ORIGINAL RESEARCH

When a health policy cuts both ways: Impact of the National Emergency Access Target policy on staff and emergency department performance

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Abstract

Objective: To explore the impact of the Four-Hour Rule/National Emergency Access Target (4HR/NEAT) on staff and ED performance.

Methods: A mixed-methods study design was used to link performance data from 16 participating hospitals with the experiences reported by 119 ED staff during policy implementation. Quantitative and qualitative measures were triangulated to identify the staff and organisational effects on hospital performance. An overall score was developed to categorise hospitals into: high, moderate and low performers, then compared with four qualitative themes: social factors, ED management, ED outcomes and 4HR/NEAT compliance.

Results: Key factors identified were stress and morale; intergroup dynamics; interaction with patients; resource management; education and training; financial incentives; impact on quality and safety; perceived improvements on access block and overcrowding. High performing hospitals reported increased stress and decreased morale, decreased staff–patient communication and staff shortages; significant changes in ED management and effective use of the whole-of-hospital approach. Moderate performing hospitals reported similar findings that ED performance largely improved with 4HR/NEAT time targets by varying degrees at different hospitals.

Key findings

• This study confirms that ED performance largely improved with 4HR/NEAT time targets by varying degrees at different hospitals.
• Top down implementation of the national policy had positive and negative effects as well as unexpected consequences.
• Hospital performance associated with reduction of access block had unintended effects on ED staff.
• Improved performance had an adverse impact on perceptions of ED staff stress, morale and other qualitative measures reported during the 4HR/NEAT implementation.
• Further research is required to explore the impact of the 4HR/NEAT on other performance criteria such as communication with patients and other measures of clinical and service outcome.

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hospitals also reported increased stress and low morale and a less effective whole-of-hospital approach. ED staff also reported a reduction in communication with patients.

**Conclusions:** There was strong evidence of an association between high stress and low morale and the implementation of the 4HR/NEAT across all levels of performance. These adverse consequences of the 4HR/NEAT implementation indicate that a more nuanced approach to efficiency improvements is required. This would balance processes measured by 4HR/NEAT against a range of other clinical and organisational performance measures.

**Key words:** ED performance, Four Hour Rule, mixed methods research, National Emergency Access Target, staff perception.

**Introduction**

Access block, defined as admitted patients spending more than 8 h in the ED, is the principal cause of ED overcrowding and remains the major problem confronting EDs worldwide. After the introduction of a 4-h time-based ED performance target in the UK, it was modified and introduced in Western Australia (WA) in 2009, and then across Australia in 2012. The Four-Hour Rule/National Emergency Access Target (4HR/NEAT) requires that most patients presenting to an ED should be seen, admitted or discharged within 4 h, when appropriate.

The 4HR/NEAT policy has had an impact with modest to major improvements in access block, excess mortality, and other patient flow and outcome measures. However, our previous studies have also shown complex effects at the ED, hospital and health system level such as effects on quality and safety, education and training, as well as the direct impact on ED overcrowding and access block.

This study is based on the hypothesis that hospital performance is determined by multifactorial conditions that are not discernible by quantitative measures alone. The hypothesis is based on the assumption that there is a marked variation in performance as a result of the interaction of qualitative factors such as organisational, human, social and clinical. The purpose of this mixed-methods study was to specifically explore the association between improvements in 4HR/NEAT performance between the quantitative component (ED performance) with the qualitative component (staff perceptions of stress and morale, clinical impacts and other organisational factors). In doing so, this study identified which qualitative factors were associated with staff (i.e. stress and morale, communication) and hospital performance (high versus moderate and low performing outcomes).

**Methods**

**Study design, data source and participants**

This study used a two-phase explanatory mixed-methods design known as ‘Sequential QUAN → QUAL’, in which qualitative data was utilised to explain or build upon initial quantitative results. This explanatory sequential design is based on Creswell and Clark model classification. The quantitative component is referred as QUAN and the qualitative component is referred as QUAL.

The aim of ‘Sequential QUAN → QUAL’ approach was to explore from the ED staff point of view how they perceived their hospital’s performance, and how they engaged locally in the implementation of the 4HR/NEAT. In this case, we used quantitative linked data from the participating hospitals to categorise them into high, moderate and low performance hospitals and triangulate those categories with rigorous qualitative themes identified previously.

