Clinical process redesign for unplanned arrivals in hospitals

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ABSTRACT

- Emergency department performance had been deteriorating in NSW Health facilities and at Flinders Medical Centre before a fundamentally new approach involving a redesign method, additional bed capacity and more rigorous hospital performance management was applied.
- Redesign was undertaken in over 60 hospitals in New South Wales.
- Numerous disconnections and misalignments in the process of care delivery have been uncovered during the diagnostic phase of this redesign.
- Solutions addressed the entire patient journey through the hospital, to produce smoother patient flow along the continuum of care.
- To achieve a sustained improvement in performance, numerous solutions must be simultaneously implemented in each hospital.
- With this multipronged approach, a turnaround in NSW emergency access performance has been achieved in the face of rising demand for services; the improvement has continued over 3 years.
- This article reports on our findings from system-wide redesign for unplanned hospital attendances.

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Australian public hospital emergency departments (EDs) have recently been experiencing an overwhelming growth in demand for unplanned care: in New South Wales ED attendances are up 6.5% (Tony Dunn Director, Data Analysis and Performance Evaluation Branch, NSW Health, personal communication). The most obvious sign of this is a queue of patients on ambulance trolleys, waiting for a bed in the ED. The challenges facing Australian EDs have been described previously in this Journal, and include lack of access to inpatient beds, workforce deficiencies,[1] safety issues,[2] increased mortality,[3,4] and inefficiencies that compound each other. The volume of demand for beds for patients being admitted from the ED often also resulted in a destructive impact on elective surgery.[5]

We have carried out system-wide redesign in over 60 NSW hospitals (through the Clinical Services Redesign Program) and at Flinders Medical Centre in South Australia (through the Redesigning Care Program) to tackle these issues. The diagnostic phase of our redesign work confirms these previously reported observations, and includes other findings, such as:

- ambulatory patients were complaining that little information is given about reasons for their long waits or how much longer they will have to wait;
- patients' uncertainty and frustration is often expressed by anger and aggression toward staff, or by not waiting to be seen by a doctor;
- patients in an ED who needed to be admitted to hospital sometimes waited days before being transferred to a ward;
- patients were often not admitted to their specialist team's home ward;
- staff in busy EDs often felt under siege, and there was a mindset among hospital management and ED staff that if the ED is very busy, the best response is to reduce patient demand by not accepting ambulances, rather than to improve internal hospital processes;
- when one hospital is busy, so are most hospitals in the vicinity;
- the overall pattern of presentations to EDs is surprisingly predictable when analysed by season, day of week or hour of day (eg, hospitals are most often congested on Monday afternoons as occupancy peaks because of the combination of elective arrivals, ongoing emergency arrivals and the delayed departure of inpatients because the rate of discharge at weekends is reduced); and
- congestion in ED is contributed to by inefficient flow of patients through the entire hospital, as well as inefficiencies within the ED.

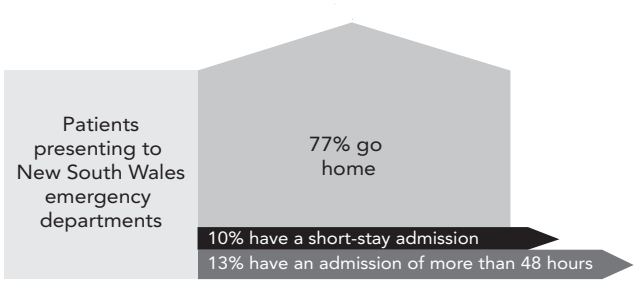
Clearly, an annual growth in hospital ED demand across Australia of about 5%–8% per year (Tony Dunn, Director, Data Analysis and Performance Evaluation Branch, NSW Health, personal communication) cannot be accommodated by ambulance diversion. Previous explanations for the challenges in EDs have focused on a lack of inpatient beds and workforce deficiencies. While these clearly contribute, our redesign work has identified numerous correctable issues which, when addressed, permit substantial improvements in performance with modest increases in bed capacity and workforce. Examples include such mundane issues as the mismatch of staff rosters to patient attendances and the predictable adverse impact of junior medical staff term rotations.

