Rapid Implementation of an Early Respiratory Intervention Protocol: Lessons from the Frontlines

We interviewed Lauren Westafer, DO, MPH, MS, IDHPS Fellow, and Assistant Professor of Medicine at UMMS-Baystate about her recent implementation of an Early Respiratory Intervention Protocol here at Baystate to address the needs of patients sick with SARS-CoV-2.

Lauren, what inspired you to create the Early Respiratory Intervention Protocol?

My colleagues and I in Emergency Medicine were noticing, in the early days of the COVID-19 crisis, that patients who appeared comfortable and were on nasal cannula were subsequently getting intubated on the floor shortly after admission. Even worse, we knew from early data that once patients with COVID-19 are intubated, they are at high risk for prolonged and complicated courses on the ventilator and death. Like most hospitals, we were following recommendations from multiple organizations that early intubation be used, a decision that was driven by reports that non-invasive modalities posed a high risk of failure and subsequent intubation and fear that high-flow nasal cannula (HFNC) or noninvasive ventilation (NIV) would aerosolize SARS-CoV-2 and unnecessarily expose the health care team. However, within days, we had more than 40 patients who were intubated in the ICU. These numbers didn’t seem sustainable, and given the poor expected outcomes for these patients, it seemed there had to be a better way.

How did you approach the creation of the protocol?

Well, the first thing that I did was really dig into the literature, but it was beyond sparse. The recommendation for early intubation cited a 12-patient series in which 5 patients were trialed on NIV but ultimately intubated and placed on invasive mechanical ventilation (IMV). As the pandemic progressed, more case series and small studies were published, revealing a different picture. Sun and colleagues reported a multifaceted intervention that used NIV or HFNC and awake proning and the result was that fewer than 1% required IMV. However, within days, we had more than 40 patients who were intubated in the ICU. These numbers didn’t seem sustainable, and given the poor expected outcomes for these patients, it seemed there had to be a better way.

How did you get buy-in from all the stakeholders within the Baystate System?

I knew early on that even if we implemented the protocol in Emergency Medicine, it would really only work if clinicians across the spectrum of care followed the protocol – otherwise the patients would end up being intubated regardless. For this reason, I assembled stakeholders within our organization from emergency medicine, hospital medicine, critical care, and respiratory therapy. The main issues we had to overcome were: 1) the quality of the evidence for treatment of this novel disease was much lower than our typical threshold to change practice and 2) anything we created had to be amenable to near-immediate implementation.

The group reached consensus within 48 hours and quickly disseminated the protocol (figure below). It was updated for ease of use several times, based on feedback from bedside use by clinicians. This protocol differs from usual management of acute respiratory failure in several ways. First, we had consistently observed that a subset of patients...
presented with profound hypoxemia but minimally increased work of breathing, so the protocol encouraged tolerance of lower oxygen saturations than is usually seen on inpatient units outside the ICU (≥88%). Second, the protocol leveraged early “awake” proning by patients. Historically, proning is used in mechanically ventilated patients with acute respiratory distress syndrome (ARDS) to improve ventilation-perfusion matching, promote more uniform ventilation, and increase end-expiratory lung volume.8 Prior literature was limited to the use of awake proning in small case series of ARDS and we agreed to trial awake proning in a sizable proportion of our COVID-19 patients outside the ICU.9,10 Finally, we clarified that, with appropriate reduction in risk of aerosolization, HFNC and NIV would be trialed prior to intubation in select patients, in accordance with new guidelines.11

The next step in assuring buy-in was aggressive dissemination and education. We designed a single-page protocol for ease of use at the bedside, and we then disseminated the protocol throughout the institution using not just email but also text messaging (WhatsApp) and (Google Drive) to reach clinicians. The hospitalists trained leaders among nursing, respiratory therapists, and clinicians on the protocol who then trained staff. As a result of these efforts, adoption of the protocol was essentially immediate across the institution, within 12 hours of protocol approval.

