonstrated by the discordance between FIM/SF-36 and 6MW distance. These observations may inform future rehabilitation and continuum of care pathways that incorporate off-site/home visits to optimize healthcare utilization and patient-centered outcomes after critical illness.

ORAL PRESENTATION 8

INFLUENCE OF BODY MASS INDEX ON RESPIRATORY MECHANICS IN ACUTE RESPIRATORY DISTRESS SYNDROME: A MULTICENTER COHORT STUDY.

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Introduction & Objective

Overweight and obesity are increasingly prevalent worldwide and account for about 30-40% of patients with acute respiratory distress syndrome (ARDS). How body mass index (BMI) influences respiratory mechanics in ARDS is unclear. Our objective is to compare the respiratory mechanics of obese and non-obese ARDS and assess the influence of BMI on respiratory mechanics and lung volumes.

Methods

This study is a secondary analysis of 2 cohorts of ARDS according to the Berlin definition: a bicenter Canadian study of 45 ARDS of any BMI enrolled in a prospective study (NCT02457741), and a French monocenter cohort of selected ARDS with a BMI > 40 kg/m^2. Airway pressure, flow and esophageal pressure were collected in all patients and we report data at a set positive end-expiratory pressure (PEEP) of 5 cmH_2O. Presence of complete airway closure and airway opening pressure were assessed using a low-flow inflation pressure-volume curve.[1] End expiratory lung volume (EELV) was measured using the nitrogen washout/washin technique. The ratio EELV to predicted functional residual capacity was calculated.[2]
Patients were sorted in 3 groups according to the World Health Organization overweight classification (BMI < 30, from 30 to < 40, and ≥ 40 kg/m^2).

Results

Among the 54 patients included, 18 patients (34%) had BMI < 30 kg/m^2, 16 (30%) between 30 and 40 kg/m^2, and 19 (36%) ≥ 40 kg/m^2. The median PaO_2/FiO_2 was 138 mmHg with a PEEP of 15 cmH_2O, and mortality was 32% without difference across groups.
Airway closure occurrence increased with BMI (22%, 38% and 58%, p= 0.04). When present, airway opening pressure was 9.6 cmH_2O (8.5-13.2) and similar between the 3 groups. With increasing BMI, total PEEP increased from 6.0 to 9.0 cmH_2O between groups (p= 0.02). All values of esophageal pressure increased with BMI.

End-expiratory esophageal pressure was strongly correlated with BMI (rho= 0.71, p<0.001), as illustrated in Figure 1. Consequently end-expiratory transpulmonary pressure decreased from -2.7 to -9.3 cm H_2O with increasing BMI (p= 0.008). The ratio of EELV to predicted functional residual capacity was negatively correlated with end-expiratory pressure (Rho= -0.39, p= 0.01), but not with BMI.
Driving pressure and elastance of the respiratory system, chest wall and lung were similar across all ranges of BMI. Likewise, EELV was similar between groups.

Conclusion

In ARDS, increasing BMI is associated with increased occurrence of airway closure and increased values of esophageal pressure. Conversely, chest wall elastance is not influenced by BMI, as well as lung elastance. Including BMI in interpreting respiratory mechanics in ARDS patients can provide additional information for the clinical management.

