



Western Australia Emergency Flow Report

UK Visit

Final Report

September 2013

Contents

About this Document

This document outlines an emergency flow review conducted by an independent team of clinicians, academics, analysts, quality improvement experts and health managers from the UK, led by Imperial College London.

In making these recommendations the review team have drawn on their broad background in providing, managing and improving emergency care as well as the latest evidence base and best practice guidelines.

The observations and recommendations are based on the triangulation of multiple information sources including staff interviews, observations, analysis of routine data, questionnaires and day of care survey at the hospital site. In some areas all comments may not have been aligned reflecting different views of local staff and departments. As such these perceptions or misconceptions may be important when assessing the delivery of high quality patient flow at a local level.

Improving the flow of emergency care is vital in the provision of safe, timely and effective patient care across the healthcare system. Central to this is the patient journey and experience, which was used as the focus for our discussions and this overview.

Contents

- **Why Emergency Flow?**
- **Programme Visit Outline**
- **Executive Summary of Recommendations**
- **Introducing Emergency Flow - Action Effect Diagram**
- **Change Management and Measurement for Improvement**
- **London NHS Emergency care standards**
- **Overall – Best Practice**
- **WA and Site specific Data**
- **Recommendation 1:** Improve patient flow – securing links in the chain
- **Recommendation 2:** Reduce complexity of internal ED systems
- **Recommendation 3:** Reduce the complexity of the admission interface between ED and AAU/ASU
- **Recommendation 4:** Optimise the admission flow between ED and specialist wards; and between AAU/ASU and sub-specialty inpatient wards
- **Recommendation 5:** Provide continuity of patient care
- **Recommendation 6:** Optimise physical and staff capacity – doing today's work today and making Mondays better
- **Additional Observations and Recommendations**

- **Appendix – UK Visit Team**
- **Appendix – Action Effect Diagram Workshop**
- **Appendix – London NHS Emergency care standards**
- **Appendix – Day of care survey**
- **Appendix – Evidence List for Emergency Flow**

Why Emergency Flow?

Why is this important?

- Assessing and treating patients who require emergency care is time critical to achieve good patient experience and outcomes. Efficiently managing the spectrum of all patient groups (admitted and non-admitted) accessing the emergency care pathway will improve patient flow through the emergency care pathway. For admitted patients, prompt assessment and transfer to the appropriate in-patient area with the correct clinical staff, care team and equipment is essential to ensure the provision of high quality and effective care. Evidence suggests the sooner patients are moved to the right clinical environment that overall outcomes are improved.

Origins of the 4 hour patient flow measure

- The 4 hour measure first appeared as a quality measure in the UK in 2003 following input from patients and public who were unhappy with long waits in emergency departments (ED) and was agreed by all Royal Colleges and specialist societies. More recently the Scottish Government Unscheduled Care Expert Group reinforced the clinical and managerial commitment to retain the 4 hour measure as a whole system quality marker.
- As well as being an indicator of quality from a patient perspective, the percentage of patients being seen by ED within 4 hours is an important measure of overall patient flow and whole system performance. System factors within the control of hospital services are the primary drivers to improve flow.
- The 4 hour measure is therefore a powerful marker of overall system function.
- Western Australia has been in the forefront of application of improvements to deliver a standard performance of 4 hours and much has already been done to improve systems and processes. The time is now right to reinvigorate the approach to improvement in this sphere.

Joining up the journey, transitions in patient care

- Individual elements of care are generally of high quality. There is a clear focus on delivery of safe care. However, patient care is provided by many different healthcare professionals in different care settings. It is the communication and connectivity between these different people and physical locations where quality of care can break down, and delays are experienced. Focusing on the transitions of care will allow bottle necks to be identified and will also identify potential areas of clinical risk at handovers between parts of the system which can be improved. *Of note, this was a key finding during the visit, consistent with challenges in other health economies and possibly the area where most gains appear to be possible.*

Review objective

- The UK team were invited to Western Australia by the Deputy Premier and Minister for Health, the Hon. Dr. Kim Hames, to review the emergency flow system of three major tertiary hospitals in Perth to provide an objective and independent perspective to help inform the continuous improvement efforts of health services in Western Australia.

Programme Visit

The programme visit was based on methods developed over the last decade to support the quality of care for patients requiring urgent or emergency care .

1) Action effect diagram workshop

Designed to encourage communication by all professionals and organisations with responsibility for managing the care of patients. A structured framework linking strategy to identify and prioritise key interventions and assign appropriate evidence and measures.

2) Data sharing and analysis

Information obtained and analysed from existing health care data sets including Emergency Department and Hospital systems. The joint analysis of WA health data has been used to inform sections of this report plus site based feedback.

3) Day of Care surveys

Using a rapid survey methodology, on-site hospital staff reviewed all in-patient ward areas, excluding ICU, mental health, maternity and paediatric services at each site, between 8am and 10am. Data was entered and analysed in real time .

4) Patient pathway walk-through 'diagnostics'

Designed as a diagnostic peer support walk through covering the Emergency Departments, Acute Medical and Surgical units and selected in-patient medical and surgical wards as well as associated support services. This was conducted on the same day as Day of Care survey and informed by an assessment of compliance with the London NHS Emergency care standards.

5) London NHS Emergency care standards

The London NHS Emergency care standards (2011-2013) were used to assess compliance of each hospital for emergency care (emergency departments, acute medicine and emergency general surgery) based on self-assessment and subsequent review.

6) Site feedback

On the same day of the site visit local feedback was provided by members of the UK visiting team based on high level local performance data, results of the day of care survey and initial reflections from the patient pathway walk-through.

7) Overall feedback

Initial verbal feedback of the high level recommendations was given on 7th and 8th August 2013, linked to the above processes and data analysis. A written report was provided in draft format on the 8th August 2013 including site specific observations and data. A final version of the report was agreed in September 2013.