**Data definitions**

**Quantitative component**

We used administrative linked data with differing time periods from the Emergency Department Data Collection and the Admitted Patient (or Hospital Mortbidity) Data Collection for the 16 participating hospitals. The study period for Emergency Department Data Collection started in 2002 for WA, 2005 for New South Wales (NSW) and Australian Capital Territory (ACT), and 2008 for Queensland (QLD). The study period ended in 2013 for all four jurisdictions.

Hospital performance was assessed based on two flow metrics: (rate of) access block and (rate of) ED presentations with ED length of stay within 4 h (EDLOS ≤4). For each flow metric, three outcome measures were computed for each participating hospital: (i) the difference in rates between the end year (2013) and the baseline year (varying by jurisdictions); (ii) the log of the odds ratio between these 2 years; and (iii) the rate in the end year. The baseline year (i.e. the year before NEAT implementation) was ‘April 2008–2009’ for WA, and ‘January to December 2011’ for the other three jurisdictions.

For each participating hospital, the six outcome measures were then standardised to a standard normal distribution (mean 0, variance 1). The mean of the six standardised scores was then assigned as the ‘overall’ score for each corresponding hospital, which was then used to rank and classify the hospital either as a high, moderate or low performing hospital. This classification was later also used in the sequential mixed-method analysis.

**Qualitative component**

As indicated in our previous publications, we used qualitative data from 119 interviews conducted among ED staff between 2015 and 2016 from the same participating hospitals. Study participants included department directors, physicians, nurses and administrative employees working in the ED. Interviews were audio-recorded, transcribed verbatim, and imported into NVivo 11 (QSR International, Melbourne, Victoria, Australia).

**Sequential mixed-methods analysis**

After the completion of the quantitative analysis, the qualitative data were analysed by using a thematic approach. We created codes for each of the hospitals as high, moderate and low categories in NVivo and conducted a comparison and contrast.
analysis for each theme (key concepts) and subtheme by hospital category. The codes were discussed and reviewed by the research team (RF, NM, SN), and during this process we calculated the proportion of the main themes by quotation numbers or frequency of key concepts.23 We also calculated the proportion of the main concepts) and subthemes by hospital category. At the end of the process we defined and refined the subthemes. Systematic text condensation27 was used for summarising the interview data. Analysis and coding were iterative processes throughout the sequential analysis.

Results

Qualitative

We identified four main themes (i.e. social factors, ED management, ED outcomes and 4HR/NEAT compliance) and subthemes from the QUAL analysis described elsewhere.21,22,23

Quantitative

Standardised quantitative measures of performance and aggregate score based on three methods for quantifying access block and % EDLOS ≤ 4 h were used to measure overall ED performance. Table 1 shows the classification based on the overall measures of access block and the proportion of ED patients with EDLOS ≤ 4. The clustering into performance groups based on log of odds is like that based on rate difference (Table 1 and Appendixes S1 and S2).

Table 2 shows the mean of each of the measures to describe ED performance for each group. Analysis of variance test for differences between the groups was statistically significant for all measures. The Cronbach alpha measure of internal consistency for the aggregate score was 0.94 (i.e. very high at >0.90).

Table 3 shows the association between the performance groups and the perceptions of staff as to the consequences of the 4HR/NEAT. Apart from the range and variety of comments, this table indicates the overall frequency of those comments (quotations), the number of interviews conducted and thus the proportion of interviews in which those comments were included. For example, worsened stress and morale was mentioned a total of 558 times and included in all the 37 interviews in the high performing hospitals (100%). On the other hand, it was mentioned in 96% of the 49 interviews from the moderate and 98% of the 24 interviews of the low performing hospitals.

