Western Research

HSREB Initial Application

1.1

1.1 *If this is the first time you are submitting this particular application to the REB, select “Initial Submission”. If this application form has already been reviewed by the REB and they issued recommendations, select “Response to REB recommendations”:

- ○ Initial Submission
- ◉ Response to REB recommendations

1.2

1.2 *Does this study involve the London hospitals (see HELP text if you are unsure):

- ○ No this study does not involve the London hospitals
- ◉ Yes this study involves the London hospitals and this form has been exported from ReDA.
- ○ This study involves the London Hospitals but a ReDA application has not been completed. NOTE: You cannot submit this application until the ReDA application has FIRST been completed and you exported from ReDA to WREM.

*What is the Lawson ReDA number associated with this study?

9889

*As this study IS taking place in the hospital, copy and paste: lawsonapproval@lawsonresearch.com in the below email text box:

Email: lawsonapproval@lawsonresearch.com

1.3

Once the PI is added to this form you MUST also add them into the ROLES tile (See ROLES tile in the actions items on the left hand side of your screen).

1.3 Use the Search field to enter the Principal Investigator (PI) details from the WREM user directory:

*Prefix	*First Name	*Last Name
Dr.	Tarek	Loubani

Address	800 Commissioners Road East
	PO Box 5010, Stn B
City	London
Province/State	Ontario
Postcode/Zip	N6A 5W9
Telephone	519-685-8500 x76538
*Email	tarek.loubani@lhsc.on.ca

*Indicate the PI's Western Academic Faculty/Department:

Schulich-Medicine-Emergency Medicine

Indicate the PI's Hospital Department/Division:

Emergency Medicine-Adult

1.4

Once study team members are added to this form you MUST also add them into the ROLES tile (See ROLES tile in the action items on the left hand side of your screen).

1.4 *Are there any additional study team members (incl. students, postdocs, coordinators, managers, etc.) from Western and/or its affiliate institutions working on this study?

- (•) Yes there are additional study team members
- ( ) No other study team members involved

1.4 *Complete the following information for additional study team members (from Western and or its affiliate institutions) who are

working on this study:

Prefix	*First Name	*Last Name
Ms	Chelsea	Darling

Address: 800 Commissioners Rd E

City: London

Province/State: Ontario

Postcode/Zip: N6A5WL

Telephone: 519.685.8500 ext. 57956

*Email: chelsea.darling@lhsc.on.ca

1.4 Specify ROLE, DUTIES, and DEPARTMENT/FACULTY. (E.g. John Doe - Research Assistant - responsible for recruitment, interviews and analysis of data; Psychology/Social Sciences.):

Research coordinator - responsible for managing overall flow of study, ensuring compliance with Health Canada and LHRI requirements, maintaining data; Emergency Medicine

1.4a *Are there any additional study team members (incl. students, postdocs, coordinators, managers, etc.) from Western and/or its affiliate institutions working on this study?

- (•) Yes there are other study team members
- ( ) No other study team members

1.4a *Use the Search field to enter the following information for additional study team members (from Western and or its affiliate institutions) who are working on this study:

Prefix	*First Name	*Last Name
Dr.	Melanie	Columbus

Address: 800 Commissioners Rd E

E1-122

City: London

Province/State: Ontario

Postcode/Zip:

Telephone: 55014

*Email: melanie.columbus@lhsc.on.ca

1.4a *Specify ROLE, DUTIES, and DEPARTMENT/FACULTY. (E.g. John Doe - Research Assistant - responsible for recruitment, interviews and analysis of data; Psychology/Social Sciences.):

Research Coordinator - responsible for managing study information, ensuring supplies are available.

1.4b *Are there any additional study team members (incl. students, postdocs, coordinators, managers, etc.) from Western and/or its affiliate institutions working on this study?

- (•) Yes there are other study team mbmers
- ( ) No other study team members

1.4b *Use the Search field to enter the following information for additional study team members (from Western and or its affiliate institutions) who are working on this study:

Prefix	*First Name	*Last Name
	Scott	Anderson

Address

City

Province/State

Postcode/Zip

Telephone

*Email sanderso@uwo.ca

1.4b *ROLE and DUTIES assigned by the PI to this individual (e.g. John Doe - Research Assistant - involved in recruitment, interviews and analysis of data.):

Dr. Scott Anderson, Co-Investigator

1.4c *Are there any additional study team members (incl. students, postdocs, coordinators, managers, etc.) from Western and/or its affiliate institutions working on this study?

- ( ) Yes there are other study team members
- (•) No other study team members

1.5

1.5 *Enter the Complete Study Title:

Non-invasive positive pressure ventilation mask to minimize mask leak and potential aerosolization leading to spread of virus such as COVID-19

1.6

1.6 *What is the acronym or nickname/short title for the study? (NOTE: The acronym or nickname/short title will be used to identify the study and will be included in all notifications and REB applications associated with this project.):

Reduced-aerosolizing BiPAP for patients in environment at risk of COVID-19

1.7

1.7 *What type of REB submission is this?

- (•) Full Board
- ( ) Delegated Level 2 - Prospective data collection
- ( ) Delegated Level 1 - Retrospective study data and/or biological sample collection

1.8

1.8 *Are any of the investigator(s) based at any of the sites below or will the study utilize any patient data/biological specimens, staff resources or facilities within any of these sites? (Please indicate all applicable sites):

- ☐ No

LHSC Sites

- ☐ Adult Eating Disorder Service (Riverview)
- ☐ Byron Family Medical Centre
- ☐ Children's Hospital
- ☐ Fowler Kennedy Sports Medicine
- ☐ Kidney Care Centre (Westmount)
- ☐ London Regional Cancer Program (LRCP)
- ☐ Southwestern Ontario Regional Base Hospital Program
- ☐ Stroke Prevention & Atherosclerosis Research Centre
- ☑ University Hospital (UH)
- ☐ Victoria Family Medical Centre
- ☑ Victoria Hospital (VH)

St Joseph's Sites

- ☐ Mount Hope Centre for Long Term Care
- ☐ Parkwood Institute – Main Building
- ☐ Parkwood Institute Mental Health Care
- ☐ Southwest Centre for Forensic Mental Health Care
- ☐ St. Joseph's Family Medical and Dental Centre
- ☐ St. Joseph's Hospital

1.9

1.9 *Is this study directly related to a study at this institution (e.g., is this study a sub-study, extension, rollover, subsequent to a pilot study)?