Executive Summary of Recommendations and Actions (1)

Improve patient flow – securing links in the chain

- Establish greater clinical and managerial ownership and leadership of patient flow throughout the emergency care patient pathway including weekends
- Routine interpretation with action outputs based on weekly site level review of 4 hour performance time-series, and associated data
 - length of stay, re-admission rates, outliers, over-census and detailed reasons for breaches
- Embed Estimated Date of Discharge (EDD) in all wards with multi-disciplinary buy-in to drive effective discharge and capacity planning
- Rationalise the use of, and review the number and complexity of, IT systems involved in managing patient flow
 - to release clinical time
 - improve visibility throughout patient journey in all relevant departments to promote pull systems
 - avoid complexity of data analysis
- Minimise (avoid) routine creation of surge capacity (e.g. extra beds or ‘corridor beds’)
- Promote morning and weekend discharges from all clinical areas

Reduce complexity of internal ED systems

- Maximise and prioritise performance of discharge stream (minors) to reduce occupancy and support timely decision making
- Eliminate multiple hand-offs and physical moves for admitted patients within ED, including to short stay ED areas
- Provide alternative hospital pathways for specific patient groups attending ED, including for emergency psychiatric patients and patient groups whose care could be transferred from emergency to planned care e.g. transfusion for patients with anaemia

Reduce the complexity of the admission interface between ED and AAU/ASU

- Manage outflow from ED so the patient is cared for in the right place, first time – avoid front-door outliers and switching on and off surge capacity
 - Embed ED consultant admission rights to AAU and ASU
 - explore direct admissions or rapid access clinics for defined patient sub-groups to AAU/ ASU from primary care to bypass ED
- Eliminate unnecessary hand-offs and transactions between clinical disciplines and departments, patient flow staff and information systems (including bed management)
- Broaden the inclusion criteria for AAU/ ASU and ensure they are recognised safe havens 24/7

Executive Summary of Recommendations and Actions (2)

Optimise the admission flow between ED and specialist wards; and between AAU/ASU and sub-specialty inpatient wards

- Establish effective pull and push systems to ensure effective patient flow and avoid delay between departments and clinical specialties
 - ensure the patient is cared for in the right place, first time – avoid outliers and routine use of surge capacity
- Streamline and prioritise specialist opinion process in ED, AAU and ASU to eliminate delays in all clinical decision making and management – develop pull systems as the norm

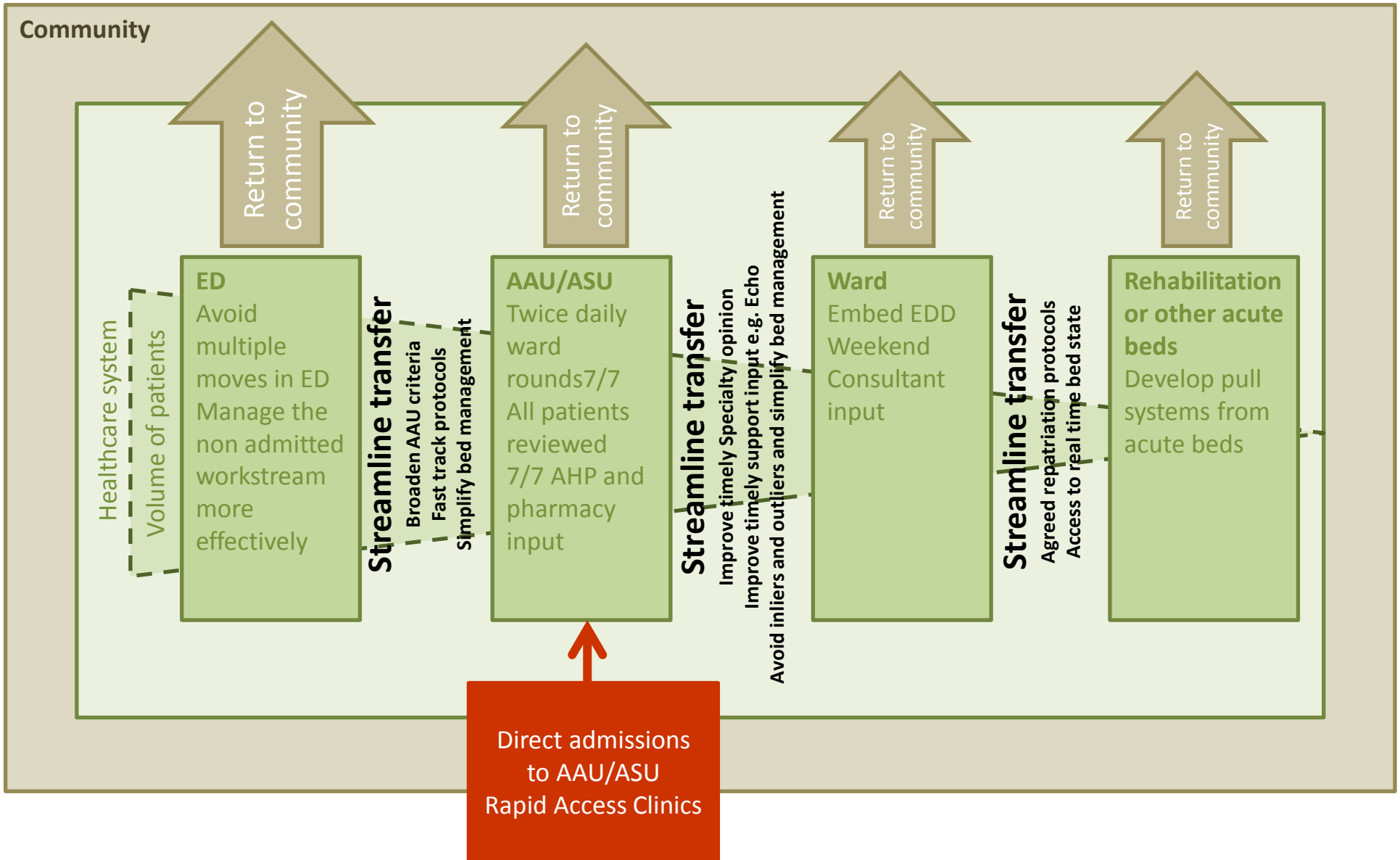
Provide continuity of patient care

- Ensure timing of consultant decision making is matched to patient need in all clinical areas throughout the week
 - AAU/ ASU to provide continuity of care, twice daily ward round for all patients and clinicians to be free from all other clinical or elective duties
 - improve consultant input on inpatient ward areas at weekends to improve discharges and timely investigations
- Consider adopting a team of consultants to provide continuity of care rather than individual consultant teams in areas where consultant cover is intermittent, particularly for in-patient medical wards and at weekends
- Align the multi-disciplinary team (including nurses, therapists and pharmacists) at ward level to support timely decision making and treatment (right place, first time) seven days a week

Optimise physical and staff capacity – doing today's work today and making Mondays better