Twenty percent of participants from moderate performing hospitals

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TABLE 1. Standardised quantitative measures of performance and aggregate score based on three methods for quantifying access block and % EDLOS ≤ 4 h.

| Hospital | Performance level | Access block | % EDLOS ≤ 4 h | Access block | % EDLOS ≤ 4 h | Access block | % EDLOS ≤ 4 h | Aggregate score |
|----------|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|----------------|
| I High   | 1.177             | 1.583        | 1.335        | 1.618        | 1.061        | 1.211        | 1.331        |
| O High   | 0.470             | 1.317        | 1.177        | 1.418        | 1.412        | 1.393        | 1.198        |
| K High   | 1.680             | 1.061        | 1.458        | 0.972        | 0.677        | 0.092        | 0.990        |
| P High   | 0.974             | 0.897        | 1.001        | 0.868        | 0.847        | 0.691        | 0.880        |
| L High   | 1.687             | 0.188        | 1.212        | 0.198        | −0.166       | 0.678        | 0.633        |
| M Moderate | −0.067         | 0.183        | 0.276        | 0.321        | 1.027        | 1.315        | 0.509        |
| N Moderate | 0.072          | −0.105       | 0.234        | −0.100       | 0.796        | 0.510        | 0.234        |
| D Moderate | −0.496         | 0.507        | −0.469       | 0.429        | 0.298        | −0.112       | 0.026        |
| F Moderate | −0.442         | −0.204       | −0.326       | −0.243       | 0.566        | −0.098       | −0.124       |
| E Moderate | −0.301         | 0.360        | −0.468       | 0.319        | −0.430       | −1.158       | −0.280       |
| A Moderate | −0.632         | 0.322        | −0.770       | 0.286        | −0.767       | −1.216       | −0.463       |
| J Low    | 0.261             | −1.776       | −0.033       | −1.758       | −0.510       | 0.410        | −0.568       |
| H Low    | −0.272            | −1.322       | −0.508       | −1.291       | −1.127       | 0.306        | −0.702       |
| C Low    | −1.334            | −0.893       | −1.298       | −0.911       | −0.148       | −1.031       | −0.936       |
| B Low    | −1.561            | −0.687       | −1.548       | −0.709       | −1.716       | −1.419       | −1.273       |
| G Low    | −1.216            | −1.431       | −1.275       | −1.416       | −1.819       | −1.574       | −1.455       |

The overall score is the mean of the six measures reported above.
reported bullying, when compared with 16% of high performing and 7% of low performing hospitals. Sixty-eight percent of participants in high performing hospitals reported that 4HR/NEAT had a negative impact on teamwork, when compared with 41% of moderate performing and 30% of low performing hospitals.

Sixty-two percent of participants in high performing hospitals reported that 4HR/NEAT decreased staff–patient communication, when compared with 31% of moderate and 16% of low performing hospitals. As described previously, many ED staff also indicated that decreased staff–patient communication could increase the number of complaints in ED and may increase the risk of medical errors.²¹²² Some participants indicated that the dual task of accommodating complex patients (multiple comorbidities) or high acuity patients, the increased number of patients and ongoing overcrowding compromised the relationship with patients.

Ninety-two percent of interviewees from high performing hospitals reported that 4HR/NEAT policy had an impact on staff roles and staff shortages, when compared with 70% of moderate and 77% of low performing hospitals.

In relation to perceived improvements, most participants (92%) of high performing hospitals reported that the whole of hospital approach improved 4HR/NEAT performance, when compared with 65% of moderate and 67% of low performing hospitals. Half of the participants (57%) from high performing hospitals, 23 (45%) from moderate and 18 (60%) from low performing hospitals also reported that access block improved with 4HR/NEAT.

In relation to negative perceptions, most high (92%), moderate (70%) and low (77%) performing hospitals indicated 4HR/NEAT was related to staff shortages and changes in staff roles. Only a minority of all performing groups reported that access block worsened with 4HR/NEAT implementation.

Table 4 presents a summary of key quotations using systematic text condensation²⁷ in relation to stress and morale; the impact on teamwork and relationships with patients; internal as well as organisational bullying; the overall impact of the whole of hospital approach; staff shortages; access block and 4HR/NEAT performance. A full description of the main quotations is reported in Appendix S3.

Appendixes S1 and S2 show the descriptive statistics on performance in the three performance groups:

- High performing hospitals reported a reduction in access block between 27% and 42% and improvement in the rate of patients being managed within EDLOS ≤4 between 16% and 28%.
- Moderate performing hospitals reported between 13% and 22% improvement in access block and between 12% and 19% improvement in the proportion of patients with EDLOS ≤4.
- Low performing hospitals reported between 0% and 24% improvement in access block and less than 10% improvement in the proportion of patients being managed within EDLOS ≤4 (Appendix S1).

