A three-part series from an Interview with an International Thought Leader in Early Mobility

Part One: The Time is NOW!

Getting to know Dr Dale Needham

Dr Dale Needham is an Intensivist and Medical Director of the Critical Care Physical Medicine & Rehabilitation Program at Johns Hopkins Hospital in Baltimore, MD and a Professor in Pulmonary & Critical Care Medicine, and Physical Medicine & Rehabilitation at Johns Hopkins University. He is Director of the Outcomes After Critical Illness & Surgery (OACIS) group at Johns Hopkins University, that is a multi-disciplinary clinical and research team focused on research and quality improvement projects to improve the outcomes of ICU patients.

A selection of papers from the OACIS group can be found at http://www.hopkinsmedicine.org/pulmonary/research/outcomes_after_critical_illness_surgery/

A more detailed list of Dr Needham's publications can be found at http://www.ncbi.nlm.nih.gov/myncbi/browse/collection/47220259/?sort=date&direction=ascending

Dr Needham started practising Intensive Care Medicine 13 years ago. Around that time, he started as part of a NIH-funded research study evaluating the long-term physical and psychological outcomes of ARDS survivors, and his work in the field of early rehabilitation in the ICU continued to build from there.

“We looked at patient outcomes at 3 and 6 months and then 1, 2, 3, 4 and 5 years after ARDS, and it became clear to me from seeing the patients with my own eyes, as well as from the research data, that there were real long-term problems that ARDS survivors faced..... and from there the research and clinical work in this area just snowballed”

“What makes this work so interesting, fun and enjoyable is that from a clinical perspective, we can see improvements in our patients in front of our very eyes from the approach to care that embraces patients being awake and moving. Changes that we never saw when we were providing deep sedation and bed rest”

The body of work that Dr Needham and his team at Johns Hopkins have built over more than a decade and their contribution to the field of intensive care medicine is astounding as we see in the extensive list of publications and clinical networking and educational resources they have developed.

Dr Needham explains the importance of work in ICU Early Mobility and Rehabilitation, and the importance of building the body of evidence to demonstrate that this CAN be done as part of routine care.
“It is important to disseminate the findings widely through publication and presentations to increase awareness and build interest in the evidence base and increase uptake by providers in other ICUs”.

In addition to the research papers, Dr. Needham publishes and presents about quality improvement projects outlining the steps needed to actually implement early mobility programs, and build structural change that is sustainable over time.

**What difference does ONE DAY make?**

One of Dr Needham’s recent publications, first authored Dr. Eddy Fan, looked at a number of patient and ICU related variables that they hypothesized would be associated with long-term decreases in muscle strength in ICU patients.

This study found that only TWO variables had consistent long-term associations with a relative decrease in muscle strength. The first was age, which is not a modifiable risk factor, but helps identify the patients most at risk for long-term weakness. The ONLY other variable that had a statistically significant effect AFTER adjusting for sedation, severity of illness and nutrition variables was the number of days of bedrest.

The hope is that this evidence motivates clinicians NOT to delay onset of rehabilitation and mobilization of patients in the ICU.

“Every single day may have a long term impact.”

Puthucheary and colleagues, published in JAMA 2013, demonstrated rapid muscle wasting in the ICU, through ultrasound, muscle biopsy and biochemical analysis. This study found that even after 3 days of immobility, there were already measurable changes in the cross-sectional area of the quadriceps muscle, and by just day 7, there was a 12.5% loss in cross sectional area. Additionally, this study showed myofiber necrosis in over 50% of the patients, and depressed protein synthesis in the muscles even on day 1 compared to healthy controls. The overall conclusion of this seminal work was that muscle wasting occurred early and rapidly during the first week of critical illness, and was further exacerbated in the presence of multi-organ failure.

The study by Fan, Needham and the team at Johns Hopkins is the first study in critical care to empirically show a relationship between the ICU-acquired weakness and long-term functional outcomes, complementing the work by Puthucheary and colleagues.

“Not only are the muscles in the legs affected, resulting in difficulty with functional tasks and self-care from a mobility perspective, but the inspiratory muscles also show long-term weakness. This further compounds the functional difficulties for these patients, which shows up in compromised 6 minute-walk test, which is a standard measure of physical function, and in lower quality of life scores as measured by the SF-36 survey.”
Why do some studies show no benefit from Early Mobility, and others show improved outcomes?

Building on the foundation of these studies, Dr Needham discusses the apparent conflict in outcomes among studies in a recent review article, published in CHEST. This review did a great job of unpacking the differences between clinical trials that have shown positive functional outcomes, and those showing no significant functional benefit with early mobility.

One study that showed no significant benefit from early mobility, was by Denesy et al comparing intensive physical therapy to usual care in a single center randomized controlled trial in Australia, published in Critical Care in 2013. Patients in the intervention group received care that was graded, individualized, and aimed at improving physical function. The protocols were based on exercises that were consistent with Australian physiotherapy practices in the ICU. However, the interventions received by the control group in this study may have been too similar to the intervention group to show any significant difference. The authors noted that usual care (control group) in their ICU included early and intensive physical therapy interventions, aimed at improving strength, endurance, and functional mobility.

The other study that did not show a significant difference in outcomes was done in the United States by Moss et al, published in American Journal of Respiratory & Critical Care Medicine in 2015. Interestingly, the median time to the start of physical therapy in the Intervention group was 8 days, which was the same as the Control group in a prior randomized trial of early vs. later onset of physical and occupational therapy in the ICU. So this trial by Moss et al really looked at later onset intensive intervention. The fact that outcomes were not significantly improved for the intervention group further points to the importance of early intervention given the rapidity of muscle wasting over the initial days in the ICU for mechanically ventilated patients.

In the studies demonstrating improved outcomes, the mobility interventions were initiated much sooner. Schweickert and colleagues started combined PT and OT intervention at a median of 1.5 days after start of mechanical ventilation and in the Morris and colleagues study in 2008, interventions were initiated within 48 hours of the start of mechanical ventilation.

In the context of the work by Puthucheary et al, showing early and rapid muscle wasting in the setting of ICU immobility and Dr Needham’s team findings that each day of delay to mobilization has a significant and long-lasting impact on muscle strength, the delay in initiating physical therapy interventions, may have partially explained the lack of difference in outcomes in the Moss study.

“So I think the big take away message from this body of work is two-fold: We need to be thinking about EARLY intervention, and that every day that mobility is delayed has potential long-lasting effects on the patient’s health and quality of life. The second take-home message is that we need to continue building the body of evidence so that the whole field of ICU Rehabilitation and Early Mobility is not based on one or just a few randomized controlled studies.”
“The signal seems to be…. Earlier is Better”

In Keeping with the message of Earlier is Better, the deadline for submitting abstracts for posters or oral presentations at the 5th Annual Johns Hopkins Critical Care Rehabilitation Conference is available until June 30th and Early Bird discount for registration is also available until that date.

www.Hopkinsmedicine.org/OACIS/ICUREhab

Watch this space for the next 2 parts in this series:

Part II: Identifying and overcoming barriers to implementing ICU rehabilitation

Part III: Technologies and advances in ICU rehabilitation

References:
3. Hashem MD, Parker AM, Needham DM. Early Mobilization and Rehabilitation of the Critically Ill Patient CHEST Published online March 24, 2016 doi:10.1016/j.chest.2016.03.003.

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