- ○ Yes – This study relates to a previously approved study at this institution
- ○ Yes –This study relates to a study currently under Western's REB review, but has not yet been approved
- ◉ No - This study does not relate to a previous study at this institution

1.10

1.10 *Upload the protocol/research plan for this study. NOTE: ALL HSREB submissions require a protocol/research plan:

Type	Document Name	File Name	Version Date	Version	Size
Protocol	BiPAP Protcol April 7 2020 CLEAN	BiPAP Protcol April 7 2020 CLEAN .odt	07/Apr/2020	April 7 2020	102.8 KB

Note that your document name will appear on the approval notices. Ensure you name your document something that reflects what the document is (e.g., debriefing script, date). Avoid using slang, student names, etc. Upload only the clean version here (i.e., not the tracked copy). Do not include "clean" in the document name.

1.11

1.11 *Is this an Investigator-initiated study?

- (•) Yes
- ( ) No

1.12

1.12 *Who is the Study Sponsor?

- [ ] Industry Sponsored
- [ ] External Non-Profit
- [ ] External PI (outside of Western)
- [ ] Local PI (Western-affiliated team member other than PI on this REB application)
- [x] Self (PI on this REB application)

1.13

1.13 *Is this primarily a student project?

- [x] No
- [ ] Yes - Resident/Fellow
- [ ] Yes - MD
- [ ] Yes - Post-doctoral Fellow
- [ ] Yes - PhD
- [ ] Yes - Masters
- [ ] Yes - Undergraduate
- [ ] Yes - Other

1.14

1.14 *Has the study undergone a formal scientific or peer review (i.e., internal peer review or external review (e.g., CIHR, NSERC, NIH, etc.))?

- ( ) Yes
- (•) No

1.15

1.15 *Has the study been reviewed and approved by another REB in Canada?

- ○ Yes
- ◉ No
- ○ pending

1.16

1.16 *Has the study been rejected by any other REB?

- ○ Yes
- ◉ No

1.17

1.17 *Is this research study supported by the United States federal government (including a study funded by a US government agency)?

- ○ Yes
- ◉ No

1.18

1.18 *Is this a multi-centre study?

- ○ Yes
- ◉ No

1.21

1.21 *Is there an external third party (Coordinating or Contract Research Organization) overseeing the study?

- ○ Yes
- ◉ No

1.22

1.22 *Indicate how the results will be communicated to participants and other stakeholders (e.g.; advocacy groups, scientific community).

***To Participants:**

- ☐ Debriefing Script
- ☐ Group debriefing
- ☐ End of study letter
- ☑ Publication(s)
- ☐ Other
- ☐ No Plan

***To Other Stakeholders:**

- ☑ Presentation(s)
- ☑ Publication
- ☐ Other
- ☐ No plan

1.23

1.23 *Provide a brief lay/non-scientific summary of the study (max 250 words)

Patients presenting to emergency departments and hospitals for various medical conditions often require non-invasive ventilation (breathing support). For example, a person with shortness of breath as a complication of COPD (chronic obstructive pulmonary disease) may be treated with a BiPAP machine, one type of non-invasive ventilation.

However, in the current environment of COVID-19, aerosols produced by a BiPAP machine in a COVID-19 positive patient pose serious potential harms to healthcare providers and other patients. All patients with similar symptoms to COVID-19 are presently treated as positive until definitive testing determines otherwise. The best test available for COVID-19 takes up to 4 hours to determine the patient's status, which is too long to delay application of BiPAP in a distressed patient. This could lead to either a delay in care or the need for invasive breathing measures (intubation), which requires intense resource utilization, may not be in line with a patient's goals of care, and could cause serious harms (i.e. infection, medication reactions, etc.) in patients who do not need it.

As well, the lack of BiPAP as an option in the clinician's arsenal leads to increased ventilator days that would previously have been bridged with a BiPAP machine. The use of a closed-loop BiPAP machine in which no expired air is released into the environment would solve these problems. Building off the experiences of a similar approach that was trialed in Italy in response to the COVID-19 crisis, this project will develop and test a novel non-aerosolizing BiPAP system.

2.4

2.4 *Will you collect biological specimens in this study?

- ○ Yes
- ◉ No

2.5

2.5 *What are the study hypotheses or research question(s) or purpose of this study?

To validate that an easy-to-produce, specifically-engineered mask and circuit has the ability to maintain non-invasive ventilatory support while reducing aerosolization of viral particles

2.6

2.6 *What is the rationale for this study (why is it being done)? In your response ensure to include relevant background information from previous studies that have been done. Cite references where appropriate and add LIST as a separate attachment (do not include within your response).

Non-invasive ventilation has been rigorously studied, showing its efficacy as a first-line treatment for several types of respiratory pathology[1]. However, few studies have been done on the potential harm caused by aerosolization from non-invasive ventilation2. The data available suggest that caution must be taken with acute respiratory infection (ARI) patients when placing them on non-invasive ventilation such as CPAP or BiPAP due to excess risk to health care workers[2–5]. This advice is being heterogeneously applied during the recent COVID-19 pandemic, with some practitioners advocating the use of non-invasive ventilation[6].

There is a role for non-invasive ventilation in COVID-19 negative patients during the pandemic, although practitioners are reluctant to initiate these measures because of the slow speed, lack of reliability and lack of availability of the viral swab confirming corona virus status. While other studies have been done on non-invasive ventilation, and some to assess leaks, none have proposed an effective method for reducing aerosolization that is easy to produce and disseminate.

The BiPAP mask proposed has undergone bench testing by the engineering partner (General Dynamics Land Systems; GDLS) on dummies while developing the mask and adapters. This study seeks to ensure that this easy-to-produce, specifically-engineered mask and circuit has the ability to maintain non-invasive ventilatory support without aerosolizing viral particles, as measured through air leak. If successful, this will return an important tool to the clinician’s arsenal.

Upload a list of references used in your rationale above (if applicable):

Type	Document Name	File Name	Version Date	Version	Size
References	2.6 - references	2.6 - references.pdf	07/Apr/2020		19.7 KB

2.7

2.7 *Provide a brief summary of the study design type and methodology being employed in this study. NOTE: Information about objectives, inclusion/exclusion criteria, study procedures, sample size calculations and data analysis should be described when prompted elsewhere in the application.