COVID-19 RESPIRATORY PATHWAY

Awake proning is beneficial
Early intubation may not be needed
Permissive hypoxemia is ok. Target O2 saturation ≥88%
See text for information and references

Does the patient with suspected or confirmed COVID-19 have O2 <88%

Yes

Start O2 Up to 6 L via face mask

O2 ≥88%

Continue-supplement O2, Monitor ≥ 1/2 hours

No

Awake proning

Awake proning (if appropriate) to maintain O2 ≥88%

based on work of breathing and patient tolerance

Initiate awake proning

Patient must meet following criteria

Respiratory rate <30

No restrictions

Alert, released, follow instructions (no AMS)

Patient able to tolerate rolling over (on or off side)

No additional contraindication

1. Remove chest leads /stickers

2. Place cardiac leads on back

3. Avoid patient rolling over

4. Ensure leads, wires, lines, O2 in place

5. Continue oxygen or HFNC

6. Ensure call bell in patient’s hand /reach

7. Consider nothing by mouth for visualization of patient

8. Maintain sedation

RN reassess after 15 minutes

Is the patient tolerating respiratory support ≠ proning?

(CO2 ≥ 60%)

No respiratory distress /AMS /signs of poor perfusion

Escalate respiratory support based on patient’s work of breathing/mental status/perfusion

↑ HFNC to: FiO2 0.8 ± 30 LPM

or

NIV, EAP: 10cmH2O and FiO2 0.6

or

intubation

Yes

Escalate respiratory support

Patient cannot tolerate

± no change

In general, consider these patients for intubation:

- Respiratory distress and/or shock

- HFNC FiO2>0.8

- NIV EAP: 10cmH2O, FiO2 ≥0.6, or no improvement after 48 h

- ROX index <3.83 predicts high likelihood of failure of HFNC

Can be measured if clinician judgment is uncertain and patient is not improving.

* Pneumonia Absolute contraindications: Respiratory distress, HR >35, accessory muscle use, immediate need for intubation based on clinician judgment. Hemodynamic instability (SBP <90 or unstable), sepsis, uncontrolled patent arterial hypertension, chest, or abdominal surgery

Pneumonia Relative contraindications: Facial injury, temporalis masses (e.g. temporal artery), deep vein thrombosis, or extensive intubation, chest, or abdominal surgery
Where do you go from here?
It’s interesting because for all the challenges and losses we’ve all experienced over the last few weeks, this does, in some ways, also feel like an opportunity for implementation science. When you think about implementation of evidence generally, it’s not uncommon for knowledge translation to take a decade or more (think of beta blockers after MI, for example). Even Advanced Cardiac Life Support protocol updates can take over a year. In contrast, the COVID-19 pandemic has highlighted the importance for rapid dissemination of knowledge. We are still considering how to measure outcomes of this protocol. Of course, we are thinking about patients’ clinical outcomes; days on ventilator, death, disability, and other outcomes. However, we’re also curious about use of the pathway: Did clinicians find it easy to use? Generalizable? What are the barriers to its use? Further, we think that the methods we used to generate information (crowdsourcing, social media, and resources such as blogs and podcasts) aren’t going to go away but may emerge as important sources of rapid, real-time information for future clinical challenges. These are points for future work. For now, we’re just proud of the development of this new paradigm for respiratory support because it considers emerging literature from a variety of sources and represents an implementation story that took days rather than years.

References

Integrating a Parenting Intervention for Mothers with Substance Use Disorder into Child Development Services

We interviewed Lili Peacock-Chambers MD, MS, IHDPS Fellow and Assistant Professor of Pediatrics at UMMS-Baystate about her NIH-funded Career Development Award integrating an evidenced-based intervention for mothers with substance use disorder (SUD) into home visiting services.

What are the goals for the award?
The primary goal of this 4-year award is to test the feasibility and acceptability of an evidenced-based intervention for mothers with SUD when integrated into existing home-based child development services, called Early Intervention. As a career development award, the goal is also to advance my skills as a behavioral intervention researcher through mentorship and formal coursework.

The motivation for this research project is to make an evidence-based...
parenting intervention specifically designed for mothers with SUDs more accessible after the birth of a child, when the rate of overdose triples. Such parenting programs have the benefit of reducing the rate of relapse for the parent and strengthening parent-child relationships that support the child’s long-term health. In order to make the intervention more readily accessible to postpartum women, we proposed adapting it for in-home delivery by Early Intervention, a national program that serve families with children from birth to age 3 years. Over the past 3 years, we have engaged community partners and families to inform the adaptation of the intervention and began testing the training and delivery over the past year.

