



THE USE OF INTENSIVE CARE UNITS IN MANITOBA

A summary of the report, *The Epidemiology and Outcomes of Critical Illness in Manitoba* by Allan Garland, Randy Fransoo, Kendiss Olafson, Clare Ramsey, Marina Yogendran, Daniel Chateau, Kari-Lynne McGowan

Summary written by Jack Rach

The Intensive Care Unit (ICU) is the part of the hospital where the sickest patients go. The critical illness that brings patients there causes much suffering. There are often long-term negative effects on physical, mental and emotional health. These issues, in turn, can decrease patients' quality of life and social functioning, impact their economic well-being, and affect the lives of their family and friends.

Fortunately most hospital patients do not need that level of care. However, a new report by the Manitoba Centre for Health Policy (MCHP) shows that care in an ICU may be more common than you think.

Each year, about 0.6 per cent of Manitoba adults are admitted to an ICU. By comparison, about 7.5 percent of Manitobans are admitted to a hospital.

So, when we look at the number of people admitted to an ICU in Manitoba and compare it to the number admitted to hospital, about eight percent of those in hospital need ICU care at some point. Whether this number is too high, too low, or just right is hard to know for sure. However, Manitoba is likely the only place that knows this number with such accuracy. These details come from the combination of data now available at MCHP.

Research at MCHP has used hospital records for years. But recently, more detailed information about ICU care was added in collaboration with the WHRA. So now, Manitoba researchers

and doctors can understand more about the patients admitted to ICUs, the treatments they receive, and the outcomes of that care.

About 0.6% of Manitoba adults are admitted to an ICU each year. That means about 8% of those in hospitals in the province need ICU care.

MCHP uses this type of information while protecting the security and confidentiality of personal details. All records at MCHP are anonymous, so no personal information is available—even to the researchers.

Most previous research on ICUs from around the world included patients from just one or a few hospitals, and usually only for a short time. What makes the information in this report so valuable is that it includes the entire population of Manitoba, from 1999 onward. Plus, it has information from every intensive care unit in the province. We used information from routinely collected files for all hospital patients in the province which was then compared to ICU-specific data. The combination of data sources allowed us to confirm that we capture virtually all ICU use in the province. This allowed for the first comprehensive assessment of ICU care in Manitoba.



No other place has data that allows this kind of detailed population-based research on ICU care. This gives Manitoba a real advantage in terms of research and improving patient care. Plus, this research has implications for the other provinces and territories in Canada. The Canadian Institute for Health Information (CIHI), collects hospital records from across the country, so these research methods could be used to identify ICU care nation wide as well. This is helpful because it tells policy-makers, administrators and researchers that they can reliably use provincial and national health data to identify and measure aspects of ICU care.

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ICU bed supply

How many ICU beds does Manitoba have, and how many do we need? The first question is easy to answer. The second is hard, because it depends on a number of factors. Care in ICUs is often critical for the survival of those patients, so we need to be sure we have enough ICU beds to meet those demands. On the other hand, ICU care is very costly—and the costs are increasing—so we don't want to have more than we need. Finding the right number of beds is important, but not easy.

Many factors need to be considered when planning ICU bed supply. These include things like where the unit is, how often it's full, and how easy it is to transfer patients to other ICUs or out of ICUs to regular hospital wards.

In 2007/08, Manitoba had 118 ICU beds. There were 82 in the six Winnipeg hospitals, nine in Brandon, and 27 more spread among nine rural hospitals. These beds serve all 1.2 million Manitobans, which means we have 9.8 ICU beds per 1000 people. That number is lower than the Canadian average of 13.5 beds per 1000 people. Is this a serious problem? Apparently not.

This study showed that over a nine year period, ICU beds in Winnipeg were completely full less than five percent of the time. Outside Winnipeg, ICU beds were full less than one per cent of the time. That means Manitoba

hospitals run their ICUs quite efficiently. Patients seem to be getting into the ICU when they need to. There are crunch times of course, but Manitoba does not appear to be generally short of ICU beds. In part, this may be due to the way that ICU beds are managed across the province. It allows patients to transfer to another ICU when one is full.