Time-consuming processes within emergency departments

Increasingly, patients in EDs are older[6] and frail, with multiple problems that take many hours to assess. Such patients can be hard to place with medical teams, which have become increasingly specialised around single-organ diseases. Teams may not feel confident outside their subspecialty and may be reluctant to accept the patient. Another large patient group is people with chest pain, who are managed under treatment protocols that require them to wait many hours for tests to exclude a cardiac cause.

Patients of all kinds are often assessed first by junior medical staff, who then present the problem to registrars and then to ED specialists. Thus, decisions about treatment can be delayed for hours. Once assessed by ED staff, patients often need further assessment by specialty teams who may be unable to attend immediately because of other commitments. Patients also wait in the ED for test results while diagnostic departments process samples from all parts of the hospital, and patients from the ED are not necessarily given priority.

1 Disposition of patients from New South Wales emergency departments



Data covers 1.7 million NSW public emergency department attendances in the 2005–06 financial year.

Source: Tony Dunn, Director, Data Analysis and Performance Evaluation Branch, NSW Health, December 2007. ◆

Problems in the wards

Our diagnostic work during the redesign of patient flow through hospitals confirms that congestion in ED is exacerbated by systematic failure to manage the processes and rate-limiting steps involved in patient progress through the hospital. Typical examples include: the often haphazard nature of discharge planning; the dependence on visits by medical staff for decisions, despite the routine nature of most patient journeys; the lack of a shared understanding among staff, patients and carers of the likely patient trajectory; and the compounding impact on the incidence of adverse events and increased length of stay if patients aren't nursed in their "home ward".

Clinical redesign solutions: a whole-of-ED management system

Our experience is that redesigning patient journeys makes it possible to improve flow for all three major patient groups presenting at EDs — those who don't require admission, those requiring only a short admission, and those requiring a longer admission.

Preventing unnecessary hospitalisation

A large number of patients who have historically stayed in hospital for only 1–2 days have conditions such as cellulitis, deep vein thrombosis and community-acquired pneumonia that are amenable to safe management in the community using "hospital in the home" models.[7] Home-based care can also be preferable for older people, who often become confused and debilitated in hospital. Other advantages of community-based care include the reduced risk of hospital-acquired complications, and that such care can replace the final portion of an otherwise longer hospital stay.

Smoothing the load before arrival at hospital

Load levelling between EDs can be significantly improved by introducing ambulance case-distribution algorithms to minimise clustering of ambulances at any one ED. This removes the concept of bypass, replacing it with the concept of each hospital accepting the expected load from its community and having plans in place to handle surges in demand. When specialty service availability is also factored into the distribution algorithm, this load levelling ensures that patients are taken to a hospital that will provide the necessary services in a timely manner. This approach requires regional planning. We believe its introduction as part of system-wide redesign in metropolitan NSW has been a significant contributor to reduced ambulance response time despite rising demand.

Implementing solutions for patients who do not need admission: streaming

In NSW in the 2005–06 financial year, 40% of patients admitted to public hospitals came through EDs (Tony Dunn Director, Data Analysis and Performance Evaluation Branch, NSW Health, personal communication), and these patients are demanding on ED staff time. However, the number of patients attending EDs is over 2 million per annum in NSW, and 77% are not admitted (Box 1). Redesigning pathways for this large group is potentially very beneficial, as moving them quickly through the ED can reduce congestion and frustration and improve the safety of care. A number of care models have been used in NSW to achieve this effect, such as "fast track zones", advanced practice nurses, and rapid assessment teams.

Fast track zones stream patients with conditions of lower urgency or complexity, especially those who are ambulatory, into a separate zone of the ED where they are attended by a separate group of ED staff. Having experienced staff in this zone permits rapid decision making and faster handling. Medical staff can be supplemented in this model by nurse practitioners and experienced physiotherapists (used at Liverpool Hospital for minor musculoskeletal conditions), who are able to efficiently and independently manage a large subset of these patients and achieve high patient satisfaction.[8]

Protocol-based nurse-initiated ordering soon after patient arrival has reduced time to analgesia and decision making. Rapid assessment teams permit assessment, diagnosis and simple treatments to begin soon after the patient arrives.

At John Hunter Hospital, ED patients are directed into one of three streams: high acuity/high complexity; low acuity/high complexity; or fast track (low acuity/low complexity). The groups are allocated to separate teams. There have been improvements in access block and triage time and a reduction in ED length of stay for both admitted and discharged patients.