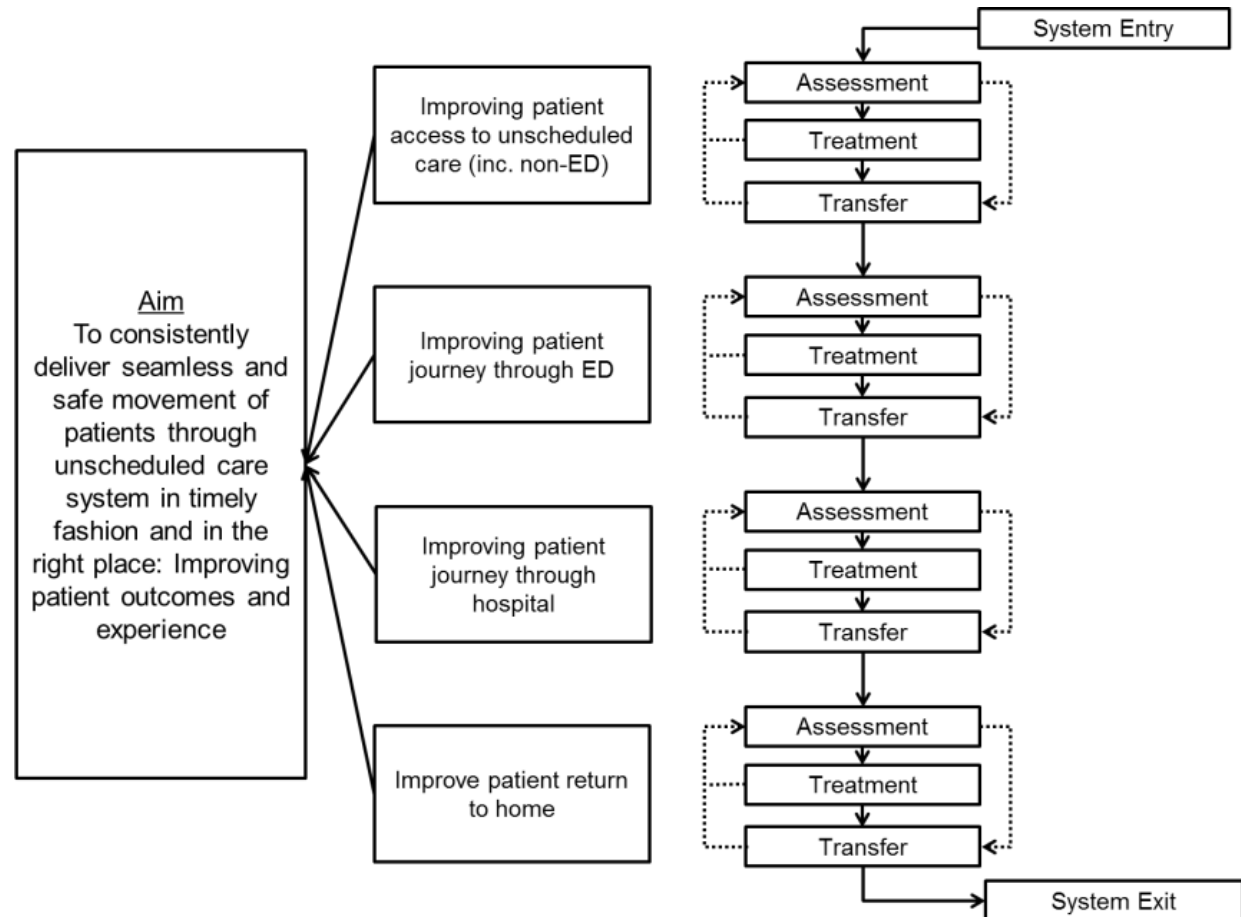
- Improve the consistency of high quality and safe patient care, seven days a week
 - design staffing profiles to provide more effective patient care at weekends
- Ensure support services are provided in a more timely fashion – e.g. echocardiography, pharmacy pre-packs and process for provision of discharge medications
- Minimise (avoid) outliers thus maximising physical capacity
- Ensure protected emergency theatre time, seven days a week
- Review all weekend elective activity including zero lengths of stays particularly in relation to medical and nursing resource utilisation to ensure that it is not dependent on utilising staff committed to emergency care

Mind the gap – Streamline Transfers



Introducing Emergency Flow - Action Effect Diagram

- An introductory workshop was held with over 60 key individuals from across the WA Health system responsible for the delivery of patient care through the emergency care system.
- Action Effect Diagrams (AED) provide a mechanism to bring together an overall aim with representation of a system, interventions to influence change in the system and metrics to support monitoring of the impact of change, together with explicit reference to the evidence and/or guidance that underpins each key connection
- An initial high-level AED for the WA emergency care pathway was developed and is presented to be used as a standard reference point for data, observations and recommendations.
- Additional information collected in the workshop, breaking down the factors further, is presented as an appendix.



WA Emergency Care Action Effect Diagram as developed in Workshop 30.07.13
(High level – not inc. further breakdown, interventions or metrics)

Re-energising the Change Process

Implementing service level change requires significant sustained efforts across the region. This can be achieved through building on the foundations of previous change programmes and re-energising the change process:

- Drive improvements in emergency flow through a quality agenda, focusing on the provision of safe, high quality and effective patient care and improved clinical outcomes and patient experience.
- Ensure the patient voice is central to all discussions and improvement efforts.
- Secure proactive clinical engagement and leadership through the development and implementation of a competitive process for the appointment of clinical leadership roles in all sites including medical, nursing and AHP.
- Increase central support to provide guidance, facilitation and expert and technical support linked to site specific ownership and leadership of sustainable solutions.
- Increase local support for quality improvement capacity to actively engage all staff involved in the emergency care pathway and provide local systems thinking and information analysis expertise to inform change based on local data.
- Build capacity for quality improvement and change management at site level through investing in professional development of both clinical and non-clinical staff and investigating graduate and post-graduate opportunities.
- Current plans for emergency flow need to be linked to the changes proposed for Fiona Stanley. Importantly, attempts to trial new practice or changes in patient access or flow should be considered in existing sites prior to opening.

Change Management and Measurement for Improvement

This report makes recommendations for changes in care processes, with a view to improving patient flow through the system as measured by performance against the 4 hour rule. Consistent with the tools and techniques used in the WA Four Hour Rule Programme and recommendations from Professor Bryant Stokes' review in 2011, we recognise the process of change management is critical to delivering and sustaining improvements. In order that these changes be successful and the resulting improvements sustainable, certain principles relating to improvement should be observed.

Change principles

- Change should be patient centred.
- Do not expect your first change attempt to be a perfect solution. Healthcare is complex and it is hard to predict what will work in advance. Engaging staff in the change design process, testing ideas and using real time feedback to evaluate their impact is essential to inform iterative change and to develop effective and sustainable solutions.
- Change requires strong leadership, both clinical and non-clinical, and requires sustained effort and attention. Careful attention must be paid to implementation of changes, with appropriate resource and support provided. Executive sponsors, clinical and redesign leads should strive to remove barriers to implementation.
- Facilitators and managers of change should support objective reflection using data and feedback to review the progress of improvement initiatives and inform decision making including whether to persist, modify or abandon.