### Discussion

The 4HR/NEAT provided a unique opportunity to assess the impact of its implementation at the staff level and generated both positive and negative effects on those who were directly involved. It has generated important changes to individuals and organisations that impact on hospital performance. This mixed-methods study identified critical associations between qualitative and quantitative factors that have not been reported previously. Future prospective research would be required to establish causation between the implementation of the policy and its interaction at the organisational and staff levels.

We were able to confirm that 4HR/NEAT policy generated unexpected effects including associations between perceived ED performance and its impact on staff: high stress and worsened morale, poorer communication.

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**Table 2. Summary of quantitative measures of performance**

| Quantifying methods and outcome measures | Performance groups | Quantifying methods | Outcome measures | Quantitative measures of performance | P-value† |
|-----------------------------------------|-------------------|--------------------|-----------------|-------------------------------------|---------|
| Rate difference from baseline to end of study | High (Hospitals I, O, K, P, L) | Access block | EDLOS ≤4 h | −0.357 | −0.173 | −0.111 | <0.001 |
| | Moderate (Hospitals M, N, D, F, E, A) | | | 0.229 | 0.157 | 0.035 | <0.001 |
| | Low (Hospitals J, H, C, B, G) | | | −1.794 | −0.880 | −0.464 | <0.001 |
| Log of odds from baseline to end of study | | | | 0.967 | 0.655 | 0.143 | <0.001 |
| Level in the year 2013 (end of study) | | | | 0.160 | 0.219 | 0.367 | 0.003 |

†P-values from analysis of variance test of differences across the three performance groups.
| Performance groups | High (Hospitals I, O, K, P, L) | Moderate (Hospitals M, N, D, F, E, A) | Low (Hospitals J, H, C, B, G) |
|--------------------|-------------------------------|-------------------------------------|-------------------------------|
| **Themes and key concepts** | **Quotations** | **Interview** | **Int. % total (37)** | **Quotations** | **Interview** | **Int. % total (51)** | **Quotations** | **Interview** | **Int. % total (30)** |
| Social factors | | | | | | | | | | |
| 4HR/NEAT worsened stress and morale | 558 | 37 | 100% | 418 | 49 | 96% | 177 | 24 | 80% |
| Increased incidents of bullying in ED | 23 | 6 | 16% | 55 | 10 | 20% | 6 | 2 | 7% |
| 4HR/NEAT had negative impact on teamwork | 34 | 14 | 38% | 36 | 15 | 29% | 12 | 6 | 20% |
| 4HR/NEAT had a negative impact on relationships between ED and rest of hospital | 74 | 25 | 68% | 48 | 21 | 41% | 15 | 9 | 30% |
| Whole of Hospital (WoH) approach improves 4HR/NEAT | 114 | 34 | 92% | 136 | 33 | 65% | 84 | 20 | 67% |
| Hospital did not use WoH approach to achieve 4HR/NEAT | 51 | 19 | 51% | 102 | 24 | 47% | 37 | 11 | 37% |
| Hospital went some way towards executive buy-in | 27 | 16 | 43% | 32 | 13 | 25% | 15 | 6 | 20% |
| Hospital did not have sufficient executive buy-in | 21 | 11 | 30% | 25 | 10 | 20% | 18 | 5 | 17% |
| 4HR/NEAT increased staff–patient communication | 32 | 10 | 27% | 20 | 13 | 25% | 4 | 3 | 10% |
| 4HR/NEAT decreased staff–patient communication | 79 | 23 | 62% | 50 | 16 | 31% | 11 | 4 | 13% |
| ED management changes | | | | | | | | | | |
| 4HR/NEAT-related to staff shortages | 306 | 34 | 92% | 228 | 36 | 70% | 128 | 23 | 77% |
| Short Stay Unit/Emergency Medicine Unit | 89 | 27 | 73% | 94 | 28 | 55% | 51 | 15 | 50% |
| Fast track area | 25 | 16 | 43% | 15 | 14 | 27% | 22 | 12 | 40% |
| One-call admission policy | 29 | 20 | 54% | 34 | 15 | 29% | 17 | 9 | 30% |
| Direct admission policy | 8 | 7 | 19% | 0 | 0 | 0% | 0 | 0 | 0% |
| Performance groups | High (Hospitals I, O, K, P, L) | Moderate (Hospitals M, N, D, F, E, A) | Low (Hospitals J, H, C, B, G) |
|--------------------|-------------------------------|---------------------------------|-----------------------------|
| Themes and key concepts | | | |
| IT system changes as a result of 4HR/NEAT | 65 28 76% | 25 16 31% | 39 14 47% |
| 4HR/NEAT led to improve the size and capacity of ED | 35 23 62% | 17 14 27% | 24 11 37% |
| ED outcomes | | | |
| 4HR/NEAT had positive effects on EDs | 240 32 86% | 289 43 84% | 181 24 80% |
| 4HR/NEAT had negative effects on EDs | 172 27 73% | 145 30 59% | 72 19 63% |
| 4HR/NEAT did not impact ED care and practice | 42 14 38% | 66 26 51% | 55 13 43% |
| Consequences of access block | | | |
| Access block has been an issue before during and after 4HR/NEAT | 73 27 73% | 41 21 41% | 31 9 30% |
| Access block got worse with 4HR/NEAT | 9 7 19% | 4 4 8% | 2 2 7% |
| Access block got worse regardless of 4HR/NEAT | 2 2 5% | 2 2 4% | 1 1 3% |
| Access block got better with 4HR/NEAT | 65 21 57% | 47 23 45% | 34 18 60% |
| 4HR/NEAT positively impacted medical education and training | 18 7 19% | 16 5 10% | 2 1 3% |
| 4HR/NEAT negatively impacted medical education and training | 53 15 41% | 27 10 20% | 3 2 7% |
| 4HR/NEAT compliance | | | |
| Unsatisfactory 4HR/NEAT performance | 16 8 22% | 23 9 18% | 23 10 33% |
| Satisfactory 4HR/NEAT performance | 21 10 27% | 18 12 24% | 2 1 3% |
| 4HR/NEAT performance improved but plateaued or failed | 36 12 32% | 31 12 24% | 11 5 17% |
| 4HR/NEAT performance improved but the target is not met | 24 11 30% | 31 15 29% | 23 12 40% |