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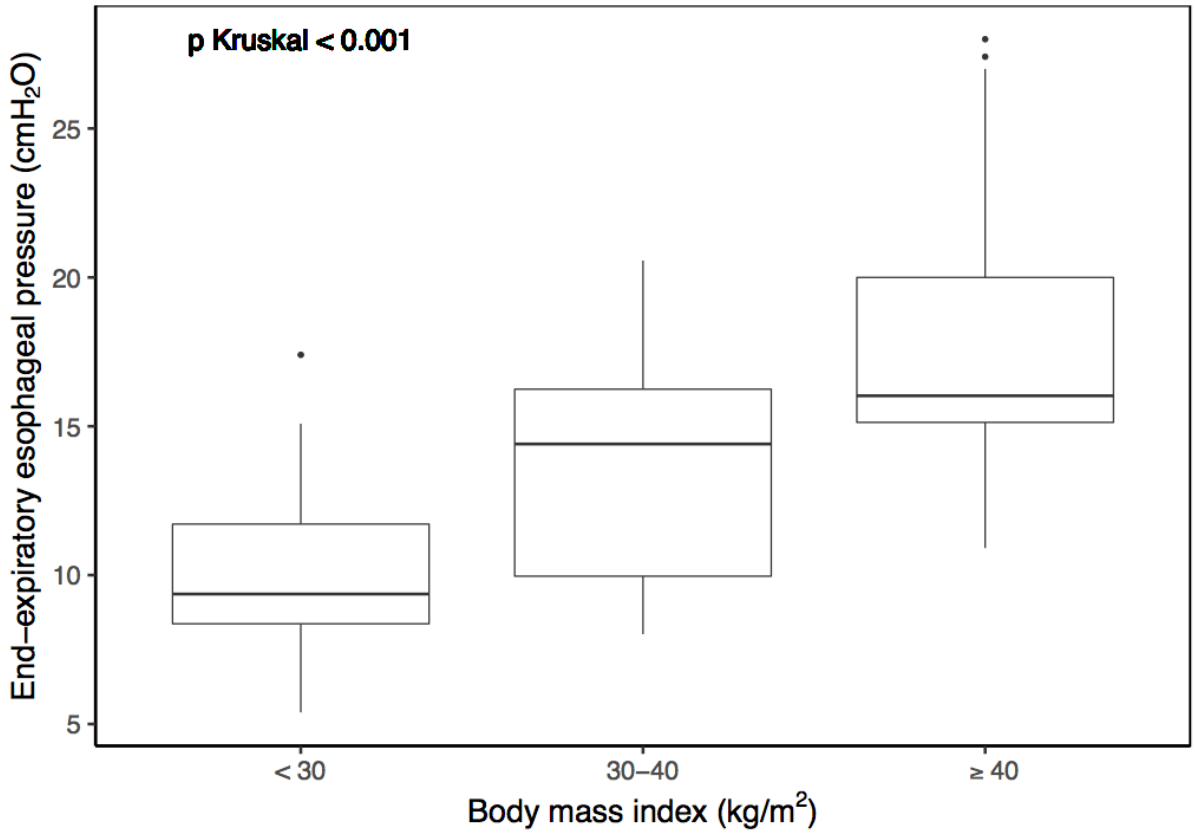

Figure 1. Evolution of end-expiratory esophageal pressure measured at a set positive end-expiratory pressure of 5 cmH_2O according to body mass index.

ORAL PRESENTATION 9

ASSOCIATION BETWEEN ETHNICITY AND END-OF-LIFE CARE

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Introduction and Objective: The social determinants of health, including ethnicity and race, influence end-of-life care. Most studies have compared end-of-life care of African-, Hispanic- and Caucasian-Americans, with few quantitative studies investigating how care may differ for other large ethnic minority groups or for patients outside the United States of America. Previous research in Ontario, Canada showed that recently immigrated decedents from South Asia and East Asia experienced more aggressive end-of-life care than longstanding resident decedents, which may be confounded by decedent ethnicity. Differences in end-of-life care by ethnicity may represent an opportunity to improve healthcare quality and equity; therefore, we analyzed end-of-life care according to decedent ethnicity.

Methods: This population-based cohort study included all people who died in Ontario, Canada between April 1 2004 and March 31 2015. People were identified as having Chinese ethnicity or South Asian ethnicity based on a validated surname algorithm. Modified Poisson regression analyses were used to assess location of death and care received in the last six months of life.