Engagement

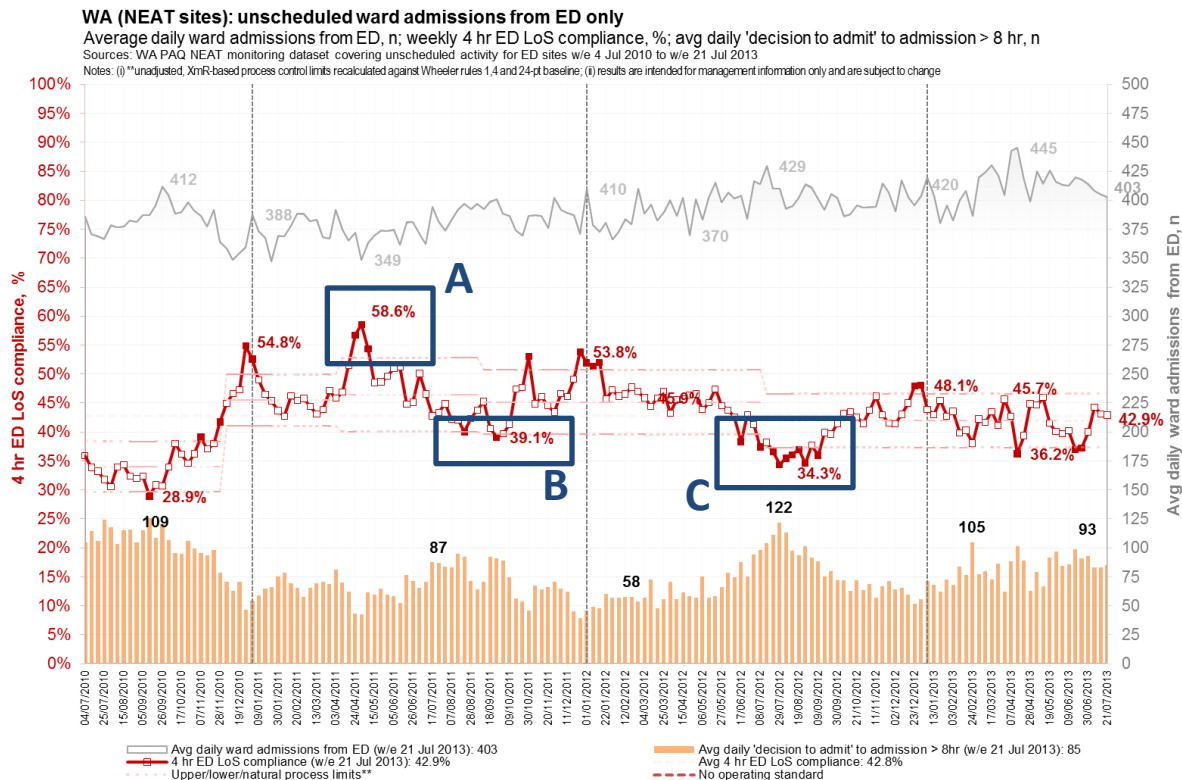
- Opportunities should be created to engage all staff in an active dialogue regarding emergency flow. This should include a safe forum for them to exchange different perspectives of the healthcare system, share concerns, generate ideas and work collaboratively. This will help staff to feel valued, ensure they are listened to and understood and support them in playing an active role in delivering improvements.
- Communication strategies should ensure staff are aware of progress in improving emergency flow and associated metrics.
- Patient opinion should be an integral part of design, implementation and evaluation.

Data

- Objective data and information should be used in any decisions relating to design and implementation. We recommend an overarching set of a few key quality metrics to support specific local efforts in addition to the state-wide dashboard.
- These metrics should be updated on at least a weekly basis, preferably daily. In addition, metrics should be distinguishable by in and out of hours, weekday and weekend and by process stage.
- Statistical process control (SPC) should be used to analyse improvement measures, in order that variation is understood and acted on appropriately. Training in Clinical Service Redesign and SPC should be offered widely.
- Further data should be analysed and interpreted to support investigations to identify patterns and explore what is happening and why. Examples of such metrics are provided within the recommendations.
- Measures of clinical outcome, including mortality, should be used; monthly or more frequently where possible. Balance measures should be included to monitor unintended consequences of change.

Application of statistical process control to 4 hour rule performance: introduction to the control moving range chart (XmR)

- This graph shows compliance against the 4 hour rule and average daily admissions for **all unscheduled admissions from ED** across NEAT sites in WA on a monthly basis since July 2010.
- Admissions from ED are depicted by the grey shaded area against the scale on the right of the chart.
- Performance is charted as the red line chart against the percentage scale on the left of the chart.
- The average daily number of unscheduled admissions from ED where the time between the 'decision to admit' and actual admission was greater than 8 hour is charted by the orange bars, the actual number being inserted at the top of the bar. To convert to weekly total, multiply by 7.
- The central dashed line that is horizontal over periods of time represents the mean performance for the period.
- The two other dotted lines are the *process control limits* that form the basic tool of *statistical process control*.
- A set of *rules* (in this case those articulated in Donald Wheeler's book [Making Sense of Data: SPC for the Service Sector](#) allows a distinction to be made between *common cause variation* – exhibited by every process and not assignable to any particular cause; and *special cause variation* – attributable to a particular cause. Optimal decision making for improvement is based on this distinction.
- Common cause variation can only be reduced by fundamentally changing the system; special causes can be targeted and eliminated or built in, depending on whether they are positive or negative.



Analysis and Discussion

The control limits here have been recalculated following special causes detected via the rules. This establishes when performance altered, and to what extent. **Where points lie outside the control limits, this is indicative of a special cause.**