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| Performance groups | High performing hospitals | Moderate performing hospitals | Low performing hospitals |
|--------------------|---------------------------|-------------------------------|--------------------------|
| Themes and code groups |                           |                               |                          |
| Social factors     |                           |                               |                          |
| 4HR/NEAT worsened stress and morale | ‘...much more stressful, much more aggravation. It’s a different stress to before.’ (ED Physician, QLD) | ‘There are stresses... because when you send patients up to the ward and you know the ward is not adequately staffed...’ (ED Director, NSW/ACT) | ‘Without a doubt, morale has gone down and stress has gone up.’ |
| 4HR/NEAT had negative impacts on teamwork | ‘...a reduction in professional courtesy and respect.’ (ED Nurse, WA) | ‘It degrades relationships within the department.’ (ED Physician, NSW/ACT) | ‘...I can see that the breaches are happening...’ (ED Nurse, NSW/ACT) |
| 4HR/NEAT had a negative impact on relationships between ED and rest of hospital | ‘We had to harass the wards staff which had a negative throwback towards us, and we were harassed by executives, nursing and others, who would come down on a regular basis to explain and justify why patients had not left the emergency department.’ (ED Nurse, WA) | ‘I think ED staff find it stressful when the rest of the hospital blame ED for ‘Oh, you’re only bringing this patient up so you can reach the four hour target.’ Because that’s often the response that people get. Or ‘You’re pushing us to accept these people, so that they... Which is just rubbish.’ (ED Nurse, NSW/ACT) | ‘4HR/NEAT] creates a bit of bad blood between the inpatient teams and us, because we’re pushing for an admission...’ (ED Director, NSW/ACT) |
| Whole of Hospital (WoH) approach improves 4HR/NEAT | ‘By making it a whole of hospital approach, it made NEAT everyone’s responsibility, not just the ED.’ (ED Nurse, WA) | ‘Transformational approach from the whole of hospital – it was amazing. It was almost a clinical orgasm!’ (ED Nurse, NSW/ACT) | ‘...it’s actually a whole of hospital target, so I think the culture change has been significant in that whole aligning of services and helping out.’ (Data/Admin, NSW/ACT) |
| 4HR/NEAT decreased staff–patient communication | ‘Because they’re gone before you sort of build-up that rapport... That’s a big complaint.’ (ED Nurse, QLD) | ‘Before NEAT...it gave you time to...like, look, I don’t have time now to be with the patient and chat with them and their family. There’s no time for that.’ (ED Physician, NSW/ACT) | ‘I think the relationship with patients is zero...’ (ED Physician, NSW /ACT) |
| Increase incidents of bullying | ‘...junior staff found it very stressful...and you know, some of them felt a bit bullied by various people because of the pressure of meeting the target.’ (ED Physician, WA) | ‘There’s quite a lot of threat and bullying that goes on around compliance, particularly towards nursing staff.’ (ED Physician, NSW/ACT) | ‘That sort of unrealistic numbering thing is actually not helpful because, really, all you’re saying to the staff is, ‘You’re not good enough. You don’t work hard enough. You can’t do your job fast enough.’ (ED Director, NSW/ACT) |
| Performance groups | High performing hospitals | Moderate performing hospitals | Low performing hospitals |
|--------------------|---------------------------|------------------------------|--------------------------|
| ED management changes | **4HR/NEAT-related staff roles** | ‘So we’ve created lots of new roles, and it’s just a constantly evolving thing.’ (ED Nurse, WA) | ‘Well, for us, we did get funding, and that was a separate project for the changing models of care, but with NEAT, there’s been project officers, whole of hospital project officers.’ (ED Director, NSW/ACT) | ‘I feel that there were big changes to staffing roles… Certain positions were trained up to empower the rest of the team, and that role was placed on staffing roles that were already overwhelmed.’ (ED Nurse, NSW/ACT) |
| | **Staff shortages and supply** | ‘…it’s due to all the funding cuts and the staffing pressures, so the fact that we’ve not been able to increase our staffing, so we’re short-staffed.’ (ED Physician, WA) | ‘I think one of our ongoing issues is staff shortages, and particularly the hospital has a real RMO shortage, … I think our ability to do it really relies on us having good staffing.’ (ED Physician, QLD) | ‘I think historically we’ve always had staffing issues. The demand curve’s about 3 to 4% per annum; ours, at times we were admitting 12 to 15% annum. …we are understaffed and remain so.’ (ED Physician, WA) |
| | **Short stay unit/ Emergency medicine unit** | ‘I’m sure the short stay units changed as well. It became a clinical decisions unit…’ (ED Nurse, WA) | ‘So, there were a few things that we’ve done in terms of trying to improve flow. Probably one of the earlier ones was more effective: the use of the short stay unit…’ (ED Physician, NSW/ACT) | ‘I think there is a lot of implementation for things like short stay units, so that people introduced a whole pile of medical short stay, surgical short stay, So in our institution that didn’t work, either.’ (ED Director, NSW/ACT) |
