

## Resident duty hours in Canada: past, present and future

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Over the course of the 20th century, residency training programs in North America evolved. They were once an unstructured experience offered to a small proportion of medical school graduates for an unspecified length of time,<sup>1</sup> and are now a set of formal, fixed-length, specialty-specific programs required of all physicians who wish to obtain a licence to practise independently. Emerging concerns about patient safety<sup>2</sup> and resident well-being<sup>3</sup> have led to a reduction in the number of hours that residents are required to work in many countries and in Quebec. The National Steering Committee on Resident Duty Hours was formed in Canada to address these concerns, and it recently released a set of recommendations. In this article, we discuss resident duty hours in the context of these recommendations, international differences and the existing evidence.

### Resident duty hours in Canada and elsewhere

Internationally, there is substantial variability in the maximum allowable hours of work as well as in the bodies responsible for enforcing the restrictions (Table 1). In Canada, resident associations have played a more prominent role in the debate over duty hours than in other countries.<sup>4</sup> In 2009, residents at McGill University filed a grievance alleging that shifts longer than 24 hours endangered both patients and residents. The arbitrator, who rendered his decision in 2011, ordered residency programs in Quebec to reduce the maximum period of in-hospital work to 16 hours or less.<sup>5</sup> Elsewhere in Canada, provincial agreements on maximum shift lengths have recently converged on 24 hours plus two hours for handover, and a maximum call frequency of one shift every four days averaged over four weeks.<sup>6</sup> The precedent-setting nature of the Quebec decision and the absence of consensus on work-hour limits between provinces were part of the impetus for the formation of the National Steering Committee on Resident Duty Hours.

In June 2013, the steering committee, which included representatives from resident associa-

tions and from organizations responsible for the accreditation of residency programs and the certification of physicians, as well as governmental representatives, educators and hospital administrators, offered a set of recommendations and a path forward (Box 1).<sup>6</sup> The aspects of the steering committee's report that have garnered the most attention are its adoption of the principle that residents should work 24 or more consecutive hours without restorative sleep only in exceptional circumstances and its recommendation that each residency program develop a plan for fatigue risk management for its residents.

Many other countries have reduced resident duty hours ahead of Canada. In the United States, the Accreditation Council for Graduate Medical Education (ACGME) enforces nationwide restrictions on duty hours for all accredited postgraduate training programs.<sup>7</sup> In 2003, the ACGME instituted a limit of 80 hours of work per week for residents, with a maximum shift length of 30 hours. In 2011, the ACGME modified its regulations, limiting first-year residents to a maximum of 16 consecutive work hours with an extra four hours for handover, with no further changes to the hours of more senior residents.

The European Working Time Directive, initially introduced in 1993 but only implemented in British hospitals in 2009, limits the workweek for resident physicians in Europe to an average of 48 hours. In New Zealand, resident work hours were capped at 72 hours per week in 1985, with shift lengths limited to 16 hours.<sup>6</sup> In Australia, there has also been an expectation that resident duty hours should be consistent with the work requirements of others in the population, although there are no binding regulations.<sup>6</sup>

#### Competing interests:

Peter Wu was a resident representative on the Survey Development Group for the National Steering Committee on Resident Duty Hours. Irfan Dhalla is a member of the Hours of Work Committee, which comprises individuals appointed by the Professional Association of Residents of Ontario and the Council of Academic Hospitals of Ontario. No other competing interests were declared.

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#### KEY POINTS

- Recent restrictions of resident duty hours in the United States and Quebec have prompted a national discussion on the number of consecutive hours that residents should work in Canada.
- Evidence suggests that reduction of resident work hours does not, by itself, markedly improve patient outcomes or resident well-being.
- Changes in the way residents are scheduled to work may have unforeseen effects, which could potentially include harm to patients. Such changes should be implemented with care and rigorously evaluated.

## Resident duty hours and patient safety

The case of Libby Zion, an 18-year-old who died of a fatal drug interaction while under the care of two residents, spurred work-hour reforms first in New York state and subsequently throughout the US and abroad.<sup>7</sup> Although the treatment prescribed by one of the residents caring for her probably worsened her condition, it is doubtful that this was a fatigue-related error.<sup>8</sup> Nevertheless, the tragic outcome and substantial media attention resulted in a national dialogue about the potential link between resident work hours and patient safety.

Although the notion that physicians will make fatigue-related errors if they work continuously for longer than 24 hours has obvious face validity, the evidence that reducing work hours improves patient safety in real-world settings is conflicting. In one oft-cited randomized trial, Landrigan and colleagues<sup>9</sup> assigned first-year residents working in an intensive care unit or a coro-

nary care unit to either a call schedule of 24-hour shifts every third day or an intervention schedule with call periods no longer than 16 hours. First-year residents working under the traditional schedule made about four more errors for every 100 patient-days, most of them related to medication management, than residents in the intervention group. Although this trial merits recognition for its rigorous design and high degree of internal validity, its generalizability is limited in large part because of its implementation in two high-acuity units in a single hospital that were extraordinarily well-staffed in the intervention arm.