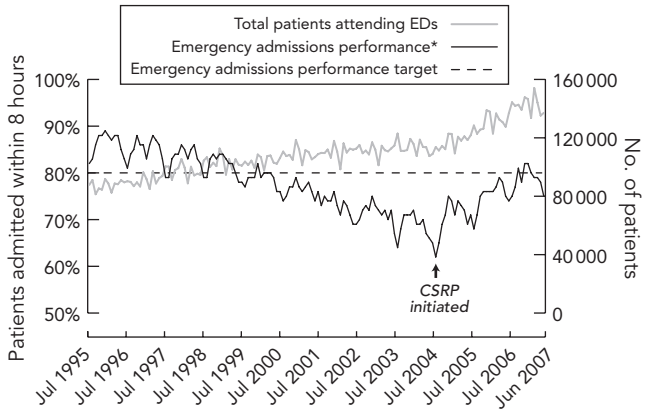
At Flinders Medical Centre, patients who present to the ED have been streamed into two broad categories — those most likely to go home and those most likely to need admission. These groups are treated within two separate areas of the ED by distinct staff. Except for patients with time-critical presenting problems, patients are seen in their order of arrival rather than by triage category. This simple approach has resulted in improved access for both groups of patients and has reduced the rate of adverse events.

Implementing solutions for patients requiring short admissions (less than 48 hours)

Many patients require only a relatively short inpatient period of monitoring once their initial assessment and treatment has been completed. Ten per cent of ED attendances in NSW result in a hospital stay of less than 48 hours (Box 1). A number of hospitals have established wards where short-stay patients are managed together, grouped by their likely duration of stay or other characteristics. This can improve the quality of the patient experience and reduce time spent in hospital.

Very short-stay units, such as 12–24-hour wards adjacent to EDs and managed by ED physicians (emergency medical units or short stay observation units) are now common. Wards with stays up to

2 Emergency admission performance* in New South Wales hospitals, 1995–2007



ED = emergency department. CSRP = Clinical Services Redesign Program.
* Percentage of patients admitted through the ED who egress from the ED within 8 hours. ◆

48 hours managed by inpatient services have also been established. At the Flinders Medical Centre, a short-stay ward for patients whose predicted length of stay is less than 72 hours cares for both medical and surgical patients in the same ward. That one ward now manages around a quarter of all adult overnight, emergency admissions.

Short-stay wards work well when care is straightforward, protocols for common conditions are well developed, and nurses are empowered to advance patients to the next step in their treatment pathways once agreed criteria are met. The most important feature of these wards is the mindset for patients, their carers and staff that the patient will stay only the designated time period. This drives the development of good systems to standardise and coordinate care pathways and avoid delays so that patients can be transferred to the next stage of their journey in a predictable process.

Short-stay wards can be better places than the ED for patients who need a prolonged period of investigation, assessment or monitoring before the decision is made as to whether they need to be transferred to a specialist team.

Implementing solutions for patients requiring longer admissions

The challenge for hospitals in managing patients who stay more than 48 hours is to guarantee processes that support smooth flow through the hospital from presentation to discharge, with minimal waste of time and effort. In NSW, 13% of ED attendances result in hospital stays longer than 48 hours (Box 1).

The following clinical process redesign solutions have been found to enable a faster, safer, more efficient patient journey through the hospital.

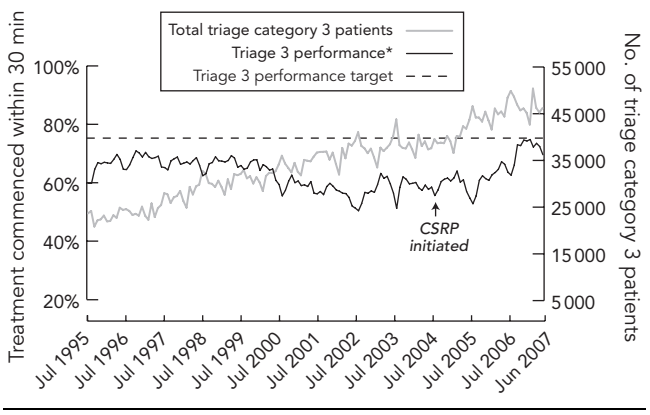
Solutions relating to the ED

- Electronic ambulance arrivals boards, linked to ambulance control rooms, can alert ED staff to imminent arrivals and to pending surges in demand.
- Use of non-clinical staff, a better staff skill mix and clearer allocation of roles according to skills can allow tasks to be performed by the appropriate category of staff, thus freeing more highly trained staff for tasks that only they can undertake.
- Identifying a manager who is responsible for overseeing patient flows in the ED and redistributing workloads or activating escalation plans at peak periods. For a complex system such as an ED to function well in the face of high and fluctuating levels of demand, staff need a clear chain of command.