| | **Fast track area** | 'Fast Track’s changed quite a lot.’ (ED Physician, QLD) | ‘We’ve had a fast track which has been sort of variably effective, so within that discharge stream, to try and pluck out particular subgroups of patients who you know are pretty quick fixes, to get them in and out.’ (ED Physician, NSW/ACT) | ‘When the NEAT came in, we also brought in Fast Track.’ (ED Nurse, NSW/ACT) |
| | **ED outcomes** | ‘…it’s given us goals that we can kind of set to achieve, otherwise – previously, you know, working in ED, you just went through the motions…’ (ED Nurse, QLD) | ‘…some benefits, in a way, to the staff in that they can actually measure what they’re doing. You know. It’s some way of giving them feedback…’ (Data Admin, NSW/ACT) | ‘It gives us a lot of focus on issues we know are a problem and allows us to bring those issues to executive level, to state level, and have those problems addressed…’ (ED Physician, WA) |
| Performance groups | High performing hospitals | Moderate performing hospitals | Low performing hospitals |
|---------------------|----------------------------|-------------------------------|--------------------------|
| 4HR/NEAT had negative effects on EDs | ‘Oh, it’s crap. It’s a conduit to get money to get resources to look after patients, but it’s – you know, it’s providing NEAT solutions to get numbers to please CEO’s.’ (ED Director, QLD) | ‘It probably has a positive in that we’re making decisions and getting patients to the ward earlier…’ (ED Physician, NSW/ACT) | ‘Unfortunately, we’re seeing more and more political pressure to achieve the target, and that puts greater stress on clinicians, on departments, on institutions to meet those targets.’ (ED Physician, WA) |
| Access block | ‘We’re facing a lot of access block currently… It’s talked about, but there’s no actual actions happening.’ (ED Physician, NSW/ACT) | ‘I think – well, when it was implemented and there was that push, access block just went away!’ (ED Director, QLD) | ‘The impact of NEAT meant that the hospital started talking to each other a bit more…’ (ED Physician, NSW/ACT) |
| Medical education and training | ‘I think the biggest impact that it’s had is that it’s actually sunk all our resources into trying to achieve that one target so that other aspects of our normal work which we think are important, such as education and research, are just continually being eroded.’ (ED Physician, QLD) | ‘…in the longer term I think it makes it difficult for people to get good training, and ultimately puts people off training in emergency medicine, which can only be to the long-term detriment of patients.’ (ED Physician, NSW/ACT) | ‘I also think research and training, which are other really important components of a tertiary training institution like ours, are not given the same emphasis at all, and so, you know, there’s no sort of KPI’s for research and training…’ (ED Director, NSW/ACT) |
| 4HR/NEAT did not impact ED care and practice | ‘My practice probably didn’t change much at all.’ (ED Nurse, WA) | ‘To be honest, I don’t think it’s made too much of a difference to the way I actually practice…’ (ED Physician, QLD) | ‘Well, it’s a sort of double-edged sword: because the NEAT is so poor it quite hasn’t impacted practice, because we haven’t rushed people through… I think that sort of hasn’t quite changed practice!’ (ED Physician, WA) |
| 4HR/NEAT compliance | So I think it has, I think it is good. We are very successful and certainly here we have been pivotal in driving funding for the four-hour rule, because we do see and discharge…’ (ED Nurse, WA) | ‘We’ve always been 96, 97% with our cohort of patients, because they selected us out…so we ended up with two more positions, and the second person on the evening shift, because we could demonstrate that our model worked.’ (ED Nurse, QLD) | ‘…I can’t be bothered remembering the numbers. I just look at the overall graph, and if it’s OK I’m happy!’ (ED Director, NSW/ACT) |
| Unsatisfactory 4HR/NEAT performance | ‘I think we’re constantly in the bad books for not meeting our targets.’ (ED Nurse, QLD) | ‘So how have we performed? Basically, very badly.’ (ED Physician, NSW/ACT) | ‘I think currently at least we perform poorly in NEAT. That’s my understanding of our dashboard numbers.’ (ED Physician, WA) |
between ED and other hospital staff, altered models of care, and worsening communication with patients and potential impacts on clinical outcomes. All hospitals reported increased levels of stress and low morale independent of performance. 4HR/NEAT compliance was reported to have been affected by changes in overall hospital management, such as closing medical wards, staff shortages and insufficient inpatient services. 4HR/NEAT compliance was perceived to generate more workload, particularly from more hospital transfers and patient admissions.

