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Intensive Care Systems Research-Interview With Associate Professor Hannah Wunsch



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Your research centres on the organization and management of critical care services. What drew you to this area?

In medical school, I was on rounds in a surgical ICU, seeing how complex the delivery of care was, and how many people worked to care for any individual patient. This intrigued me and led me to my interest in how we deliver critical care and what sort of difference that makes.

Big data about intensive care is available. Is it of sufficient quality, and are there items that are not being measured that should be?

There are always concerns about the data, such as the quality of specific codes and variables. It is tempting to assume that if the boxes have been ticked off then the data are accurately collected. We need to continue to ask about the quality of data being used for analyses. It is important to remember that there are huge risks associated with assessing and analysing these datasets, as it is always possible to draw wrong conclusions from data. There are also always more items one would like to see more available in large datasets, such as information on medications administered and processes of care in the ICU and hospital, as well as linkage of hospital data with outpatient data.

Your research has shown that some of the variation in intensive care use is independent of hospital and patient factors (Seymour et al. 2012). What are your thoughts on this?

This is a huge area for research. It is important to try to pinpoint what hospital drivers there are, and determine why variation is happening and why we are seeing these extremes in use and so on. The first step is to be aware that variation exists. You cannot do anything about it until you know that it exists, and it is usually quite eyeopening to see just how big the variation can be. There are potentially many different drivers of all the documented variation. You need to understand the system you are working in, and a lot comes down to these systems-level issues. In the US a driver of high ICU use could be as basic as the fact that hospitals are accountable for the wait time in their emergency rooms. Some hospitals may choose to admit patients to the ICU, because that's where there is a free bed. Severity of illness plummets when you do that, and you are not necessarily taking care of critically ill patients in the ICU, but the ICU will be full. On the other hand there are hospitals that have no step-down or intermediate care beds, so when a patient needs a slightly higher level of nursing care they have to be admitted to intensive care. These are examples of ways in which some hospitals may perhaps be using ICU beds in less efficient ways and are not matching patients to beds appropriately. There are many of these potential systems factors out there, and we need to get a better handle on how often these things occur, and what may be modified to make overall care safe and efficient.

You have researched ICU capacity, for example for mechanical ventilation (Wunsch et al. 2013), and have suggested the concept of a Starling Curve for intensive care, whereby extra beds may result in harm (Wunsch 2012). What are the issues with capacity?

Like anything this is a balance. One extreme would be to say that hospitals should run with massive excess capacity, because that way you ensure that no one ever has to wait for an ICU bed. For any individual that is certainly in their best interest, but it has to be balanced against the realities of costs, staffing and the system. We have to decide as a community what excess capacity is appropriate and at what cost potentially to patients. It is a little like saying that in an ideal world everybody will get a new car every year because every year cars get safer. We don't function that way as a society. We accept the fact that some people are driving cars that are a little less safe to drive than others. It's acceptable to have that increased risk. However, where there are not enough beds we can demonstrate the specific harms that result from that situation, e.g. patients sitting in the emergency room for 24 hours on a ventilator or not having the appropriate nursing staffing for a patient while they are waiting for a bed. It is important to recognise that there are two extremes, but what constitutes the "best" balance, we will never know for sure. We should probably run ICUs with "slightly excess" capacity, but it's hard to pinpoint what that means. It is also important to recognise that Starling curves may be different for different countries, because values and societal norms are different. For example, around end-of-life care, what is expected in terms of care may be different. We cannot say that everybody is going to follow the same curve, but I think we need to keep questioning where we are in terms of provision of intensive care and what we are gaining or losing by those choices.

With the move to 'value-based' healthcare in the United States, what might the effect be on critical care?

This is anecdotal, but when I trained, and it's been only 6 years since I finished, there was almost no discussion of costs in the ICU. That has changed, and the way in which we are now teaching residents and fellows is to think not just about blanketing patients with tests and studies because they can, but to really think about what the patient needs done and how it will benefit them. The only way that we are going to get from volume to value is when fee for service is no longer a driver in the ICU and where hospitals do not have a financial incentive to put someone in the ICU. Until that happens, unfortunately, there are strong incentives to fill ICU beds. For some of the big payers in the US, such as Medicare, there has already been a move towards bundled payments for all care.

Of the studies that you have conducted, are there any whose findings surprised you?