This study is an opportunistic prospective randomized controlled trial.

If experimental non-invasive ventilation masks are available in the patient's expected size, patients will be randomized to control masks or experimental. If experimental masks are not available, the patient will be consented and entered into the control arm. Patients who receive BiPAP or CPAP with the mask are assessed for several variables over time to ensure adequate treatment and assess leaks.

Upload a flow diagram (if applicable):

Type	Document Name	File Name	Version Date	Version	Size
Flow Diagram	study_flowchart	study_flowchart.pdf	03/Apr/2020	1	11.9 KB

2.8

2.8 *Will this study include the following population(s): (select ALL that apply):

- [x] Patients (see help text)
- [ ] People who are unable to consent
- [ ] Healthy Volunteers
- [ ] Caregivers/Study Partner
- [ ] Cognitively impaired individuals
- [ ] Students
- [ ] Adult individuals temporarily unable to provide consent (i.e. unconscious)
- [ ] Staff/Health care providers
- [ ] Pregnant Women
- [ ] People with mental health issues
- [ ] Elderly people
- [ ] People institutionalized
- [ ] People with palliative disease
- [ ] Prisoners/persons in detention
- [ ] People in long-term care
- [ ] People in poverty
- [ ] Minors
- [ ] People in medical emergencies
- [ ] Other

2.9

2.9 *If a patient population is included, describe the usual diagnostic, therapeutic “routine” or standard of care at this trial site for this population (including frequency of follow up visits). If there is no diagnostic, therapeutic “routine” or standard of care state this clearly.

There is no present standard of care for the treatment of patients who are COVID positive or treated in a hospital where this is likely, as the disease is poorly understood and novel. As testing is poor and prevalence is high, many institutions will not provide non-invasive ventilation options for any patients. However, with the lack of mechanical ventilators and shortage of ICU beds, some eventually resort to non-invasive measures in an effort to conserve resources. At London Health Sciences Centre, the standard of care is in flux, but includes consideration of non-invasive options in both the emergency department and the intensive care unit.

2.10

2.10 *If a patient population is included, will any procedures be carried out in this study that are not considered the usual diagnostic, therapeutic "routine" or standard of care?

- ○ Yes
- ◉ No

2.11

2.11 *Will the participants be withdrawn from or denied usual therapy for any condition in order to participate in this study?

- ○ Yes
- ◉ No
- ○ N/A

2.12

2.12 *Will management or treatment of the participant's condition be prolonged or delayed because of this research project?

- ○ Yes
- ◉ No
- ○ N/A

2.13

2.13 *Does this study include a non-patient group (e.g., caregiver, student, employee, etc.)-SEE HELP TEXT?

- ○ Yes
- ◉ No

2.14

2.14 *Is this a collaborative community-based project?

- ○ Yes
- ◉ No

2.15

2.15 *Indicate your data collection tools/forms by selecting the relevant option(s) below:

- ☐ Paper Survey(s)/Questionnaire(s)
- ☐ Online Survey(s)/Questionnaire(s)
- ☐ Interview Guide(s)
- ☐ Focus Group Guide(s)
- ☐ Non-Participant Observation Guide(s)
- ☐ Participant Observation Guide(s)
- ☐ Case Report Form(s)
- ☑ Other (e.g., visual stimuli, participant diary, data collection forms, etc.)

Note that your document name will appear on the approval notices. Ensure you name your document something that reflects what the document is (e.g., debriefing script, date). Avoid using slang, student names, etc. Upload only the clean version here (i.e., not the tracked copy). Do not include "clean" in the document name.

*Upload "Other" instrument(s) that will be used during this study:

Type	Document Name	File Name	Version Date	Version	Size
Other Data Collection Instruments	Data Collection April 7 2020 CLEAN	Data Collection April 7 2020 CLEAN.odt	07/Apr/2020	April 7 2020	10.3 KB

*Describe "Other" instrument(s) and how they will be used in this study:

The Data Collection Sheet will be used to collect data points for each patient in the study for the relevant outcome variables

2.16

2.16 *Will any technological tool(s)/platform(s)/software/device(s) be used (beyond an institutional network or hard drive) throughout the project (e.g., data collection, analysis, transfer, storage, etc.)?

- ○ Yes
- ◉ No

2.17

2.17 *Are there any associated sub-studies or companion studies?

- ○ Yes
- ◉ No

2.19

2.19 *What is the local sample size (if there are more than one group (e.g., patients, caregivers, students, employers, etc.) clarify the number of participants in each group?

50

2.20

2.20 *Is the sample size justified in the study protocol/research plan or sponsor protocol?

- (•) Yes
- ( ) No

*Describe the sample size justification. If there is a description of the justification in a study protocol/research plan, indicate the page number.

Sample size will be based on a convenience sample of patients presenting with conditions requiring non-invasive ventilation. Given the urgency of providing access to medical equipment that may save lives, data will be updated as available as use is continued or stopped based on product performance.

2.21

2.21 Describe the method(s) for data analysis.

Data will be entered directly into a study-specific LibreOffice database (The Document Foundation, Berlin, Germany). All data analyses will be performed using R (R Foundation, Vienna, Austria). All identifying patient data will be kept separate from study data. LibreOffice and R are two pieces of Open Source software that will be run locally on study computers and store all data to the LHSC P: drive. A LibreOffice database is stored in an ODS (Open Document Spreadsheet) file. It is a storage format akin to Microsoft Excel's XLSX format.

For Data Analysis, the means and standard deviations of the Glasgow coma scale (GCS), respiratory rate, heart rate, pH, $PaCO_2$, and PaO_2 will be calculated for each time period.

Participants will be assigned a subgroup of control or experimental depending on which mask the patient received. These two subgroups will be compared using an analysis of variance (ANOVA) to detect differences between outcome parameters. A subgroup analysis will also be taken based on COVID-19 culture status regardless of the type of respiratory failure. This analysis will be performed with an ANOVA on the outcome parameters.

The critical importance of mask leaking means that these data will be displayed as a sum of all incidents. As these are binomial, a subgroup and time comparison will also be carried out using a generalized linear model of the binomial family (logistic regression). Leak volumes will be compared with an ANOVA.

2.22

2.22 *Provide the inclusion criteria:

Patient with respiratory failure due to primary pulmonary pathology.
Patient who is selected for BiPAP or CPAP by the health care provider

2.23

2.23 *Provide the exclusion criteria.

