researchNS

UV Light Project Q+A

(reviewed and approved by lead researcher at NSH)

Key Messages:

- Far-UVC may offer a viable approach to improving infection control in long-term care facilities.
- Nova Scotia has significant research capacity. We are looking at Far-UVC as an additional tool to combat airborne transmission of influenza-like illnesses, respiratory infections, and COVID-19 in our long-term care facilities.
- This is a unique partnership between a research funder, provincial government, LTC facilities and researchers at a health authority to help address the COVID-19 pandemic.
- Participating sites include Northwood's Halifax campus and Windsor Elms Village in Falmouth. Locations have been selected by the research team in conjunction with provincial public health officials and Nova Scotia Health.
- Far-UVC devices, which provide disinfection from the ultraviolet light that is emitted, will be installed in high traffic areas (e.g. dining rooms, main corridors).
- Although exposure to Far-UVC light has been found to be safe for skin and eyes, staff and residents will be closely monitored.
- The study will span two flu seasons to collect sufficient data to be able to determine effectiveness and sustainability of this approach.

Describe the project. What are the objectives? How will it help with the province's response to COVID-19?

Key project objectives include:

- To understand key perspectives of stakeholders (residents, staff, and experts) in implementing the trial.
- To determine whether far-UVC light causes a reduction in the incidence of influenza-like illnesses, respiratory infections, and COVID-19 infections among residents of nursing homes.
- To determine whether using far-UVC light increases the incidence of erythema and photokeratitis among residents and staff in long-term care facilities.
- To determine the feasibility, acceptability, efficacy, and scalability of implementing far-UVC as an infection prevention approach in nursing homes.
- To estimate whether the benefits of far-UVC outweigh the costs.

Findings from this research could not only have a positive impact on the province's response to COVID-19, but it could also further protect long-term care residents from other influenza-like illnesses and respiratory infections.

Could UV light replace or impact other COVID-19 testing and prevention systems?

UV would work to complement existing testing and preventions systems. In the LTC setting where many are frail or living with dementia, the intent would be to enhance the prevention where people may not be able to reliably wear masks, maintain physical distance and wash their hands.

Who are the researchers?
Dr. Kenneth Rockwood (Geriatric Medicine), Dr. Melissa Andrew (Geriatric Medicine), Dr. Ian Davis (Infectious Diseases), Dr. Jason LeBlanc (Microbiology), Dr. Tara Sampalli (NS Health Research, Innovation & Discovery), Dr. Gail Tomblin Murphy (NS Health Research, Innovation & Discovery) and relevant research leads from Research, Innovation & Discovery.

When will the project begin?
We are finalizing our protocol and aim to begin the qualitative study in the fourth week of February.

Where will the UV light be installed? How were the locations selected?
Participating sites include the Northwood campus on Northwood Terrace in Halifax and Windsor Elms Village in Falmouth. These sites were selected by the research team in conjunction with provincial public health officials and Nova Scotia Health. Key considerations included diversity of neighbourhoods, residents, experiences with COVID-19, and proximity to one another.

Will additional locations be identified?
The trial period will span two flu seasons to allow sufficient data and sample size to describe the efficacy and sustainability of the far-UVC intervention. The team will be responsive to key policy and planning needs during post pandemic times and will support the design and implementation of a potential third site pop up site. Findings will be made available regularly to support key policy and planning.

How will the project be conducted? What is the methodology?
The far-UVC and placebo lights will be placed in high traffic areas (e.g. dining rooms, main corridors). Their output power will be controlled to meet the 24-hour exposure threshold limit value set by the American Conference of Governmental Industrial Hygienists (ACGIH) for the 222nm wavelength, which has been demonstrated to be skin-safe in other settings.
The number of units for each neighbourhood was determined based on the number of residents per neighbourhood and to maximize effective coverage in common areas, including entrance areas and elevators. Each neighbourhood will have 9 lamps installed for a total of 36 units per site. In addition, far-UVC lamps will be installed in common areas for a total of 50 units per site overall.

How does the research team know the lights are safe?

- Far-UVC light was introduced specifically to be used as a safe alternative to UCV lights which has been used for decades.

- The light disrupts the membranous outer walls with which viruses protect themselves.

The decades long experience was with light at 254 nm. That wavelength is enough to also damage human tissue cells. Far-UVC light, by contrast is only 222 nm and several lab studies have shown that this in not harmful to humans at anything close to the dose that we will be using.