A more recent US randomized trial compared a call model comprising 30-hour call shifts every fourth day to one of two models consistent with the 2011 ACGME regulations, which require first-year residents to be scheduled for shifts no longer than 16 hours.<sup>10</sup> Although residents assigned to both of the newer models had more sleep, they also reported a decrease in educational opportunities, more frequent handoffs disrupting continuity of care and, most important, a perceived decrease in the quality of care. Nurses

**Table 1:** Regulations and restrictions pertaining to resident duty hours in Canada and elsewhere

Country	National regulations	Duty hour restrictions
Canada	No Work hours are currently regulated primarily through negotiated agreements between provincial residents' associations and employers. In the future, work hours may also be regulated via residency accreditation mechanisms.	<ul style="list-style-type: none"> <li>• Variability in maximum hours worked per week (range 60–90 h)</li> <li>• Limit of 24–26 hours of consecutive work               <ul style="list-style-type: none"> <li>- Exception Quebec (2011): limit of 16 hours of consecutive work</li> </ul> </li> <li>• Limit of in-house call once every 4 days, averaged over 4 weeks</li> <li>• Limit of out-of-house call once every 3 days</li> </ul>
United States	Yes Regulations issued by the Accreditation Council for Graduate Medical Education	<ul style="list-style-type: none"> <li>• Limit of 80 hours of work per week, averaged over 4 weeks</li> <li>• Limit of 24 hours of continuous work plus 6 hours for handover               <ul style="list-style-type: none"> <li>- For interns, limit of 16 hours of continuous work plus 4 hours for handover</li> </ul> </li> <li>• Limit of in-house call once every 3 days, averaged over 4 weeks</li> </ul>
Europe	Yes Resident duty hours regulated through the European Working Time Directive	<ul style="list-style-type: none"> <li>• Limit of 48 hours of work per week</li> </ul>
New Zealand	Yes Resident duty hours regulated through the Multi Employer Collective Agreement, in a manner similar to Canadian provinces	<ul style="list-style-type: none"> <li>• Limit of 72 hours of work per week</li> <li>• Limit of 16 hours of continuous work</li> <li>• Minimum time off between shifts of 8 hours, minimum every other weekend free of duty</li> </ul>
Australia	No Recommendations issued by the Australian Medical Association	<ul style="list-style-type: none"> <li>• Work in excess of 50 hours per week puts the resident at risk</li> <li>• Work in excess of 70 hours per week puts the resident at "higher" risk</li> </ul>

also reported that they perceived the quality of care provided in the new models to be worse.<sup>10</sup>

Most of the evidence assessing the link between resident duty hours and patient safety has been obtained from observational studies. Some studies have suggested that patients have worse outcomes when residents work fewer hours,<sup>11,12</sup> and another study has provided some evidence of improved patient outcomes.<sup>13</sup> Whereas much of the evidence comes from the US, a survey conducted after the implementation of the European Working Time Directive in the United Kingdom indicates a consensus among surgeons that the quality of care worsened as a result of reduced duty hours.<sup>14</sup>

Despite the theoretical benefit of reducing fatigue-related errors, the overall evidence suggests that reducing the work hours of residents does not, by itself, markedly improve patient safety.<sup>15,16</sup> Although changing the environment to improve residents' alertness is intuitively attractive, reducing resident duty hours also has the potential to increase the risk of errors that arise from more frequent handoffs and reduced clinician presence. Health care systems can benefit from lessons in developing more effective systems for handover from other industries for which communication failures can have important consequences.<sup>17</sup> Some industries mandate face-to-face verbal handover, limit interruptions during the handover discussion, encourage additional handover from individuals other than the one being replaced, have a system to read back plans to confirm accurate receipt of information, and have information updated in the same order every time. These principles are only variably incorporated in handovers within health care systems.<sup>18</sup>

Reduced duty hours may also negatively affect the development of competence, which could have a longer-term impact on patient safety. Some have argued that if clinical exposure is reduced as a result of changes to work hours, then the length of residency training programs may need to be extended.<sup>19</sup> Others have proposed a shift toward a competency-based approach in which individual residents might take different lengths of time to complete their training.<sup>20</sup> This issue is particularly relevant for procedure-intensive specialties, where increasing evidence suggests that work-hour reforms have had deleterious effects on educational outcomes,<sup>12,21–23</sup> including worse scores on licensing examinations.<sup>24</sup>

Existing proposals for resident scheduling under restricted duty hours may require trainees to be intermittently absent from the core curriculum activities occurring each day. It is possible that new means of providing education, such as Web-based modules<sup>25</sup> and simulation technology,<sup>26</sup> may compensate for reduced exposure to patients.

For these reasons, the National Steering Committee on Resident Duty Hours concluded that efforts to improve patient safety will require a comprehensive approach that extends far beyond regulating resident duty hours alone.