Age <18 years.
Respiratory failure due to non-pulmonary pathology.
Impaired consciousness (Glasgow coma scale <10).
Patients with contraindications of NIV.
Severe upper gastrointestinal bleeding.
Chest trauma.
Agitated or violent patient.

2.24

2.24 *What is/are the primary objective(s) of the study and briefly describe how it/they will be measured. NOTE: For qualitative research studies-If this is not applicable indicate "NA"

The primary objective of this study is to assess if the mask device leaks when attached to a patient's face in real-world use.

This outcome will be measured by recording data from the ventilator about the total leak volume over the study period at various intervals. This volume is a normal output of modern ventilators. The researcher will also assess the physical seal on the patient four times throughout the device's use.

2.25

2.25 What is/are the secondary objective(s) (if applicable) of the study and briefly describe how it/they will be measured.

The secondary objective of the study is to assess markers of ventilation and perfusion in patients, including pH, pCO2, pO2, respiratory rate, heart rate and level of consciousness (via GCS).

These markers will be measured through routine vital signs monitoring (respiratory rate, heart rate and GCS) and an arterial or venous blood gas (pH, pCO2, pO2).

2.26

2.26 *Does this study include any use of deliberate deception or withholding of key information that may influence a participant's performance or response?

- ○ Yes
- ◉ No

2.27

2.27 *Will study participants be subject to restrictions (lifestyle) during the study?

- ○ Yes
- ◉ No

2.28

2.28 *Describe the circumstances under under which an investigator would initiate the withdrawal of a participant/remove them from the study:

Participants can withdraw from the study upon their request.

Participants will be withdrawn from the study by the PI if:
* Unable to maintain the mask on face,
* Unable to remain calm
* Becomes agitated or violent
* The patient's physical or emotional status deteriorates

3.1

3.1 *Is this a clinical trial?

- ◉ Yes
- ○ No

3.2

3.2 *What is the proposed type of clinical trial (select all that apply):

- ☐ Pilot
- ☐ Phase I
- ☐ Phase I/II
- ☑ Phase II
- ☐ Phase II/III
- ☐ Phase III
- ☐ Phase III/IV
- ☐ Phase IV
- ☐ Other

3.3

3.3 If this is a multi-phase or combination phase trial (e.g., Phase I/II), specify whether this submission is for REB review of one phase only or for both (e.g., for REB review of Phase II only when Phase I of a Phase I/II study has been completed):

3.4

3.4 *Does study involve any of the following (select all that apply):

- ☐ Drugs, Biologics (including vaccines), Genetic Therapies or Radiopharmaceuticals
- ☐ Natural Health Products or non-prescription or disinfectant drugs (as per the Natural and Non-prescription Health Products Directorate (NNHPD))
- ☑ Medical Devices
- ☐ Biological specimen collection (e.g., blood/tissue for PK, biomarker, biobanking, genetic testing, etc., excluding biological specimens taken as part of normal care or for safety)
- ☐ Radiation (including tests involving exposure to radiation)
- ☐ Other health related interventions not listed above

3.5

3.5 *Does this submission require an application to Health Canada under the Food and Drugs Act (e.g. a Clinical Trial Application or Investigational Testing Application)?

- ☐ Yes - a Clinical Trial Application (CTA) under the Food and Drug Regulations
- ☐ Yes - a Clinical Trial Application (CTA) under the Natural Health Product Regulations
- ☑ Yes - an Investigational Testing Application (ITA) under the Medical Device Regulations
- ☐ No

3.6

3.6 *Has this study been submitted to the US Food and Drug Administration (FDA) under an Investigational New Drug (IND), Investigational Device Exemption (IDE), or Pre-Market Approval (PMA) Application?

- ○ Yes
- ◉ No
- ○ N/A

3.7

3.7 *Has this study been or will this study be registered on a publicly accessible clinical trial registry? (e.g., www.clinicaltrials.gov, www.isrctn.com/)

- (•) Yes
- ( ) No

*Indicate the registry name and registration number. NOTE: REB approval will not be issued until this is received.

www.clinicaltrials.gov

3.8

3.8 *Has the drug or other therapy been evaluated in previous human trials?

- (•) Yes
- ( ) No
- ( ) N/A

3.9

3.9 *Which of the following will be used in this study (select all that apply):

- [ ] Placebo
- [ ] Sham procedures(s)
- [ ] Washout
- [ ] Withholding treatment
- [ ] No-treatment arm
- [x] None

3.10

3.10 If applicable, describe the provisions made to break the code of a double-blind study in an emergency situation:

NA

3.11

3.11 *Are there any prohibited medications while participants are in this study?

- ( ) Yes
- (•) No

3.12

3.12 *Are there any other participant material(s) (e.g., wallet card, instructions, etc.) that they will receive? NOTE: This does not include recruitment material.

- ○ Yes
- ◉ No

6.1

6.1 *Enter the name of the device components, parts and/or accessories as per product label:

Face mask
Face mask connector
Face mask gasket

6.2

6.2 *Health Canada medical device classification:

- ☐ Class I (Note: does not require Health Canada Authorization for investigational use)
- ☑ Class II
- ☐ Class III
- ☐ Class IV

6.3

6.3 *Indicate the status of the device(s) with Health Canada (select all that apply):

- ☐ Licensed (e.g., has Medical Device License (MDL)), but being used outside of current Health Canada authorization
- ☑ Investigational

6.5

6.5 *Enter the device license number/model or catalogue number:

Glia Model # 0004

6.6

6.6 *Is the device commercially available or licenced outside of Canada?

- ○ Yes
- ◉ No

6.7

6.7 *Does this device contain a drug?

- ○ Yes
- ◉ No

6.8

Note that your document name will appear on the approval notices. Ensure you name your document something that reflects what the document is (e.g., debriefing script, date). Avoid using slang, student names, etc. Upload only the clean version here (i.e., not the tracked copy). Do not include "clean" in the document name.

6.9

For each device covered under the ITA, upload the ITA or equivalent:

11.1

11.1 *Describe any direct benefits to the study participants. If there are no direct benefits to the participants themselves, please state as such:

The primary direct benefit to the patient is the ability to use non-invasive ventilation within an environment where health care providers might otherwise refrain from using it due to fears of viruses such as COVID-19. This may reduce the number of days a participant is on a ventilator or even prevent mechanical ventilation altogether. Because this device has not yet proven to be efficacious, the patient may not directly benefit from this study.