Our study confirmed our working hypothesis that hospital performance is driven by and associated with multiple factors that are not discernible by quantitative measures alone. All the participating hospitals were successful in at least some reductions in either EDLOS or improving access block, although performance varied markedly between hospitals and over time. Our study provided insights into how people perceived these improvements and how they came at the cost of staff stress and morale, and had impacts on communication across the organisation, both staff and patients as well as on education and training.

The 4HR/NEAT was an endeavour to drive improvements in ED and hospital efficiency. System wide efficiency improvements have been required to meet the growth in demand in the context of restrained growth in resources. However, the major concern with the 4HR/NEAT is that it is a unidimensional process indicator. As with all process indicators, there is a perceived potential cost to other dimensions of performance including clinical outcomes, quality, collegiality, organisational morale and thus sustainability.

**Strengths and limitations**

The main strengths of the study are that it included both qualitative and quantitative characteristics that provide a richer perspective than quantitative data alone. The qualitative component achieved high levels of issue saturation and inter-rater reliability. The study also had significant longitudinal linked data (up to 12 years) from 16 hospitals across four jurisdictions (these jurisdictions contain 64% of the total Australian population). Our study also applied advanced statistical techniques that allowed an accurate evaluation of ED performance and the impact of the 4HR/NEAT across Australia. Our study had large data coverage, which has allowed us to reliably measure ED occupancy over time for each participating hospital, hence providing an accurate estimate of the extent of ED overcrowding throughout the long study period.