ICU patients

This study focused on adults, since the ICU database does not include children. The average age for ICU patients was 64 years old. ICU admission rates were lowest among young adults and rose with age, especially above 55 years. Admission rates peaked at about 80 years old, and then declined among older residents. Overall, about two-thirds of adult ICU care was for patients 60 years and older. Figure 1 shows these trends in ICU admission rates by patient age.

Several key aspects of ICU use in Manitoba were fairly stable during the 9-year study period. The annual number of ICU admissions dropped slightly over time. There were about 6,600 ICU admissions in 1999/2000, and by 2007/08, that number fell to about 6,200. ICU admission rates declined for those age 50 plus, and the declines were larger among those in older age groups. However, the length of stay in ICUs increased over time, from 3.7 days to 4.3 days on average. So even though the number of cases declined, patients stayed slightly longer in the ICU, resulting in a higher number of days of care provided. This increase impacts the number of ICU beds available.

The increase in the average length of stay was mostly related to an increase in the number of patients who had long stays in an ICU. It is also consistent with another trend identified in this study—that the average severity of illness of patients being admitted to ICUs rose slightly over time. This was true for all adults, young and old.

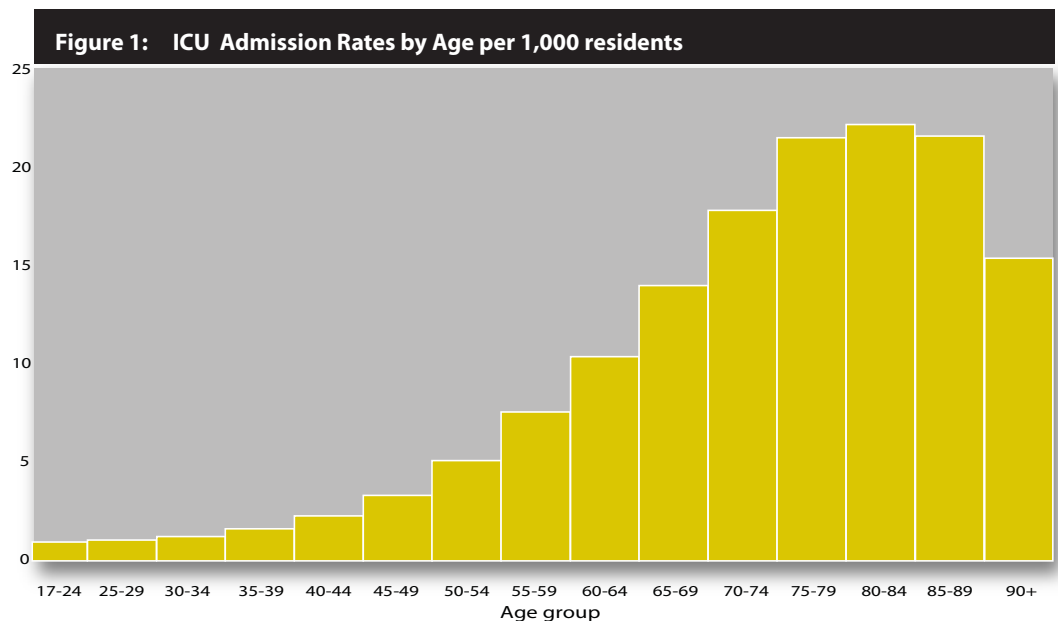
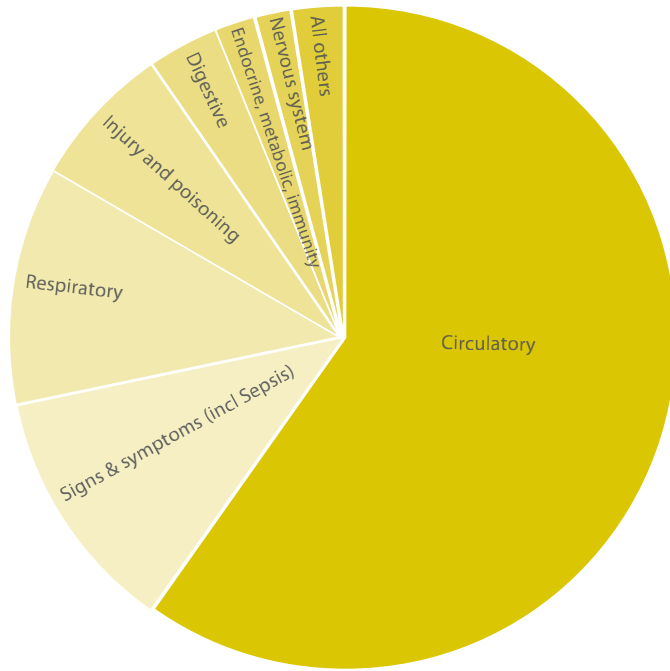