Solutions relating to the wards

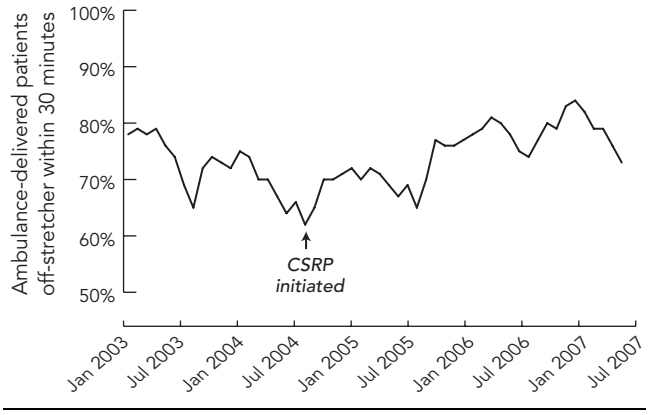
- Processes in the wards that "pull" patients who need admission out of the ED to the wards, rather than waiting until there is an overflow in the ED causing a "spill" or "push" of patients from the ED to the wards. This requires cooperation between nurse unit managers to facilitate transfer of patients.
- Regular review and modification of bed allocations to minimise "outlier" patients (those in a ward that is not the designated ward for their condition). This is an essential step, although often contentious, as number of beds is seen to equate to the status of a unit. It benefits clinicians by reducing time spent travelling between wards, and ensures skilled teams who are familiar with the patient's disease manage the patient. The benefits to patients include a better journey and higher quality care with reduced errors and fewer delays.

3 Triage 3 performance* for New South Wales hospitals, 1995–2007



CSRP: Clinical Services Redesign Program.
* Percentage of patients in triage category 3 whose treatment is commenced within 30 minutes of arrival. ◆

4 Off-stretcher times* for New South Wales hospitals, 2002–2007



CSRP: Clinical Services Redesign Program.
* Percentage of patients moved off an ambulance stretcher into an emergency department bed within 30 minutes of arrival. ◆

- A daily morning ward meeting, led by the nurse manager, where medical, nursing and allied health staff meet for a short focused discussion of each patient. The patient's journey is reviewed to determine what needs to happen next, and who will do what, by when. This ensures better coordination, and that clear work plans are made for the day, thus reducing the number of frustrating telephone calls to gather and share information.
- Information technology solutions such as a hospital electronic bed board have also been found to be effective. They provide bed managers and nurse unit managers with a clear picture of pending emergency and elective demand, and of available capacity. We have introduced electronic bed boards in over 100 hospitals in NSW.
- Universal discharge planning, with all patients having an estimated date of discharge from the time of admission. This allows better preparation for discharge, ensuring all referrals have been prepared, medications are ready, and carers are prepared to receive the patient at home.

Solutions relating to the whole hospital

- Admission rules to guarantee that all patients (especially those who have complex, multiple problems) are rapidly allocated a specialist.
- Clear rules about how ED staff will communicate with inpatient teams (including accountability for decisions about patients) and commitment from inpatient teams to rapidly attend the ED as needed.
- Direct admission to the appropriate specialty ward for patients with chronic disease who are well known to the hospital. This avoids patients having to wait and repeat their complex medical history and ensures they are treated by the team who know them.
- Access to accurate, current data for clinical staff and hospital managers to interpret patient flows through the hospital.
- Real-time analysis of performance and the ability to establish the root causes of patient flow blockages are crucial. Having a patient flow unit reporting to an accountable senior manager is an important component of a well managed system.
- More efficient communication between teams through the use of mobile phones and other new technologies, thereby delivering the right care to patients in a timely manner. This improves patient flow and also reduces staff frustration.