In the lead up to this project, a review of current scientific literature and other studies of far UVC technology has been completed. Far-UVC is emerging as a safe form of ultraviolet light disinfectant to kill airborne viral transmissions, including SARS CoV-2 virus (Brennar 2020). Far-UVC light (207–222 nm) in low doses effectively kills pathogens without damaging exposed human tissues (Welch et al. 2018; Buonanno et al. 2020). Preliminary data suggests using the regulatory safe level of exposure of lower dose UVC light (far-UVC light) can inactivate >95% of aerosolized H1N1 influenza virus and 90 percent of human coronaviruses in 8 minutes and almost 100 percent in 25 minutes (Buonanno et al. 2020). Light settings in this study are based on thresholds and limits set forth. If a participating individual in this study sat under the lamps installed, which will only be installed in common spaces, for 24 hours straight they would still not reach the limit/threshold. Continuous and low dose far-UVC light technology is thus emerging as a safe and viable option to disinfecting indoor environments.

These lights are the size of smoke detectors and will be ceiling mounted preventing trip hazard for residents and staff. They are dim lights that are not intrusive when they are on and they are not hot to touch and will be ceiling mounted.

Even so, to ensure this safety holds up to the skin of older adults in the homes, we will be actively monitoring for adverse events that are seen with 254 nm of light. That is exhibited as red skin or sore eyes. For this reason, we will have access to consultation from dermatology and ophthalmology as part of our advisory council who will meet weekly to review study progress and safety of participants.

What are the risks?
We know the risks are minimal, even to residents. Still, we are taking numerous steps to ensure that this is so. These include mounting of UVC lights to the ceiling to ensure it is out of reach and minimally invasive to residents. Extensive work has been completed with the manufacturer and a biomedical engineer to determine mounting location and light settings for dosages. Although not expected at the light spectrum being used, participants will be monitored for any unwanted effects to skin and eyes. We will have daily monitoring by a study nurse at each site and we will have an advisory council check in each week in addition to regular meetings between research and facility staff.

Can someone opt out of the study?
Organizational consent will be used for this study. If individual residents do not wish to

participate, the research team and relevant team members will work with the facility leads to identify ways to address concerns and to respect the wishes of those unwilling to be part of the study.

If there is a significant proportion of the residents with dementia, how are you able to gain consent?
Following National Guidelines and local practice for those who cannot consent, a substitute decision maker for the resident will be contacted.

If this is shown to be effective with no adverse health effects, how could you withhold this effective intervention from the placebo group?
The purpose of doing this study is to help establish effectiveness and safety of far-UVC in the long-term care setting. Data will need to be gathered and analyzed to ensure that it causes a reduction in the incidence of influenza-like illnesses, respiratory infections, and COVID-19 infections and does so in a safe manner. This scientific approach will provide valuable insight whether this intervention can be added to existing disinfection approaches.

This is a research project. Will a final report be published?
While raw data will not be released, the research team will provide regular project reporting over the course of the 2-year project. A final report on the research project would be made publicly available following appropriate reviews from Research Nova Scotia and the advisory group.

Who are the members of the advisory group?
Study will include an advisory council with diverse expertise to ensure scientific rigour and quality of the study and ensure that safety and ethical standards are being met. The experience of residents and staff will also be a top priority. The council will include leading and relevant scientific experts, site leads and staff from participating sites, providers, residents, policy and decision makers who will be engaged from the design phase of the trial with regular check-in and consultation opportunities. They will also be involved in knowledge translation activities.
The council will:

- Offer ongoing scientific review, rather than the point-in-time peer/merit review of a research proposal.
- Data monitoring and safety, including halting the research if unexpected negative impacts arise.
- Offer a range of perspectives and guidance to ensure quality and safety of all involved in the study.

What is the cost of this research project? Where is the money coming from?
Total cost is estimated at $1.7 million and includes staff, equipment, materials, and testing. Funding is allocated from the initial $50 million contribution to the Nova Scotia COVID-19 Response Council. Research Nova Scotia is the eligible recipient of funds not used for programming like the Small Business Impact Grants and Workers' Emergency Bridge.

What is the role of Research Nova Scotia in this project?
Research Nova Scotia worked with the research team and the province to actively shape the direction, scope, and scale of this research project. RNS worked with the project team to ensure scientific rigour in developing the proposal and will be active in the advisory council. By ensuring the collaboration among all partners - the research team, Nova Scotia Health, funders, public health, Northwood, and Windsor Elms Village – the project has happened in an accelerated fashion. Research Nova Scotia is engaged in active administration and monitoring of the research project.

How does Research Nova Scotia determine what COVID-related research projects to steward? (to be answered by RNS)
The Research Nova Scotia (RNS) strategy is founded on the principle of identifying first what needs to be accomplished, and then building a research agenda to achieve these goals. RNS relies on engagement with partners and research users to help define critical research areas.

To date, RNS has supported 20 COVID-related research projects in Nova Scotia. Identifying the gaps that remain requires a collaborative effort of the Province of NS and RNS to co-develop priority COVID-related research areas. RNS is ready to deploy funds to the research areas considered most urgent for the people of Nova Scotia. For each of the research priorities identified, partners will be required.