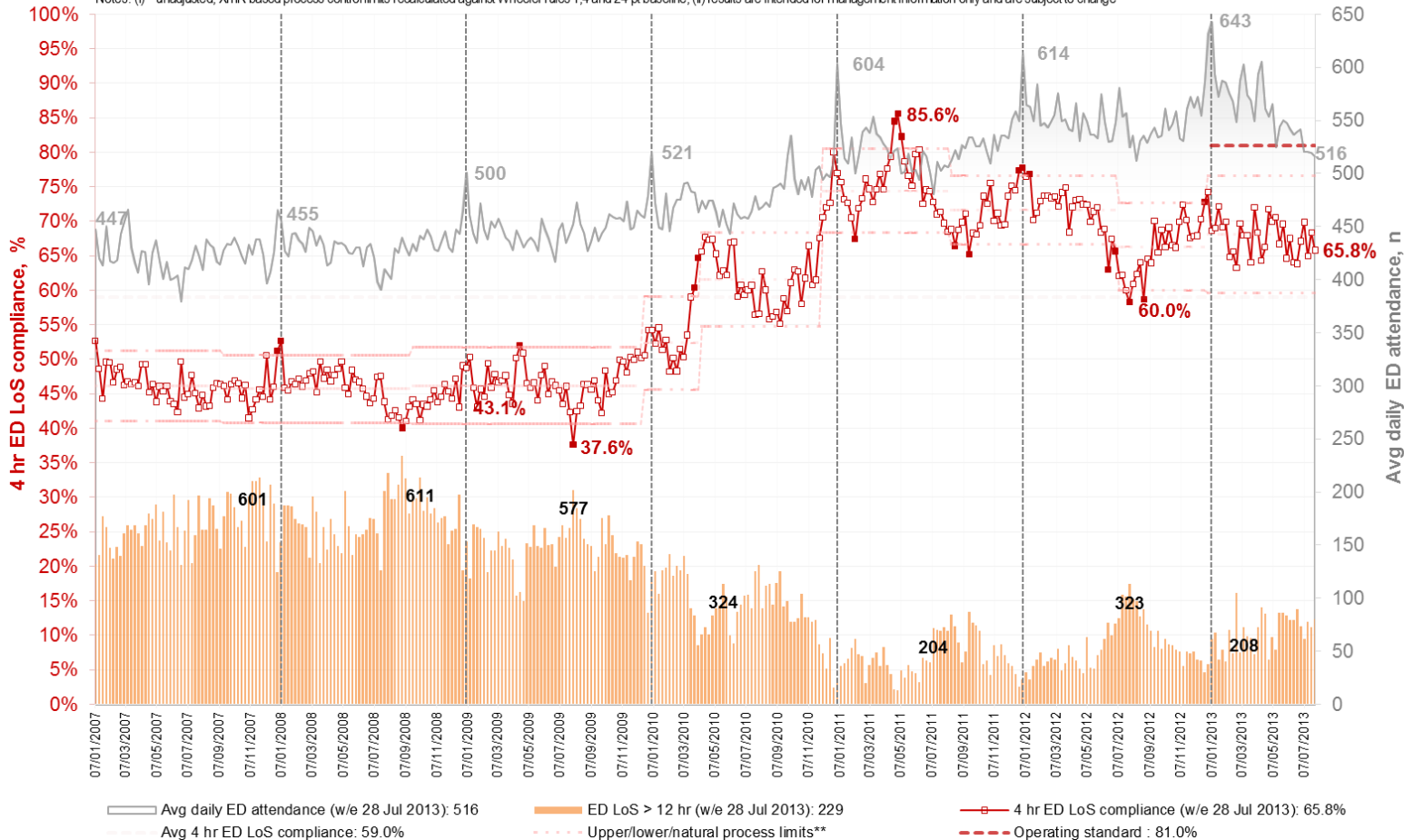
For example, the relatively high performance around April 2011 (box A) is not likely to have been due to common cause variation alone. Similarly, dips in performance around August 2011 and May 2012 (boxes B and C) are likely to be assignable to a particular cause. These signals would warrant further investigation proactively at the time of measurement, and may provide learning as to what improvements could be embedded (A) or what negative factors must be mitigated against (B and C).

WA (selected tertiary sites): unscheduled ED attendances

Average daily ED attendance, n; weekly 4 hr ED LoS compliance, %; weekly ED LoS > 12 hr, n

Source: WA HSIU EDIS extracts covering unscheduled activity for ED sites w/e 7 Jan 2007 to w/e 28 Jul 2013

Notes: (i) **unadjusted, XmR-based process control limits recalculated against Wheeler rules 1,4 and 24-pt baseline; (ii) results are intended for management information only and are subject to change



Interpretation

The data shows significant improvement in transfer or discharge from ED despite an initial increase in ED attendances. This improved performance is associated with a clear reduction of patients who stay longer than 12 hours in ED although this remains an on-going issue on all three tertiary sites. See site specific data.

Description

- The grey line shows the average daily number of unscheduled ED attendances at the three tertiary hospitals in Perth for each week against the right hand axis. To convert these averages to weekly totals multiply by seven.
- The solid red line shows the weekly percentage compliance against the 4 hour rule across the sites.
- The pale pink dotted lines are the control limits for the compliance against the 4 hour rule.
- The orange bars show the total number of patients waiting longer than 12 hours in ED each week, across all sites.

Highlighted areas of good practice

It is important to emphasise that good practice was evident at all hospitals as a mechanism to share learning across organisations and professions, a process that should be embedded.

Areas of good practice:

- Staff demonstrated commitment to support the visit, going above and beyond normal duties to provide information, answer questions and to participate in the day of care survey and the diagnostic walk-through. Staff throughout were open, professional and welcoming and demonstrated clear commitment to improve the quality of care for their patients.
- There is a clear local focus on developing the evidence base around access block in emergency care, and Western Australia is a recognised centre of excellence in terms of publications which are driving the agenda internationally.
- All three sites performed well against the London NHS Emergency care standards for the Emergency Department triage and staffing by self assessment, and this was confirmed by peer review.
- A robust triage system in ED is in place provided by a suitably trained health care professional.
- EDs are spacious, well equipped and well staffed, and prioritise teaching and training of junior doctors.
- Consultant clinical decision making support is available 16 hours a day, 7 days a week in the ED supported by 24/7 registrar cover.
- AAUs are in general well set up with appropriate facilities and staffing levels, and contain the building blocks to deliver high quality care, including medical and nurse staffing, AHP's and pharmacy provision.
- ASUs are now in place on each site in line with best practice, with plans for further development of the services.
- Support from allied health professional teams in general is well developed during routine working hours and there is clear signposting to local services.
- Improvement initiatives undertaken at Royal Perth Hospital in imaging services appear exemplary and this learning should be shared across all sites.
- Good access to theatre for emergency general surgery at Freemantle Hospital from 8am to 10pm across all seven days of the week.
- The children's hospital performs best in relation to emergency access and although this site was not visited during the review there appeared to be good monitoring systems in place with the ability to proactively manage the emergency care pathway.
- The commitment and energy of the management team of the new Fiona Stanley Hospital was evident and this bodes well for the implementation of the new site.

