Letters

Emergency department overcrowding and mortality after the introduction of the 4-hour rule in Western Australia

To the Editor: We would like to congratulate Geelhoed and de Klerk[1] for reporting the expected decreases in emergency department (ED) overcrowding following introduction of the 4-hour rule in Western Australia. Their study highlighted potential adverse effects and inflated demand across hospital systems — specifically, concerns regarding patient safety and junior medical staff training; significantly higher proportions of admitted patients (39.6% to 49.1%); and incomplete assessment and management in EDs, underscored by "more … investigations occurring on the wards".

However, we found it difficult to appreciate the relevance of inhospital mortality rates with increased denominators. It may be argued that a stretched primary care system, with little increase in resources to cater for population growth[2] and combined with worsening economic conditions, led to a disproportionate increase in numbers of relatively well patients, thus diluting the mortality rate among patients presenting to hospital in 2010–11. There was also more variation in the raw mortality over the preceding years, with a possible aberrant rise in 2009–10, which was used as the reference year to calculate the statistically significant 13% reduction in 2010–11.

The vast majority of hospital deaths are inevitable and unlikely to change with changes to patient flow. Hospital-wide reforms focusing on earlier discharge from EDs and wards further challenge the relevance of inhospital mortality. In advanced health systems, outcome measures should focus on risk of unexpected death,[3] or, at least, risk of death adjusted for major predictor variables. The question of whether the 4 hour rule is affecting outcomes in ED patients remains unanswered. The National Emergency Access Targets have been aptly termed a "natural experiment" in health policy,[4] and Geelhoed and de Klerk's analysis provides little more than exploratory data on changes in patient outcomes.

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1 Geelhoed GC, de Klerk NH. Emergency department overcrowding, mortality and the 4-hour rule in Western Australia. *Med J Aust* 2012; 196: 122-126.
2 Primary Health Care Research and Information Service. General practice size in Western Australia, 2005–06 to 2009–10. http://www.phcris.org.au/fastfacts/fact.php?id=4982 (accessed Feb 2012).
3 Mitra B, Cameron PA, Archer P, et al. The association between time to disposition plan in the emergency department and in-hospital mortality of general medical patients. *Intern Med J* 2012; 42: 444-450.
4 Richardson DB. Emergency department targets: a watershed for outcomes research? *Med J Aust* 2012; 196: 126-127.

To the Editor: We read with interest the article by Geelhoed and de Klerk[1] regarding the mortality benefits of a policy that ensures high numbers of patients are admitted to hospital within 4 hours of arrival at an emergency department (ED). The proof of improved performance following service intervention within a complex institution requires careful consideration. We offer an alternative interpretation of their data.

The number of patients who presented to the Western Australian tertiary hospitals increased over the 4 years studied, as did the number and the proportion of patients who were admitted. Mortality expressed relative to the number of admissions dropped, assuming that most deaths occurred in admitted patients (Box). We suggest that excessive admission of relatively healthy patients who otherwise would have been released from the ED resulted in this apparent drop in mortality.

Efficiencies in hospital and ED length of stay have been achieved in one tertiary hospital in Adelaide, South Australia, by interposing an acute assessment unit between the ED and the treatment settings in which ongoing care is provided.[2] This change was accompanied by a 50.5% increase in admissions to the general medical service[2] but only a 10.7% increase in presentations to the hospital ED.[3] The Charlson comorbidity score of the admitted patient cohort dropped.

At our hospital, the establishment of an acute medical unit in November 2010 was followed by a 25% increase in workload for the hospital's inpatient general medical service over the next year, without a significant increase in ED presentations. The proportion of patients presenting to the ED who were admitted increased from 38% to 41%. Mortality among general medical patients fell by 17.5%, with no change in the proportion of patients admitted to a hospital bed within 4 hours.

The nationwide imposition of a 4-hour program may result in the admission of higher numbers of relatively well patients who previously would have been discharged by the ED. This comes at the cost of a rising workload for general physicians, whose established work practices rarely embrace shift work in, or next to, an ED. We believe that the benefit of this new process to community health is still to be established. Ongoing education of physicians and surgeons in the initial assessment of emergency patients may better achieve efficient transit through the ED.

Indiscriminate admission of patients without a diagnosis and of patients who could potentially be released without admission cannot be recommended as a means of facilitating flow through an ED.

Mortality rates among admitted patients at three Perth tertiary hospitals, July 2007 to June 2011*

Year	Proportion of patients admitted after presentation to an ED	Mortality rate, deaths/admitted patients
2007–08	39.57%	2.78%
2008–09	41.66%	2.70%
2009–10	45.66%	2.46%
2010–11	49.08%	1.99%

ED = emergency department. * Calculated from raw data in Geelhoed and de Klerk, Box 1.[1]

> "a stretched primary care system … led to a disproportionate increase in numbers of relatively well patients, thus diluting the mortality rate"
>
> Mitra et al

Measures of inappropriate admission must be considered alongside apparent improvements according to current efficiency measures.

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1 Geelhoed GC, de Klerk NH. Emergency department overcrowding, mortality and the 4-hour rule in Western Australia. *Med J Aust* 2012; 196: 122-126.

2 Li JYZ, Yong TY, Bennett DM, et al. Outcomes of establishing an acute assessment unit in the general medical service of a tertiary teaching hospital. *Med J Aust* 2010; 192: 384-387.

3 Yong TY, Li JY, et al. The selection of acute medical admissions for a short stay unit. *Intern Emerg Med* 2011: 321-327. ❑

In reply: We thank Mitra and Cameron, and Toh and colleagues for their remarks. Comments from some physicians that the 4-hour rule might increase mortality provided the initial stimulus for us to look at data related to its introduction in Western Australia. Given our results, their hypothesis seems unlikely to be true.

Mitra and Cameron point out that the reference year 2009–2010 showed a possible "aberrant rise" in raw mortality; however, the mortality rate based on presentations to the three tertiary hospitals was remarkably consistent for 2007–08, 2008–09 and 2009–10 (1.10%, 1.12% and 1.12%, respectively). Also, there was no reduction in mortality at the peripheral hospitals, making society-wide changes in mortality an unlikely explanation for the fall at the tertiary hospitals. We disagree with their unreferenced assertion that the majority of hospital deaths are inevitable and that mortality is unlikely to change with change to patient flow. Sprivulis, as noted in our article, showed that negative change to patient flow with increased overcrowding in WA emergency departments (EDs) led to 120 extra deaths per year. It is unlikely that patients were discharged prematurely from the ED to die at home, given that the admission rate had risen. Anecdotally, almost certainly — given the focus on overcrowding in WA hospitals — blatant examples of patients being sent home prematurely from hospitals only to die would have been on the front page of *The West Australian*.

Toh et al give an alternative analysis and suggest that the fall in mortality was due to dilution in the severity of illness among patients admitted from EDs. Since we used number of presentations to the ED — not admissions — as our denominator, it is difficult to see the relevance of this suggestion. Furthermore, not only did the mortality rate fall, but the actual number of deaths decreased by 80 even with an increase of 10% in presentations. If a simple χ^2 test is done assuming only a 2.5% increase in presentations, the 80 fewer deaths are still significant ($P < 0.05$). Given WA's population growth of over 2.5% per annum, coupled with an ageing population, we can safely say this reduction in deaths is not due to "dilution".

> "examples of patients being sent home prematurely from hospitals only to die would have been on the front page of *The West Australian*" Geelhoed et al

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