## Resident duty hours and resident well-being

Under the current duty-hour restrictions in Canada, with maximum shift lengths of 26 hours and a maximum call frequency of one shift every four days, residents can work 70 hours per week on average and up to 100 hours per week at peak periods. Many have argued that such a schedule is incompatible with a fulfilling personal life and that excessive work hours contribute to burnout as well as mental and physical illness.<sup>5</sup>

However, there is no consistent evidence that reducing duty hours has a positive effect on resident mood, stress or personal relationships.<sup>27</sup> Although there is very little Canadian evidence in this area, a survey of surgical residents at a single centre in Quebec suggested that the new work-hour limits in that province have had a negative effect on residents' quality of life.<sup>28</sup>

### Box 1: Principles for a pan-Canadian response to resident duty hours and recommendations from the National Steering Committee on Resident Duty Hours<sup>6</sup>

#### Principles

1. Residents have interrelated roles as learners and care providers.
2. Residents are vital providers in a health care system that is collectively responsible for continuous provision of patient care.
3. Duty periods of 24 or more consecutive hours without restorative sleep should be avoided.
4. Efforts to minimize risk and enhance safety are necessary and cannot be undertaken by addressing resident duty hours alone.
5. Given the substantial variation in resident training needs, a tailored and rigorous model for resident duty hours and the provision of after-hours care is needed.

#### Recommendations

1. Recognizing that there are many factors that contribute to resident fatigue, a comprehensive approach to minimize fatigue and fatigue-related risks should be developed and implemented in residency training in all jurisdictions in Canada.
2. Educational approaches should be redesigned to use innovations and new approaches, to ensure appropriate training and acquisition of competencies in an era of increasing regulations of resident duty hours.
3. Accreditation standards must be adapted to support planned modifications of the content and duration of resident duty, through the enforcement of plans for fatigue risk management.
4. An inventory of alternate models of scheduling and provision of after-hours care should be created and disseminated to provide alternatives and benchmarks of scheduling and service delivery.
5. An independent, pan-Canadian consortium devoted to the evaluation of resident duty hours in Canada should be created.

Residents reported feeling more sleep deprived, being disconnected from the clinical environment and receiving less mentorship from attending physicians.

Increasing resident sleep may be possible through novel scheduling mechanisms that do not involve restricting the maximum number of hours in a single shift. For example, Volpp and colleagues<sup>29</sup> showed that increasing the number of residents on call overnight and strongly encouraging a “protected sleep period” during an on call shift could increase duration of overnight sleep and improve alertness. In programs where residents alternate between being on call at or near the maximum allowable frequency during some rotations (e.g., cardiology) and having much lighter schedules during other rotations (e.g., rheumatology), such a model could be implemented by requiring residents on lighter rotations to provide more “cross coverage.” However, this would increase the total number of call shifts a resident would be required to do during an entire residency, and this might have a negative effect on residents’ quality of life.

### Other consequences of reduced duty hours

Given the important role residents have in delivering health care, reduction of resident duty hours also has implications for the scheduling of other health care providers, including attending physicians. Since the introduction of the 2011 ACGME regulations, directors of residency programs in the US have reported greater use of ancillary staff, including nurse practitioners and physician assistants.<sup>30</sup> Furthermore, 74% of program directors surveyed reported an attendant increase in their own workload.<sup>30</sup> Dissatisfaction with the new rules is increasingly common among attending physicians. In one study, 60% of surveyed faculty cited slightly worse professional satisfaction with changes to duty hours, attributed to increased handovers and an increase in their workload.<sup>31</sup> An increase in faculty workload is also associated with decreased time for teaching.<sup>32</sup> Some attending physicians are concerned about the effect on trainees’ professional development that might result from a growing shift-work mentality in which restrictions of duty hours are emphasized over duty to the patient.<sup>33</sup>

### An uncertain future

Although the National Steering Committee on Resident Duty Hours challenged the notion of a “one-size fits all” solution, in doing so it has left

out important details, such as how individual residency programs should design plans for fatigue risk management. Will scheduled naps during 24-hour call shifts be sufficient, or will residency programs inexorably move toward shifts that are no longer than 16 hours? Will the increased emphasis on fatigue require directors of residency programs to exert influence over what a resident does during unscheduled time? Should there be an assessment of a resident’s fatigue before and during a shift? What would be the consequences if a resident was deemed to be too tired to work safely? All of these questions, of course, could be asked not just of residents, but also of physicians who have completed their training and other health care professionals.

### Conclusion

The structure of residency, including the manner in which residents are scheduled to work, will undoubtedly continue to evolve over the coming decades. The recommendations of the steering committee will serve as a reference in ongoing discussions at both the provincial and national levels in Canada.

Attempts are being made in the health care systems of many countries to improve the quality of patient care while limiting the growth in spending. In academic health science centres in Canada, where much of the care is provided by residents, directors of individual residency programs are faced with a small and nondirective body of evidence as they begin to make changes to their residents’ schedules. Rigorous evaluation will be required to learn how we can achieve the goals of improved quality of care and resident well-being while guarding against unintended negative consequences.

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