Figure 2: Reasons for ICU admission



In terms of diseases which brought patients into ICUs, circulatory conditions were the most common, accounting for over half of all cases. Of note though, the number of people admitted to ICUs for heart problems fell over time. This trend reflects the decreases in heart attack and stroke rates in Manitoba documented in previous MCHP reports. Other illnesses commonly bringing patients to the ICU were severe infections (sepsis), lung disorders, accidents or trauma, and poisonings. Figure 2 shows the most frequent categories of illness for patients admitted to ICUs in the study period.

Patients admitted to ICUs in Winnipeg can be separated into three groups based on the kind of problem that brought them to the ICU: cardiac, surgical, or medical. Cardiac patients are

those whose critical illness is related to heart and/or circulatory issues. The most common causes are heart attack and stroke, but this category includes other cardiovascular-related problems as well. The surgical category includes patients who needed major surgery, and whose recovery begins with time in a surgical ICU. This category includes those recovering from cardiac surgery (i.e. bypass). The medical category covers all other critically ill patients, including those with respiratory problems, severe infections, poisonings, or trauma that did not require surgery. On average, cardiac patients were less severely ill than other ICU patients. Medical patients had the highest average scores for illness severity and surgical patients were in between. Figure 3 shows the average scores for each group, using the Acute Physiology and Chronic Health Evaluation (APACHE-II) scoring system.

Repeated need for ICU care was surprisingly common. One-sixth of ICU care was for people who had previously been in a Manitoba ICU during the nine year study period.

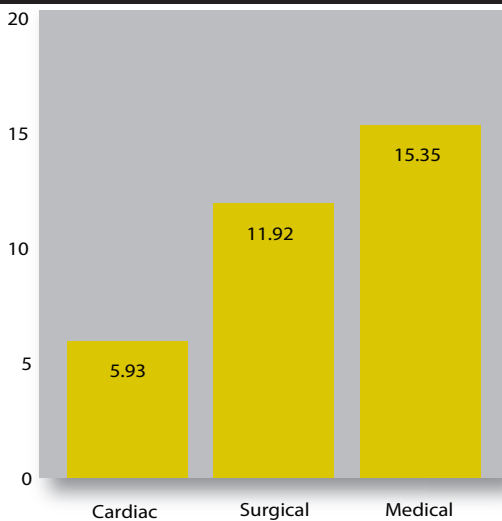
As noted earlier, the ICU sees some of the sickest people in the province. From this study, we now know that about 17 percent of these patients died while in hospital. Another three percent of ICU patients died within six months of admission, but after leaving the ICU. These figures are similar to those reported from other provinces and other countries.

We also need to bear in mind that the ICUs in this province serve not just Manitobans. The report found that about five percent of patients admitted to intensive care units in Manitoba were from outside the province. Over half of these people were from Ontario. This makes sense, as Winnipeg is the closest centre for high-level critical care for many residents of Northwestern Ontario. Others came from Saskatchewan and Nunavut, among other places.