This new grant will allow us to evaluate feasibility and acceptability of the intervention in a pilot randomized controlled trial (RCT). In this trial, we will enroll 40 participants to be randomized to the intervention or standard Early Intervention services. We will work with multiple Early Intervention programs in the greater Springfield area. We will test the research procedures and outcomes measures to be used in a fully powered clinical trial. In addition, we will collect qualitative data to guide future refinements to the intervention.

**Who are your partners this research?**

Our primary partner over the past 3 years has been Behavioral Health Network (BHN) including the BHN Early Intervention program. We also work closely with the Hampden County perinatal coalition for pregnant and postpartum women with opioid use disorders. Our advisory panel includes employees of Baystate Medical Center (OB/GYN, social workers), SUD treatment providers, early childhood education providers, and the Department of Children and Families. Families affected by SUDs contributed greatly to the planning through participation in qualitative interviews.

**Who are your research mentors?**

This particular award is designed for early career investigators and therefore includes formal course work as well as guidance from a mentorship team with unique expertise. The mentors on this project include Dr. Peter Friedmann (UMMS-Baystate: primary mentor and addiction health services research), Dr. Nancy Suchman (Yale School of Medicine: intervention developer and PI of the NIDA funded RCTs), Dr. Nancy Byatt (UMMS: perinatal mental health expert); Dr. Emily Feinberg (Boston University School of Medicine: maternal-child health systems researcher); Dr. Paul Visintainer (UMMS-Baystate: Director of epidemiology and biostatistics). During the course of this award, I will advance my training in behavioral intervention research, substance use disorders, and advanced statistical methods.

**What are the next steps for this project?**

The first step of the project is to engage additional stakeholders to reflect on the findings from our on-going beta-test of the intervention. This feedback will inform any further adaptations prior to the pilot RCT. Next we will train additional Early Intervention providers in delivery of the intervention and begin recruitment of mothers with SUDs and young children. The pilot RCT will be conducted over the next 3 years and inform a future trial.

**Population Health Snapshot: Smoking Rate and Smoking Cessation at BMP**

Over the past 50 years, the number of American adults who smoke cigarettes has steadily declined from approximately 40% in 1965 down to around 14% in 2017, according to data from the CDC. Despite lower rates of cigarette use, smoking is still the leading cause of preventable death in the United States and remains exceedingly costly in terms of both health outcomes and medical expenses. For example, approximately 16 million Americans are currently living with conditions that are caused by smoking. In additions to various types of cancer, cigarette smoking causes heart disease, stroke, lung diseases, and chronic obstructive pulmonary disease (COPD), among other conditions, and is responsible for 480,000 deaths annually in the US. Moreover, life expectancy for smokers is 10 years lower than for non-smokers. With respect to financial impact, the total cost to the US economy attributed to smoking is more than $300 billion per year, including direct costs for medical care as well as lost productivity.

Patients seen for primary care in the Baystate Medical Practices have rates of smoking which are consistent with national data. That is, 14% of BMP patients are current smokers, with 12% of female patients and 16% of male patients, the same rates most recently
reported by the CDC for the US population. We observe differences in smoking rates based on age; race and ethnicity; and insurance coverage as noted in the figure below. Specifically, higher rates of smoking are observed among men, Hispanic and Black individuals, and Medicaid beneficiaries.

Surveys of smokers over the last 10 years have revealed that approximately 6% of smokers report using prescription medications to aid in smoking cessation at the time of the survey. We observed that over the past 12 months, 38% of smokers in BMP primary care practices had an order placed in the electronic record for either nicotine replacement therapy (31%) or varenicline (7%).

In addition to the frequent advice of primary care providers to their patients about the benefits of smoking cessation, there are many other initiatives for engaging smokers across Baystate Health System. Such programs are intended not only to improve motivation for smoking cessation efforts, but also to provide assistance and support for those smokers interested in quitting. For example, integrated behavioral health clinicians, located in our primary care offices, are trained to provide evidence-based behavioral assistance for health behavior change, including smoking cessation. Additionally, staff in the outpatient cardiac rehabilitation program, see approximately 10-20 smokers with cardiac conditions per month for assistance with quitting. New programs are also being developed to expand services for smokers to various sites of service and teams, including the potential for a grant-funded, intensive inpatient smoking cessation program as well as a pharmacist-led intervention for patients who are on chronic anti-coagulation.
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