Western Australia Data

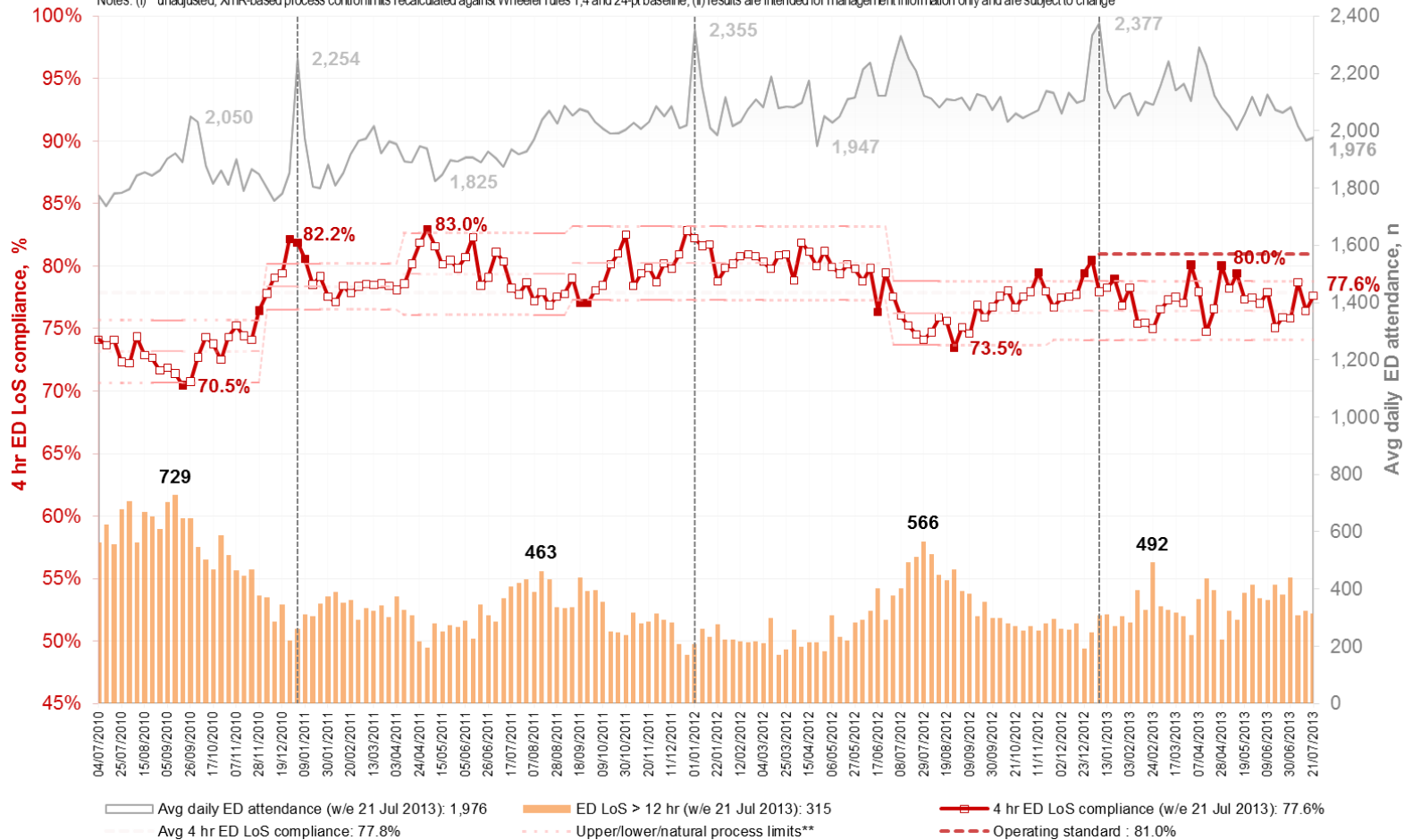
- **NEAT – All Unscheduled Care Attendances**
- **NEAT – Unscheduled Ward Admissions from ED**
- **NEAT – Unscheduled Attendances by Age Group**
- **NEAT – Unscheduled Admissions by Age Group**
- **Tertiary Care Sites (RPH, FH, SCGH) – Emergency Re-admissions within 7 Days.**

WA (NEAT sites): all unscheduled ED attendances

Average daily ED attendance, n; weekly 4 hr ED LoS compliance, %; weekly ED LoS > 12 hr, n

Sources: WA PAQ NEAT monitoring dataset covering unscheduled activity for ED sites w/e 4 Jul 2010 to w/e 21 Jul 2013

Notes: (i) **unadjusted, XmR-based process control limits recalculated against Wheeler rules 1,4 and 24-pt baseline, (ii) results are intended for management information only and are subject to change



Interpretation

Marked improvement in performance from July to December 2010 is seen accompanied by a reduction in long waits. Across WA these gains have been largely sustained but with no further improvement from January 2011 to present.

The data suggests a decline in performance associated with the change in the support programme from a central to a local level and the introduction of the national NEAT target in April 2012.

Lower performance is associated with an increase of large numbers of waits over 12 hours.

ED attendances have plateaued over the last 18 months.