By reducing or preventing mechanical ventilation, participants will face fewer risks associated with mechanical ventilation such as pneumothorax, muscle wasting, further infection and death.

11.2

11.2 *What is the overall anticipated public and scientific benefits of the study?

This study will produce two major public goods:

1. A mask that can attach to proprietary BiPAP machines and provide a seal that prevents aerosolization. This contribution would allow the use of BiPAP machines in both COVID-19 positive patients and those who are negative and pending. In an environment of high infectious load, BiPAP is currently being decommissioned. Providing clinicians with a safe way to perform non-invasive ventilation would reverse that trend.

2. The mask's bill of materials, design files and source code will all be released under an open source license. This will allow future users to iterate the design and expand it as needed for future machines and scenarios.

11.3

11.3 *List and describe the known risks/harms/inconveniences of any tests, procedures or other protocol-mandated activities that are conducted for research purposes only (including approximate rates of occurrence, severity and reversibility). This information must be included in the informed consent documentation.

No tests or procedures will be undergone for research purposes only. All tests, procedures and activities would be conducted by health care staff for the patient as part of the standards of care.

11.5

11.5 *For the study risks listed above, describe the monitoring to be undertaken during and following the study conclusion.

as per any research project there is always a risk of a breach of privacy. All institutional policies will be followed in order to mitigate this risk

11.6

11.6 *Are there any reproductive risks associated with participation in the study?

- ○ Yes
- ◉ No

11.7

11.7 *If a research participant fathers a child while in the study, will access to the health records of the pregnant partner and/or her child be required and/or will the woman and/or child be monitored by this study during and/or after the pregnancy?

- ○ Yes
- ◉ No

11.8

11.8 *Does participation in this study affect alternatives for future care or eligibility for future research?

- ○ Yes
- ◉ No

11.9

11.9 *Is there a data and safety monitoring board (DSMB) or committee (DSMC)?

- ◉ Yes
- ○ No

*Is the DSMB/DSMC independent of the sponsor?

- ○ Yes
- ◉ No

Provide a copy of the charter or describe the DSMB including its purpose, membership, relationship to the sponsor, how often they meet and whether the committee will review unblinded data (if applicable):

The data and safety monitoring board will review blinded date to ascertain that the study protocol is sound and that the device is functioning as anticipated. The board will analyze data with a focus on leak data to assess if the experimental model has an increased risk of transmitting infection.

The board will consist of five members:
1. Dr. Tarek Loubani - Principal Investigator and Sponsor
2. Dr. Azad Mashari - Anaesthetist
3. Mr. Wes Rhiger - Engineer
4. Dr. Mel Columbus - Statistics and Research coordinator

Note that your document name will appear on the approval notices. Ensure you name your document something that reflects what the document is (e.g., debriefing script, date). Avoid using slang, student names, etc. Upload only the clean version here (i.e., not the tracked copy). Do not include "clean" in the document name.

Upload DSMB/DSMC charter:

Describe the clinical criteria for stopping the study protocol due to safety concerns?

1. Increased incidence of mask failures or mask leaks
2. Evidence of poor oxyenation and ventilation.
3. Unexpected poor patient outcomes.

11.10

11.10 *Are there any plans to perform an interim analysis?

- (•) Yes
- ( ) No

*Describe:

All data will be tracked by the DSMC to ensure safety of patients. Where possible, the committee will analyze data to ensure patients are ventilating as expected by compiling and reviewing all bloodwork results found in the blood gases.

11.11

11.11 If applicable, describe how incidental findings will be managed and under what circumstances they would be disclosed to study participants:

NA

12.1

12.1 *Will Personal Information (PI) and/or Personal Health Information (PHI) be used to identify potential participants (pre-screening)?

- (•) Yes
- ( ) No

*Who is accessing the PI and/or PHI for pre-screening and under whose authorization?

A healthcare provider within the patients circle of care will complete the pre-screening.

*Describe what PI and/or PHI will be used or accessed to identify potential participants?

The patient's age and reason for visit will be identified in potential participants.

12.2

12.2 * Is a waiver of the requirement to obtain informed consent being requested for any aspect of this study (If you are obtaining consent for part of the study and requesting a waiver for another aspect of the study select both Yes AND No)?

- [ ] Yes I am requesting a waiver of consent
- [x] No I am not requested a waiver of consent

12.3

12.3 *Is there a broad recruitment plan (e.g. recruitment database, call centre, advertising)?

- ○ Yes
- ◉ No

12.4

12.4 *How will you recruit potential participants?

- ☑ Investigator or other study member who is part of the circle of care will approach patients
- ☑ Investigator or other study member who is part of the circle of care will approach the substitute decision maker
- ☐ Investigators will receive referrals from other healthcare providers
- ☐ Investigators will recruit a non-patient group (e.g. caregiver, students, employees, etc.)
- ☐ Advertising (e.g., brochures, flyers, poster, newspaper ad or web-based)
- ☐ Existing database
- ☐ Other

12.8

12.8 *Who will make initial contact with potential participants?

Healthcare provider; when given direction that patient agrees, consent will be taken by a research assistant or the PI

12.9

12.9 *How will initial contact be made with potential participants?

- ☑ In person
- ☐ Email (include: If email communication will be used please ensure that participants understand that email communication is not a secure form of communication)
- ☐ Letter
- ☐ Telephone
- ☐ Other

12.11

12.11 *Describe the consent process (for patient and/or non-patient population):

The PI or a research student will approach patients at the invitation of a member in the circle of care to discuss the study. Patients will be given as much time as needed to review the LOI and have questions answered before they sign the consent.

12.12

12.12 *Who will be obtaining consent?

Research assistant or PI

12.13

12.13 *Which of the following will be used, select all that apply:

- ☐ Assent Form(s)
- ☑ Letter of Information/Consent (LOI/C) Form(s) - (including Sub-study LOI/C, Optional LOI/C, etc)

Note that your document name will appear on the approval notices. Ensure you name your document something that reflects what the document is (e.g., debriefing script, date). Avoid using slang, student names, etc. Upload only the clean version here (i.e., not the tracked copy). Do not include "clean" in the document name.