There are several limitations to our study. First, the qualitative component was conducted after the implementation of the 4HR/NEAT and so the findings were post-hoc and we could not link some events (e.g. some events of bullying and/or miscommunication), described in the interviews with specific changes in ED performance reported per year in the quantitative data. Second, the perceptions about the 4HR/NEAT were mainly limited to

| Performance groups | High performing hospitals | Moderate performing hospitals | Low performing hospitals |
|--------------------|---------------------------|-------------------------------|-------------------------|
| 4HR/NEAT performance improved but failed later | ‘So, in the early days, the organisation was very happy. Like, really, really happy. We did really well in terms of the target, but our performance is steadily deteriorating… rs.’ (ED Physician, WA) | ‘There was a huge drive in 2014, where my understanding is that the Department got additional funding to implement a number of measures to try to improve flow… There was, unsurprisingly, a drop-off in our NEAT compliance.’ (ED Physician, QLD) | ‘I think we’re probably at a plateau at the moment, so when it was first implemented, like I said, we went from 35 to 60 in a very short time, and then we sort of hit from 60 to 70, we got up there and we started seeing those 230 days… So I think we’re sort of at that plateau stage. We need to step it up a gear.’ (Data Admin, NSW/ACT) |
| 4HR/NEAT performance improved but the target is not met | ‘I think we’ve performed exceptionally well, given – I mean, our NEAT performance for last month, for example, was 77%…’ (ED Nurse, QLD) | ‘I think it’s improved. Is that what you mean? Overall, yeah, compliance is getting better, definitely.’ (ED Physician, NSW/ACT) | ‘…I still think the work we’ve put in has seen a significant change, and I think the fact that the four-hour NEAT has come in has actually put the focus and attention on ED.’ (Data Admin, NSW/ACT) |
the ED staff without perspectives from hospital executives, inpatient teams or patients. Third, the study was limited to four Australian jurisdictions (i.e. NSW, ACT, QLD and WA). This was due to restrictions in the data linkage capability for the quantitative component and not having associated investigators/partner organisations in our project from other four jurisdictions. In addition, data linkage took a long time to get approved and linked data after 2013 was not available due to limited funding. Data linkage costs have increased substantially for those not working in the health sector (research centres and academic institutions) across all jurisdictions making it very costly and impractical to have regular data updates from the health systems.

Finally, one important aspect of the classification is that the clustering into performance group is less obvious based on the performance level at the end of the study (Appendix S2c). For example, the proportion of EDLOS ≤4 h ranged between 60% and 75% for the high performing and some of the moderate performing hospitals (Appendix S1). This is because some hospitals had relatively low levels of access block and/or high proportion of patients with EDLOS ≤4 h before 4HR/NEAT started, so that the improvement at the end of the study is small in magnitude (e.g. hospitals M and N). Conversely, some hospitals started with relatively high levels of access block and/or low proportion of patients with EDLOS ≤4 h, so that the improvement at the end of the study is relatively large in magnitude (e.g. hospitals A and E).

Conclusions
The changes in ED flow performance in this study are different to those previously reported and reflect substantial variation among the participating hospitals. The impact of implementing policies at the national level should not be underestimated, and it is possible that the secondary effects on staff and their perceptions may undermine the success achieved to date. A more nuanced approach to performance measurement may be required to identify the less visible (from performance data alone) unintended adverse consequences of 4HR/NEAT implementation. These unintended consequences may impact negatively on organisational resilience and long-term sustainability and potentially clinical outcomes.

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Competing interests
SM is a section editor for Emergency Medicine Australasia. GF is a member of the editorial board of Emergency Medicine Australasia.

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Supporting information
Additional supporting information may be found in the online version of this article at the publisher’s web site:

Appendix S1. Quantitative measures of performance based on three methods for quantifying access block and % EDLOS ≤ 4 h.

Appendix S2. Performance classification based on access block and proportion of patients being seen within 4 h in the ED.

Appendix S3. Quotes from emergency medicine staff regarding their experience during the implementation of the target across performance groups.