Description

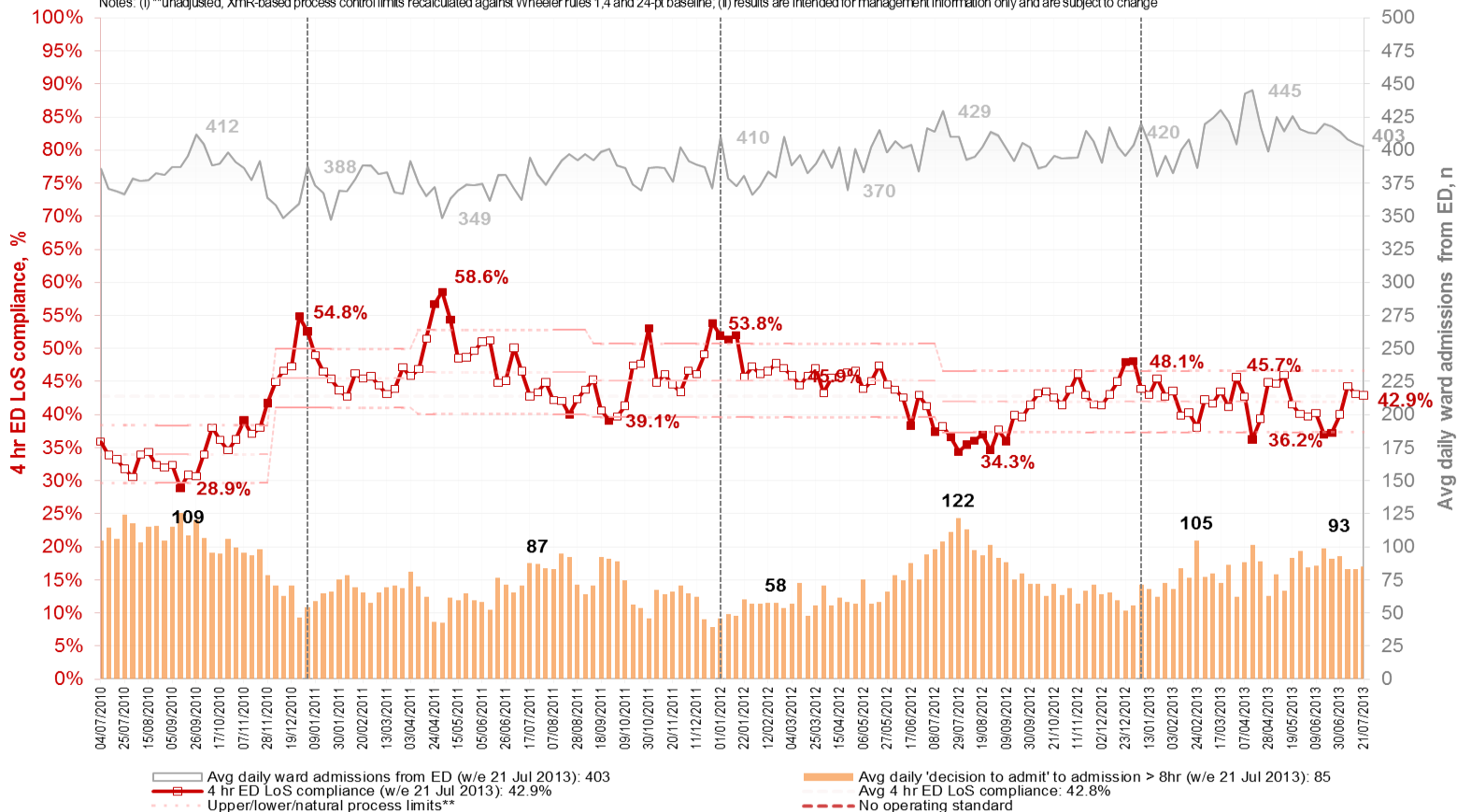
- This graph shows compliance against the 4 hour rule and average daily attendances on a weekly basis since July 2010, for **all unscheduled ED attendances** across NEAT sites in WA.
- Average daily ED attendances are depicted by the grey shaded area against the scale on the right of the chart.
- Performance is charted in red at the top of the chart against the percentage scale on the left of the chart.
- The number of ED stays in excess of 12 hours is charted by the orange bars at the base of the chart, the actual number inserted at the top of bar.

WA (NEAT sites): unscheduled ward admissions from ED only

Average daily ward admissions from ED, n; weekly 4 hr ED LoS compliance, %; avg daily 'decision to admit' to admission > 8 hr, n

Sources: WA PAQ NEAT monitoring dataset covering unscheduled activity for ED sites w/e 4 Jul 2010 to w/e 21 Jul 2013

Notes: (i) **unadjusted, XmR-based process control limits recalculated against Wheeler rules 1,4 and 24-pt baseline; (ii) results are intended for management information only and are subject to change



Interpretation

Marked improvement in performance from July to December 2010 is seen. Across WA for admitted patients these gains have declined over time as indicated by the SPC control limits.

The data suggests this may have been exacerbated with the change in the support programme from a central to a local level and the introduction of the national NEAT target in April 2012. Lower performance against the 4 hour rule for admitted patients is also associated with increase in the number of over 8 hour waits for unscheduled admissions. ED admissions appear stable over the last 18-24 months.