The Intermediate Intensive Care Unit

The Health Sciences Centre in Winnipeg has a unit called the Intermediate Intensive Care Unit (IICU). This six-bed unit is usually full, caring for patients who require longer-term artificial support for their breathing. While these patients only accounted for about 0.8 percent of all ICU admissions in Manitoba, they used over eight percent of all ICU bed-days in the province. On average, these patients stayed about 43 days in an ICU, half of which was in the IICU. The researchers in this report suggest that many of these patients could be transferred to appropriate chronic care facilities earlier in their hospital stay, if more such facilities were available. This change in procedure and policy would provide more flexibility in the management of ICU beds, which would be particularly helpful during high-pressure periods. Also, experience in other countries has shown that such facilities can be more successful in weaning patients from artificial ventilation sooner.

Figure 3: Illness severity of ICU patients



Differences in ICU use

Like previous studies, the results in this report show that men accounted for about 60 percent of patients in ICUs. Because of the rich data available in Manitoba, we were able to look into this difference more closely. Using a unique approach developed in this study that focused on disparities, we found a higher underlying rate of critical illness among men, which likely explains their higher rate of ICU use. A portion of this is related to the higher rate of heart attacks among males because complications from heart disease remain the most frequent cause of ICU admission (over 50 percent). Simply put, men outnumber women in ICUs because they are more likely to have a critical illness requiring ICU admission. So there does not appear to be a bias against females, even though their rates of ICU use are lower than those for males.

We also know that there is a long-standing association between health and wealth. Those living in lower income neighbourhoods typically have poorer health status and higher rates of chronic disease than those from higher income areas. It is therefore good news that previous MCHP reports have documented higher rates of physician visits and hospital admission among lower-income residents. But what about ICU use? Given their poorer health status, we might expect higher use of ICUs by residents of lower income areas. And that is indeed what we found, at first. However, when we applied our new approach to looking at disparities in ICU use, the trend reversed itself. Residents of higher income areas were slightly more likely to be admitted to an ICU. This finding is similar to previous research at MCHP on the use of Diagnostic Imaging.

Rural-Urban differences

It shouldn't surprise anyone to learn that patients treated in rural ICUs were not as sick as those treated in Winnipeg and Brandon, because the sickest patients get brought to the most advanced care centres. Nine percent of patients admitted to rural ICUs required transfer to one of the high-intensity urban ICUs. Patients who used only rural ICUs were less sick, spent less time in ICUs, and were less likely to die than patients admitted to urban ICUs.

Other Findings

The study also looked at the use of the healthcare system by patients for one year after they left an intensive care unit. We looked at hospital care, physician visits, prescription drugs, home care, and placement in Personal Care Homes (Nursing homes), exploiting the strength of MCHP's data system. ICU patients' use of the healthcare system turned out to be remarkably similar to that of people admitted to hospital but who did not use an ICU. The main difference was that ICU patients were almost four times more likely to be admitted (again) to an ICU in the year after discharge.

Conclusions

Manitobans appear to have good access to ICU care, even though the supply of ICU beds in Manitoba is lower than the national average. This is likely related to the centrally organized system of critical care medicine in Manitoba, and its ability to transfer patients from one ICU to another when an ICU reaches full capacity. This is a key advantage, as the data show that the day-to-day demands for ICU care can vary considerably.

The frequency of ICU use declined slightly over time, but the average length of stay increased—resulting in a net increase in ICU bed-days used. This trend supports the recent addition of 10 more ICU beds in Manitoba. The care provided in Manitoba ICUs appears to be comparable to that in other places, at least as measured by mortality rates.

This project successfully linked data from a clinical database on ICU patients into the unique collection of databases at MCHP. This presents a powerful combination of data for quality improvement initiatives and future research. This report likely provides the best population-based view of ICU use anywhere. And it's really just the tip of the iceberg, with many follow-up studies planned and several already underway.



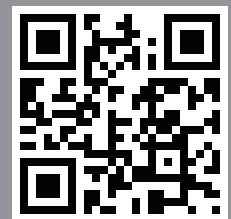
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