*Upload clean version(s) of the Letter of Information/Consent form(s):

Type	Document Name	File Name	Version Date	Version	Size
Written Consent/Assent	LOI April 7 2020 CLEAN	LOI April 7 2020 CLEAN.docx	07/Apr/2020	April 7 2020	28.0 KB

12.14

12.14 *Is there a relationship between the participant and the person obtaining consent?

- ◉ Yes
- ○ No

*Explain the nature of the relationship (e.g., physician, employer, student) and what steps will be taken to avoid undue influence (actual, apparent, perceived, or potential).

The nature of the relationship potentially will be physician and patient. Dr. Tarek Loubani may be on shift during this study and therefore may be the person obtaining consent and treating the patient. Dr. Loubani will treat the patient based on the standard of care, and will be blinded to which condition the patient will be selected into.

There will be no impact on the patient's care plan so long as Dr. Loubani adheres to the standard of care when administering non-invasive ventilation such as BiPAP. Given the burden of the current global pandemic and the public state of emergency, it may not be possible, practical, or ethical to delay application of the device to have an alternative person obtain consent and an alternate person may not be available due to the demands of the department. Also due to the current situation, research assistance and non-clinical study staff are prohibited from the clinical unit.

12.15

12.15 *Does this study have competitive enrollment

- ○ Yes
- ◉ No

12.16

12.16 *Will persons not capable to consent for themselves be included in the study?

- ◉ Yes
- ○ No

*Describe how capacity will be assessed for any individuals noted above. If participants are incapable of providing consent, provide information on how substitute decision makers will be identified and how their consent will be obtained to contact them for use of the participant's information for research. Note, discuss what safeguards will be employed to ensure the rights of the research participant are protected

This device provides a reasonable alternative to the standard of care in which the main objective of ventilation is achieved, but with a real opportunity to reduce the overall threat to other patients and providers. This study seeks to gain informed consent when possible while not delaying standard of care treatment. Potential participants presenting in need of ventilation are experiencing a medical emergency in which a response is required.

At the moment, the standard of care is often not met by providers because of the emergency situation of the global COVID-19 pandemic. While this international emergency has reduced the standard of care and thus patient outcomes, this study aims to return standard of care treatment to the patient without the current risks.

Due to the current pandemic, substitute decision makers (SDM) are only in hospital in extenuating circumstances and obtaining consent from the SDM may delay appropriate care. In such cases, obtaining consent from the SDM would be delayed until the patient is stable and the SDM is able to provide consent. If the patient or SDM subsequently decline participation, their data will be removed.

12.17

12.17 When the inability to provide an informed consent is expected to be temporary, describe what procedures that will be used to regularly assess capacity and to obtain consent if the individual later becomes capable of providing consent. Alternatively, if diminished capacity is anticipated for the study population, describe the procedure used to assess capacity and obtain ongoing consent.

Patients will be assessed on their ability to provide informed consent based on their medical condition (respiratory distress, increased work of breathing) and capacity. The patient will not be asked to provide informed consent when medical intervention using non-invasive ventilation is required immediately. A substitute decision maker will be sought out as soon as possible and informed consent will be obtained at that time or when the patient condition improves and is deemed capable to provide consent. In a circumstance where the patient or the substitute decision maker declines participation in the study, the participants data will be removed from the study.

12.18

12.18 *How much time will be given to participants to review the information before being asked to give consent?

If the patient is stable enough to provide informed consent without their condition deteriorating, as much time will be given as necessary. If the patient is in critical condition, consent would be delayed in order to provide the patient with timely treatment.

12.19

12.19 *Does the study exclude any participants based on culture, language, religion, race, disability, sexual orientation, ethnicity, linguistic proficiency, sex or age. Ensure consistency with Q2.24 (exclusion criteria)?

- ○ Yes
- ◉ No

12.20

12.20 *List any anticipated communication difficulties:

- ☑ None
- ☐ Individuals who may require translation
- ☐ Individuals who are illiterate
- ☐ Individuals unable to communicate

12.21

12.21 *Are potential participants allowed to enroll in other studies while in the current study?

- ◉ Yes
- ○ No

13.1

13.1 *(For patient orientated research studies.) Do you plan now or in the future to link your study data to the large healthcare databases held at the Institute for Clinical Evaluative Sciences (ICES)? For example, this would allow you to follow patients passively life-long, determine their healthcare costs, assess how similar your patients are compared to Ontario citizens, and help identify control groups.

- ○ Yes
- ◉ No
- ○ N/A

13.2

13.2 *Are you collecting personal identifiers for this study?

- (•) Yes
- ( ) No

13.3

13.3 *Identify any personal identifiers collected for this study. Select all that apply.

- [x] Full Name
- [ ] Initials
- [ ] Ontario Health Card Number
- [ ] Address
- [ ] Full Postal Code
- [ ] Partial Postal Code
- [ ] Telephone Number
- [ ] Email Address
- [ ] Family Physican or other care provider names
- [ ] Full Date of Birth
- [ ] Partial Date of Birth
- [ ] Full Date of Death
- [ ] Partial Date of Death
- [x] Sex
- [ ] Gender
- [x] Age
- [ ] Medical Device Identifer
- [x] Hospital Patient Identification Number (PIN)
- [ ] Full Face Photograph
- [ ] Voice/Audio Recording
- [ ] Other

*Explain and justify full name and if it will be stored on paper or electronically:

Full name will be collected on the letter of information and consent in addition to our master list with the hospital PIN. The letter of information and consent will be stored on paper and the master list will be stored electronically.

*Explain and justify sex and if it will be stored on paper or electronically

Sex/ gender will be collected for the purposes of describing characteristics of the study population and it will be stored electronically.

*Explain and justify age and if it will be stored on paper or electronically

Age will be collected for the purposes of describing characteristics of the study population and it will be stored electronically.

*Explain and justify hospital PIN and if it will be stored on paper or electronically

The hospital PIN will be stored on the master list and stored electronically. This will be used for patient identification for chart data collection.

13.4

13.4 *Will there be a master list linking identifiers/identifiable information (e.g., name, contact information) to the unique participant code (e.g., study number, pseudonym)?

- (•) Yes
- ( ) No

*Who will have access to the master list?

Only the study team will have access to the codes.