The one that stands out is what I call the "low hanging fruit study", a study of ICU bed availability in eight countries (Wunsch et al. 2008). We knew beforehand that there would be some variability in the provision of ICU beds, but I think we were absolutely shocked at just how massive the differences were between some countries. The study included countries in North America and Western Europe — no developing countries — but we still found very large variation. It led us to recognise just how big a driver bed availability could be in terms of who is admitted into intensive care and who is being treated in ICU beds. We also know now that countries that have even fewer healthcare resources show even bigger variation — 20 to 30-fold — in ICU beds (Austin et al. 2014).

What are the issues around follow-up for critical care patients?

Rehospitalisation has become a hot topic across medicine. In critical care, as in the rest of medicine, we are just getting a handle on how much it happens, to whom, and how we might prevent it (Hua et al. 2015). Awareness is increasing, and more studies are starting to come out trying to understand what's going on with these patients. We are not to the point of fully understanding how to prevent re-hospitalisations. However, there are interesting studies out there starting to propose what sort of things may help keep patients out of hospitals. Many of these studies are in specific high-risk groups, such as patients with heart failure, but many of the concepts are likely applicable to critically ill patients in general.

What are the most pressing issues for postintensive care?

We have to be careful that we don't attribute all morbidity after intensive care to the experience of being critically ill. There is a fair amount of morbidity in this population before coming to the ICU, so it is important to quantify what amount of that morbidity really is additional and what was there before. For example, if a patient is admitted to the ICU and he or she has a history of depression and treatment for depression in the last year or two and they are then measured as having depression after intensive care, do we really say that we can and should be doing something to treat that in the ICU? That said, there are many patients who leave intensive care with new disabilities, problems or diagnoses, and unfortunately we are still in the dark in terms of showing that anything we do specifically is making a big difference to that. I think a priority right now is still to identify the key modifiable factors — and modifiable is the important word here. So far we don't have a lot of data on this. I am hopeful that in the next few years we will identify some of these modifiable factors and see some positive results from intervention studies.

How much are quality of life outcomes in the ICU patient-centred?

Qualitative research is not my area of expertise, but an important point about intensive care is that we still have a marketing problem in educating people to really understand what it is to need intensive care and to be in an ICU. This understanding is still not widespread amongst the public, certainly in the US and Canada. It's hard to talk with people in hypotheticals and to really delve into what matters for quality of life. Yet, on the flip side, many of our patients are not in a good position to express their preferences. For those who have experienced intensive care, placing values on quality of life as well as quantity of life is something that the intensive care community has recognised is important — it is not about just mortality. I have a slide in some of my talks with a terrible mortality curve. I make the point that it describes the mortality over a short period of time for patients who are enrolled in hospice care. You expect them to die and the important question is really whether they are receiving good quality care and experiencing a better quality of death than many other people who maybe live a bit longer. It does challenge our central theory of ICU outcomes, which is the idea that lower mortality is always better. I think we are struggling as a community with how we incorporate quality of death into outcomes. For example, how do we evaluate a hospital that provides very high quality palliative care and has a higher overall mortality rate for their patients? They may be providing excellent care and this may be preferable to the care in another hospital that puts a tracheotomy and a feeding tube in many patients, and keeps them alive without having had proactive end-of-life discussions early on. Yet, this hospital may have a lower risk-adjusted mortality. It is a fascinating and really important area for research. I don't know how it is going to shake out in terms of how we try to measure the outcomes for patients, but it brings up important issues, particularly around the value of quality of death or dying.

This interview will appear in ICU Management's Autumn Issue, which has a cover story on "The Brain." What are your thoughts on neuro-critical care?

We need to ensure that we give people with brain injury the appropriate follow-up care they need. Providing good follow-up and rehabilitation options for brain-injured patients is important. Likewise providing very good palliative care and end-of-life care options for those with catastrophic brain injuries is also vital. There is very little research on palliative care specifically in the neuro-ICU, and yet this is a population who may benefit hugely from early discussion. I think this is an area where we will see an explosion of research in the next few years, as people work to figure out how to best meet the specific needs of this population at the end of life.

What research are you are engaged in currently?

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My research is focused around the hospital drivers of different use of intensive care. That will be a lifetime of research! I am following up and elucidating some of those drivers to understand them better. I am looking at the hospital system and how that impacts intensive care, stepping back from the ICU as a single unit to look more fully at interactions between different units and wards, step-down units and the ICU.

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