Results

Overall statewide performance on emergency access key performance indicators (KPIs) has "turned around" since the implementation of the Clinical Services Redesign Program commenced in NSW in August 2004. Performance for the three most challenging KPIs, emergency admission performance (percentage of patients admitted through the ED who egress from the ED within 8 hours), triage 3 performance (percentage of patients in triage category 3 whose treatment is commenced within 30 minutes of arrival), and off-stretcher time (percentage of patients moved off an ambulance

5 Emergency performance indicators in 19 New South Wales hospitals for the financial years 2004–05 to 2006–07

	Demand increases (%)		Outcomes (percentage point change*)		
Hospital	ED attendances	Admissions through the ED	EAP	Triage 3	Triage 4
St George	↑ 18%	↑ 16%	↑ 16	↑ 23	↑ 19
St Vincent's	↑ 26%	↑ 29%	↑ 11	↓ 3	↑ 4
Prince of Wales	↑ 18%	↑ 25%	↑ 13	↑ 17	↑ 13
Sutherland	↑ 20%	↑ 28%	↑ 22	↓ 2	↑ 10
Wollongong	↑ 18%	↑ 16%	↑ 20	↑ 24	↑ 16
Royal North Shore	↑ 18%	↑ 18%	↑ 5	↑ 3	↑ 5
Bankstown	↑ 27%	↑ 13%	↑ 34	↑ 8	↑ 16
Concord	↑ 19%	↑ 6%	↑ 24	↑ 4	↑ 9
Campbelltown	↑ 27%	↑ 6%	↑ 2	↑ 14	↑ 12
Liverpool	↑ 22%	↑ 45%	↑ 10	↑ 21	↑ 16
Royal Prince Alfred	↑ 20%	↑ 34%	↑ 12	↑ 14	↑ 8
Tweed	↑ 5%	↑ 43%	↓ 12	↑ 5	Steady
The Children's Hospital at Westmead	↑ 22%	↑ 16%	↑ 9	↑ 21	↑ 23
Blacktown	↑ 18%	↑ 11%	↑ 18	Steady	↑ 5
Newcastle Calvary Mater	↑ 16%	↑ 20%	Steady	↑ 4	↑ 4
John Hunter†	↑ 12%	↑ 18%	↑ 21	↑ 30	↑ 32
Gosford	↑ 9%	↑ 6%	Steady	↑ 7	Steady
Westmead	↑ 24%	↑ 23%	↑ 11	↑ 31	↑ 28
Nepean	↑ 22%	↑ 21%	↑ 12	↓ 3	↑ 4

ED = emergency department. EAP = emergency admission performance (% of admissions through ED who egress from the ED within 8 h). Triage 3 is the percentage of patients in triage category 3 whose treatment is commenced within 30 minutes of arrival. Triage 4 is the percentage of patients in triage category 4 whose treatment is commenced within 60 minutes of arrival.

* Percentage point change (eg, improvement from 63% to 75% is ↑ 12).

† John Hunter outcomes data cover the period commencing in 2002, as redesign commenced earlier in this hospital.

Source: Tony Dunn, Director, Data Analysis and Performance Evaluation Branch, NSW Health, December 2007. ◆

stretcher into an ED bed within 30 minutes of arrival) had been progressively deteriorating before the implementation of solutions arising from redesign in August 2004. Since the Clinical Services Redesign Program was implemented, performance has been improving, as shown in Box 2, Box 3, and Box 4.

These results are not just a one-day snapshot; they reflect millions of ED attendances throughout NSW, rising to over 1.8 million attendances in the final year represented in each graph. Importantly, they highlight how NSW performance in all three parameters was previously progressively deteriorating until redesign commenced.

The performance of a sample of 19 NSW hospitals (including the 10 with the busiest EDs) that underwent redesign of emergency patient flow is detailed in Box 5, showing that even in the face of rising demand (of between 5% and 27%), performance improved or was maintained in 52 of 57 instances for the three KPIs presented.

Conclusion

In the face of rising demand, redesign of clinical processes in hospital wards as well as within EDs is essential for improving patients' access to emergency care. By setting hospital bed capacity at an appropriate level, raising the awareness of and accountability for performance indicators, and redesigning the processes that underpin clinical care and the patient's journey, we have found that poor performance can be turned around across an entire state and this improvement can be sustained.

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Competing interests

None identified.

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