13.5

13.5 *Where will information collected as part of this study be stored (applies to both paper copy and electronic copy)? (select all that apply)

- [x] University or Hospital network drive
- [ ] University or Hospital local hard-drive
- [x] Office/Lab of PI or Research team member on Institutional Property
- [ ] Laptop
- [ ] Memory Stick
- [ ] Cloud Storage
- [ ] Off-site
- [ ] Other

*Specify the University or Hospital network drive:

All data collected will be maintained on the LHSC “P” Drive in a password protected folder.

13.6

13.6 *Indicate the measures in place to protect the confidentiality and security of any study data including Personal Information (PI) or Personal Health Information (PHI) that is accessed, collected and used (select all that apply):

- [x] Access to study data and/or medical recordswill be limited to authorized personnel
- [x] Access to electronic data will be password protected and encrypted
- [x] Electronic data will be stored on a Western, hospital or other institutional server with firewalls and other security and back-up measures in place
- [x] Study data stored on external hard drive, laptop(s) and/or portable device(s) will be encrypted
- [x] Paper copies of study data will be stored in locked filing cabinets in a secure location
- [x] A master log with identifiers will be stored separately from the study data
- [ ] Other

13.7

13.7 Describe where study data/database, source data (including completed surveys), and Letters of Information and Consent, whether electronic or paper, will be kept:

All data collected will be maintained on the LHSC “P” Drive in a password protected folder. Investigators will only look at or analyse data on LHSC computers. Hard copies will be stored in a locked filing cabinet. Data will be coded with unique identifiers and the master list containing any identifiers will be stored separately from the collected data.

13.8

13.8 *If participant information is stored on an external hard drive, laptop(s) and/or portable device(s), the device must be encrypted. Describe (name) the encryption type and software being used.

No information will be stored on external hard drives, laptops or portable devices outside of LHSC computers.

13.9

13.9 *If someone other than the local PI is the study data custodian (who is responsible for maintaining the study data) explain below (otherwise just indicated local PI):

PI: Dr. Tarek Loubani

13.10

13.10 *Are you transporting materials (paper, devices and/or media) that include Personal Information (PI) and/or Personal Health Information (PHI) between sites? (See Confidentiality and Data Security guidelines)

- ○ Yes
- ◉ No

13.11

13.11 *Will you be sending/sharing data off-site for this study?

- ○ Yes
- ◉ No

13.12

13.12 *Who will have access to the identifiable data?

Only the study team will have access to identifiable data. Data will be coded with unique identifiers and the master list containing any identifiers will be stored separately from the collected data.

13.13

13.13 *How long will you retain identifiable data?

- ○ 7 years as per UWO policy
- ○ 15 years as per Lawson policy
- ◉ 25 years as per Health Canada policy
- ○ Other

13.14

13.14 *How will you destroy the identifiable data after this period (if applicable)?

Paper records will be secured in a locked filing cabinet at LHSC where the research data will be stored for 25 years and then destroyed according to institutional protocols, which includes placing the records in locked, confidential shredding bins. The bins are then collected by an outsourced company (Shred-It) and the contents are shredded. Computer and electronic records will be encrypted and secured for 25 years and then all study files will be destroyed according to institutional protocols of data deletion including clearing all memory sticks. This will be done in consultation with the IT department for current protocols.

13.15

13.15 *Will you link the locally collected data with any other datasets, databases or registries (e.g., health registries, Statistics Canada)?

- ○ Yes
- ◉ No

13.16

13.16 *Is the purpose of this study to establish a registry/database?

- ○ Yes
- ◉ No

13.17

13.17 *Indicate the extent the study participant is able to withdraw their study data from the research study and any limitations on the withdrawal

Once data is collected, the study participant is able to withdraw their study data from the research study up until study submission for publication.

14.1

14.1 *Is this study funded?

- ◉ Yes
- ○ No

14.2

14.2 *How is the study funded?

- ☐ Industry
- ☐ Internal Grant (departmental/faculty, VP, IRF/SRF, etc.)
- ☐ External Grant (Tri-Council (e.g., CIHR, SSHRC, NSERC, NCE), government, charitable foundation, etc.)
- ☑ Other

*Specify Other:

Bassel Khartabil Fellowship

14.3

14.3 *Are there any (or will there be) research funds held in an account at Western or Lawson?

- ☐ Lawson
- ☐ Western University
- ☑ No

14.4

14.4 *What is the status of funding from this source?

- ◉ Obtained
- ○ Awarded but not received

14.5

14.5 Indicate what compensation, if any, will be provided to participants and include a justification for compensation. If this question is N/A indicate so:

No compensation will be provided to participants.

14.6

14.6 *Will participants be reimbursed for out of pocket expenses (e.g., parking, travel, food, etc.) incurred as a result of participation

- ○ Yes
- ◉ No

*Provide justification why participants should be financially responsible for direct expenses as a result of participation in this study

Participants will incur no additional costs by participating in this study, as they will already be in the Emergency Department or Intensive Care Unit and receiving care.

14.10

14.10 Attach an itemized study budget. The budget should reflect all costs to complete the study (e.g., database extraction, student payments, participant reimbursements, etc.).

Type	Document Name	File Name	Version Date	Version	Size
Study budget	REB Project Budget	REB Project Budget.docx	07/Apr/2020	April 7 2020	16.5 KB

15.1

15.1 *Are any participant-facing study documents being provided in a language other than English? (e.g., letter of information and consent/assent forms, recruitment materials, participant materials such as questionnaires, etc.)

- ○ Yes
- ◉ No

16.1

16.1 *Will the PI or Co-Investigator(s) or anyone connected to them through their interpersonal relationship (including their partners, family members, or their former or current professional associates) receive any personal financial benefit in connection with this study?

- ○ Yes
- ◉ No

16.2

16.2 *Will the PI or Co-Investigator(s) or anyone connected to them through their interpersonal relationships (including their family members, friends, or their former or current professional associates) receive any personal (financial or otherwise) benefits including patent or intellectual property rights, royalty income, employment, share ownership, stock options, etc?

- ○ Yes
- ◉ No

16.3

16.3 *Is the PI or Co-Investigator(s) aware of any other community relationships, academic interests, financial partnerships, or economic interests (e.g., spin-off companies in which researchers have stakes or private contract research outside of the academic realm) or any other incentives that may compromise their integrity, independence or ethical duties in the conduct of the research?

- ○ Yes
- ◉ No

16.4

16.4 * Is the PI to Co-Investigator(s) aware of any institutional conflicts of interest (financial or non-financial) that may have an impact on the research?