Results: We analyzed 967,339 people of whom 99,783 (10%) died in intensive care. Decedents of Chinese ethnicity (18,959, 2%) and South Asian ethnicity (11,406, 1.2%) were overall more likely to die in intensive care than general population decedents: 14% for Chinese decedents and 18% for South Asian decedents compared to 10% for general population decedents. After adjustment for age, sex, socioeconomic position, causes of death, urban and rural residence, and immigration status the relative risk (RR) of dying in intensive care was 1.21 (95%CI 1.15-1.27) comparing Chinese to general population decedents and 1.25 (95%CI 1.20-1.30) comparing South Asian to general population decedents. In their last six months of life, decedents of Chinese and South Asian ethnicity experienced more intensive care unit admission, hospital admission, mechanical ventilation, dialysis, percutaneous feeding tube placement, tracheostomy, and cardiopulmonary resuscitation (CPR).

Conclusions: Among decedents in Ontario, those with Chinese and South Asian ethnicity were significantly more likely to receive aggressive care and to die in an intensive care unit compared with decedents from the general population. These data demonstrate differences in end-of-life care by ethnicity and raise the possibility of differences in preferences of people or their substitute decision-makers, differences in health literacy, differences in decision-making or communication by health care professionals, or differences in access to home-based palliative care.

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P2 **MS Colomina**, SERUM SOLUBLE RECEPTOR FOR ADVANCED GLYCATION END- PRODUCTS (RAGE) AS A PULMONARY INFLAMMATORY BIOMARKER IN BRONCHIOLITIS

P3 **M Gupta,** IDENTIFICATION OF NOVEL MICRORNAS (MIRS) REGULATING SKELETAL MUSCLE REGENERATION IN SUSTAINED ICUAW.

P4 **S Gupta**, TYROSINE PHOSPHORYLATION OF CASPASE-8 INDUCES CELL ACTIVATION THROUGH TLR4 DEPENDENT SIGNALING IN SEPTIC NEUTROPHILS

Basic Science Category II

P5 **R Kim,** GENERATION OF PHENOTYPE-STABLE ALVEOLAR EPITHELIAL TYPE II CELLS FROM HUMAN INDUCED PLURIPOTENT STEM CELLS

P6 **E Liu,** EFFECTS OF HUMAN UMBILICAL CORD PERIVASCULAR CELL-CONDITIONED MEDIA IN AN ADULT ZEBRAFISH MODEL OF TRAUMATIC BRAIN INJURY

P7 **M Jerkic,** OVEREXPRESSION OF IL-10 ENHANCES EFFICACY OF HUMAN UMBILICAL CORD MESENCHYMAL STROMAL/STEM CELLS IN RODENT E. COLI PNEUMONIA

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P10 **K Osada,** PRONE POSITION ENHANCES REGIONAL HOMOGENEITY AT HIGH AND LOW PEEP ASSESSED BY DIRECT PLEURAL PRESSURE MEASUREMENT

P11 **T Piraino,** A NEW EXPERIMENTAL MODEL FOR TESTING VENTILATORY STRATEGIES FOR THE ACUTE RESPIRATORY DISTRESS SYNDROME: THE THIEL CADAVER

P12 **A Schreiber,** MEASURING ABDOMINAL MUSCLE FUNCTION BT ABDOMINAL MUSCLE THICKENING ON ULTRASOUND: REPRODUCIBILITY, VALIDITY AND NORMAL RANGE VALUES

P13 **I Telias,** ACCEPTABLE RANGE OF INSPIRATORY EFFORT DURING MECHANICAL VENTILATION. THE EFFORT STUDY.

P14 **B Zhang,** A COMPREHENSIVE PHYSIOLOGICAL MODEL FOR A LUNG- AND DIAPHRAGM-PROTECTIVE MECHANICAL VENTILATION DECISION SUPPORT SYSTEM

Quality Category I

P15 **A Assadi,** APPLYING CLINICIAN MACROCOGNITION IN DESIGNING A CLINICAL DECISION SUPPORT TOOL – THE METHODOLOGY

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P18 **M Gaetani,** THE ERROR-BERG: RE-CONCEPTUALIZING MEDICAL ERROR AS A TOOL FOR QUALITY AND SAFETY

Quality Category II

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