- ○ Yes
- ◉ No

16.5

16.5 * Does the PI or Co-Investigator(s) or anyone connected to them through their interpersonal relationships (including their family members, friends, or their former or current professional associates) have any proprietary interest in the product under study or in any entity that is sponsoring or otherwise supporting the conduct of the study?

- ○ Yes
- ◉ No

16.6

16.6 *Will or does the PI or Co-Investigator(s) or anyone connected to them through their interpersonal relationships (including their family members, friends, or their former or current professional associates) have any association or connection with an entity that is sponsoring or otherwise interested in the outcome of the study? (e.g., consultant, advisor, board member, employee, director, etc.)

- ◉ Yes
- ○ No

*Describe the association or connection:

Dr. Tarek Loubani (PI) is the medical director of the Glia project, one of the companies that collaborated on research and development of this device.

*Describe the proposed management plan to mitigate the conflict of interest:

Dr. Loubani is not involved in decisions that can alter the study's outcome or create any further conflict of interest. If decisions arise that might be related, they will be referred to an external assessor in the Division of Emergency Medicine for review.

16.7

16.7 *Are you or your institution the sponsor of this investigator-initiated/sponsored study?

- ◉ Yes
- ○ No

*Describe any real, potential, or perceived conflict of interest

As both sponsor and PI, I may be perceived to promote this research for personal gain.

*Describe the proposed management plan to mitigate the conflict of interest:

Dr. Loubani is not involved in decisions that can alter the study's outcome or create any further conflict of interest. If decisions arise that might be related, they will be referred to an external assessor in the Division of Emergency Medicine for review.

16.8

16.8 * Are there any other real, potential or perceived conflict of interest to declare to the REB?

- ○ Yes
- ◉ No

18.1

Although the REB requests that you delete previous version documents and replace them with updated, revised documents please DO NOT delete any of the response letters. They can all stay attached. Ensure you have different version date and/or number for each response letter.

18.1 *Upload the Response Letter, listing all REB recommendations/questions/comments and an explicit response to each:

Type	Document Name	File Name	Version Date	Version	Size
REB Response Letter	2020-04-07 Response to ethics	2020-04-07 Response to ethics.odt	07/Apr/2020	April 7 2020	55.9 KB

18.2

18.2 If changes have been made to a previously submitted consent/assent form(s) at the request of the REB, upload track-changes versions of all proposed consent and/or assent form (e.g. screening, main, optional), if applicable:

Type	Document Name	File Name	Version Date	Version	Size
Tracked Changes Document	LOI April 7 2020 Tracked Changes	LOI April 7 2020 Tracked Changes.docx	07/Apr/2020	April 7 2020	29.9 KB
Tracked Changes Document	BiPAP Protocol April 7 2020 Tracked	BiPAP Protocol April 7 2020 Tracked.docx	07/Apr/2020	April 7 2020	117.1 KB
Tracked Changes Document	Data Collection Sheet April 7 2020 Tracked	Data Collection Sheet April 7 2020 Tracked .docx	07/Apr/2020	April 7 2020	21.9 KB

18.3

18.3 If changes have been made to a previously submitted study instruments/stimuli (e.g., survey, questionnaire, interview guide, focus group guide, observation guide, etc.) at the request of the REB, upload the track-changes version(s):

18.4

18.4 Please provide any additional comments for the REB to consider (if applicable):

Dr. Scott Anderson will upload his updated contact information as soon as possible to auto populate under study team members.

19.1

19.1 *Confirm that all study team members have received a certificate for completion of human research ethics training through one of the following (select ALL that apply):

- [x] Tri-Council Policy Statement (TCPS2) Core Tutorial
- [x] Collaborative Institutional Training Initiative (CITI Program)
- [ ] Other

19.3

19.3 *Principal Investigator OR Delegate Signature:

The Principal Investigator may choose to sign off electronically on all **re-submissions** (i.e., response to REB recommendations) or he/she may delegate this task to another qualified individual. **NOTE:** The PI is still fully responsibility for the scientific and ethical conduct of the study at this institution.

- I attest that this application as submitted is in compliance with the TCPS2 (2nd edition of Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans); AND, if applicable, with the provisions of the Ontario Personal Health Information Protection Act and its applicable Regulations; AND, with all other applicable laws, regulations or guidelines (e.g., if applicable, Food and Drugs Act and applicable Regulations; International Conference on Harmonization Guidance E6: Good Clinical Practice);
- I attest that, to the best of my knowledge, the information in this application is complete, current and accurate;
- I attest that this application contains the current and complete protocol, including, if applicable, any sub-studies;
- I acknowledge that I am responsible for promptly reporting any of the following to the REB:
  - modifications or amendments, such as changes in PI, changes in Co-investigator (if applicable), specific required changes to the Letter of Information/consent form, etc.;
  - all local reportable events that meet the REB reporting criteria, including but not limited to local unexpected, serious adverse events (SAEs), privacy breaches, protocol deviations and any new information that may adversely affect the safety of the participants or significantly affect the conduct of the study;
  - progress report (renewal/ continuing review form), annually or as often as requested by the REB;
  - study completion or termination;
- I certify that REB approval and all external and local institutional approvals will be obtained before the study will commence;
- I certify that the research team will adhere to the protocol and consent form as approved by the REB unless to eliminate an immediate safety hazard to participants and in accordance with any conditions placed on the REB approval;
- I certify that all information provided in this application represents an accurate description of the conduct of the study.

Privacy and Security Acknowledgement:

- On behalf of all members of my research team, I recognize the importance of maintaining the confidentiality of personal health information (PHI)/Personal Information (PI) and the privacy of individuals with respect to that information;
- I will ensure that the PHI/PI is used only as necessary, to fulfill the specific study objectives and related study questions described in the application approved by the REB. This includes all conditions and restrictions imposed by the REB and the institution in which the study is being conducted, governing the use, security, disclosure, return or disposal of the study participants' personal information;
- I agree to take any further steps required by the REB or the institution to ensure that the confidentiality and security of the PHI/PI is maintained in accordance with the Personal Health Information Protection Act (PHIPA) and/or Freedom of Information Protection of Privacy Act (FIPPA), its accompanying regulations, and the Tri-Council Policy Statement

Signed: This form was signed by Ms Chelsea Darling (chelsea.darling@lhsc.on.ca) on 07/Apr/2020 9:23 PM