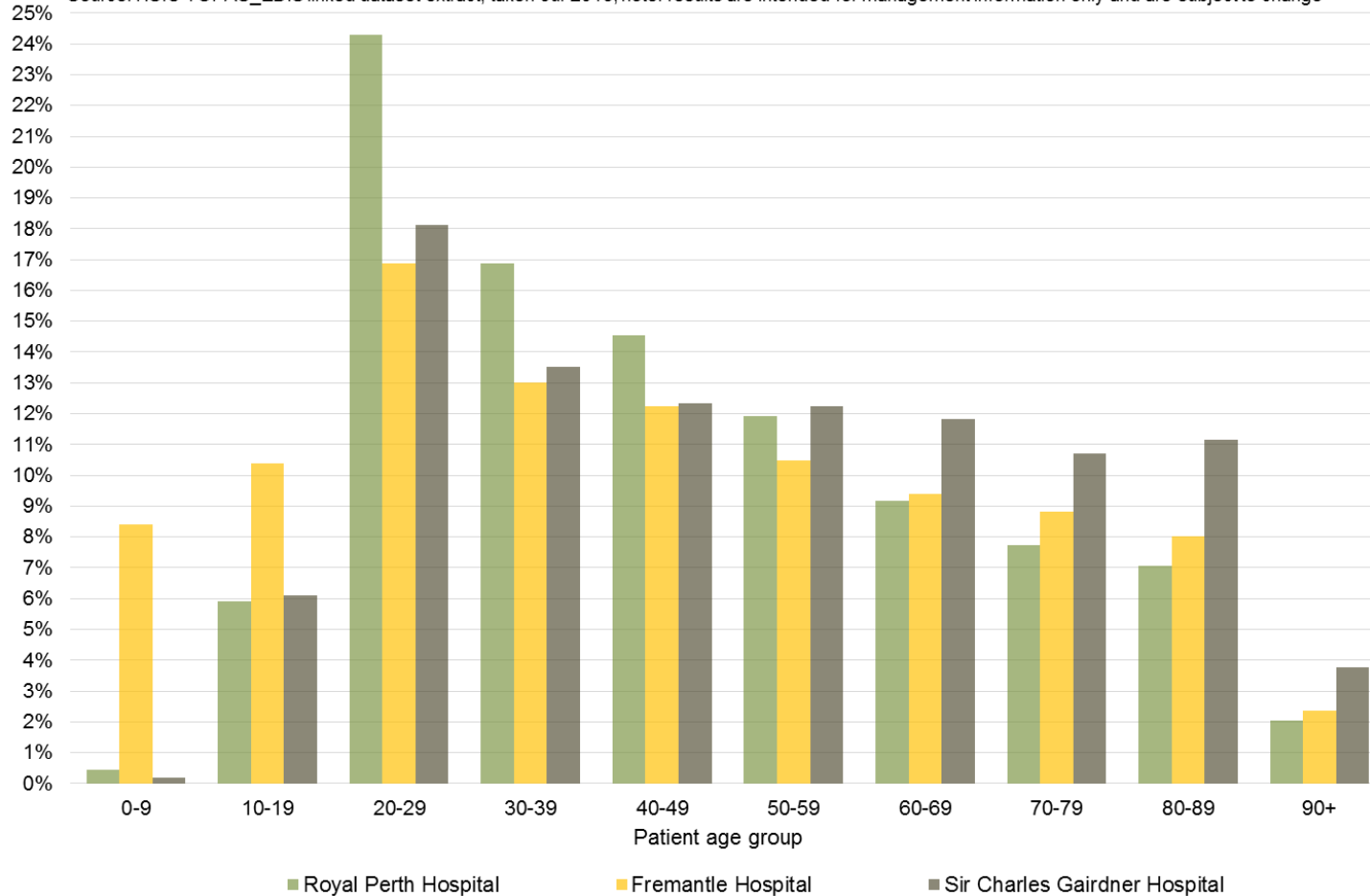
Description

- This graph shows compliance against the 4 hour rule and average daily admissions on a weekly basis since July 2010, for **all unscheduled admissions from ED** across NEAT sites in WA.
- Average daily admissions from ED are depicted by the grey shaded area against the scale on the right of the chart.
- Performance is charted in red at the top of the chart against the percentage scale on the left of the chart.
- The average weekly number of unscheduled admissions from ED where the time between the 'decision to admit' and actual admission was greater than 8 hour is charted by the orange bars at the base of the chart, the actual number being inserted at the top of the bar. To convert to **weekly total, multiply by 7.**

Unscheduled ED attendance, by age group, 7 Jan to 28 Jul 2013

Unscheduled ED attendance by site and patient age-group, %

Source: HSIU TOPAS_EDIS linked dataset extract, taken Jul 2013; note: results are intended for management information only and are subject to change



Interpretation

Attendances across the three hospitals follow broadly the same age distribution, positively skewed with the younger age groups dominant.

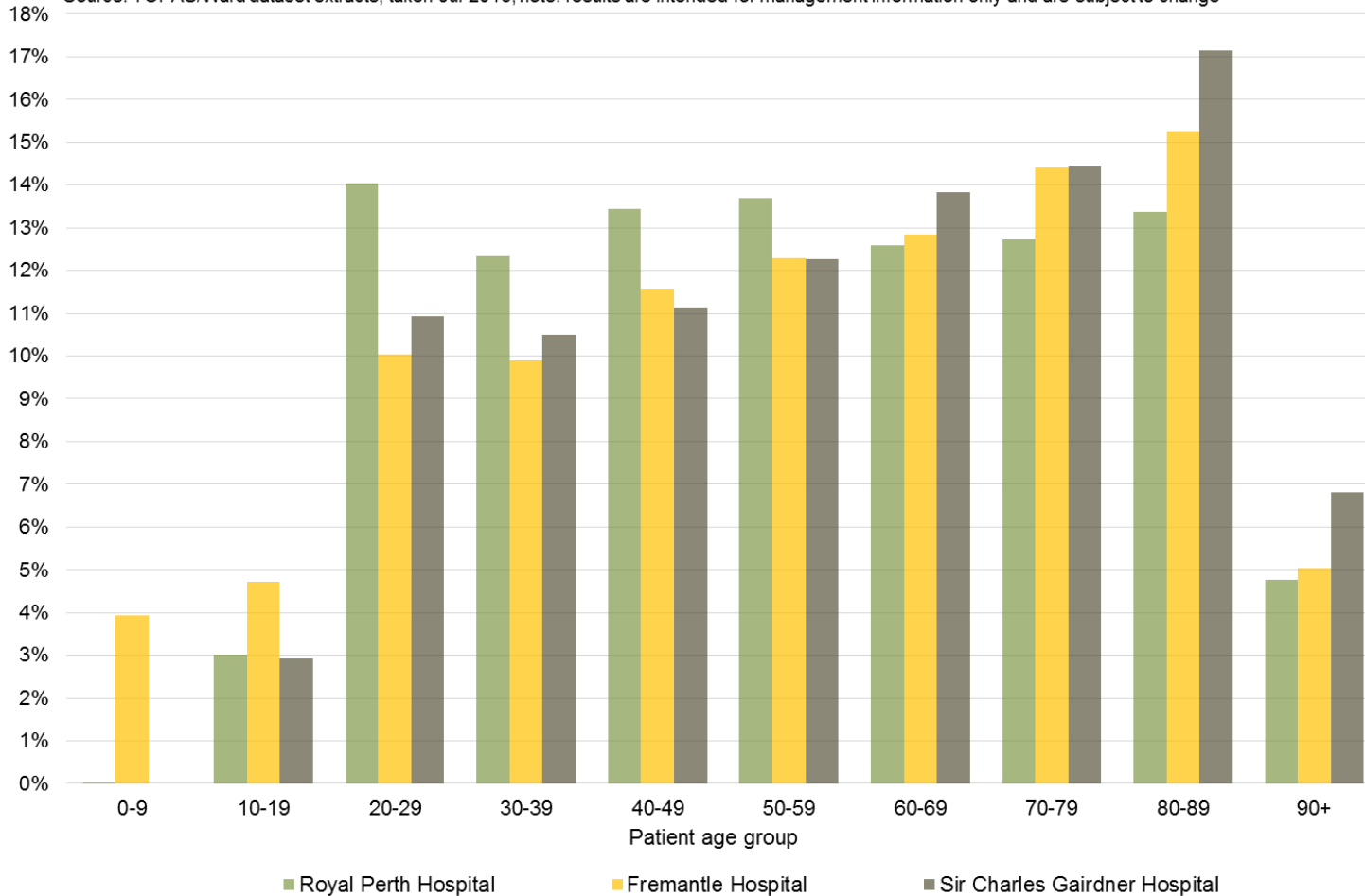
Description

- This graph shows the age distribution of patients for unscheduled ED attendances at RPH, FH and SCGH during the period 7 January to 28 July 2013.
- The X axis records the age of the patient at the time of ED attendance.
- The Y axis records the percentage of patients of that age for each hospital.

Unscheduled hospital admissions, by age group, 7 Jan to 28 Jul 2013

Unscheduled hospital admissions (ADMS=3) by site and patient age-group, %

Source: TOPAS/Ward dataset extracts, taken Jul 2013; note: results are intended for management information only and are subject to change



Interpretation

Admissions across the three hospitals follow broadly the same age distribution, which is relatively flat across all age groups with a gradual rise with age.

There are relatively more admissions in younger age groups 20-40 compared with comparable UK data. This requires review in relation to diagnosis and case mix.

Description

- This graph shows the age distribution of patients for unscheduled hospital admissions at RPH, FH and SCGH during the period 7 January to 28 July 2013.
- The X axis records the age of the patient at the time of admission.
- The Y axis records the percentage of patients of that age for each hospital.

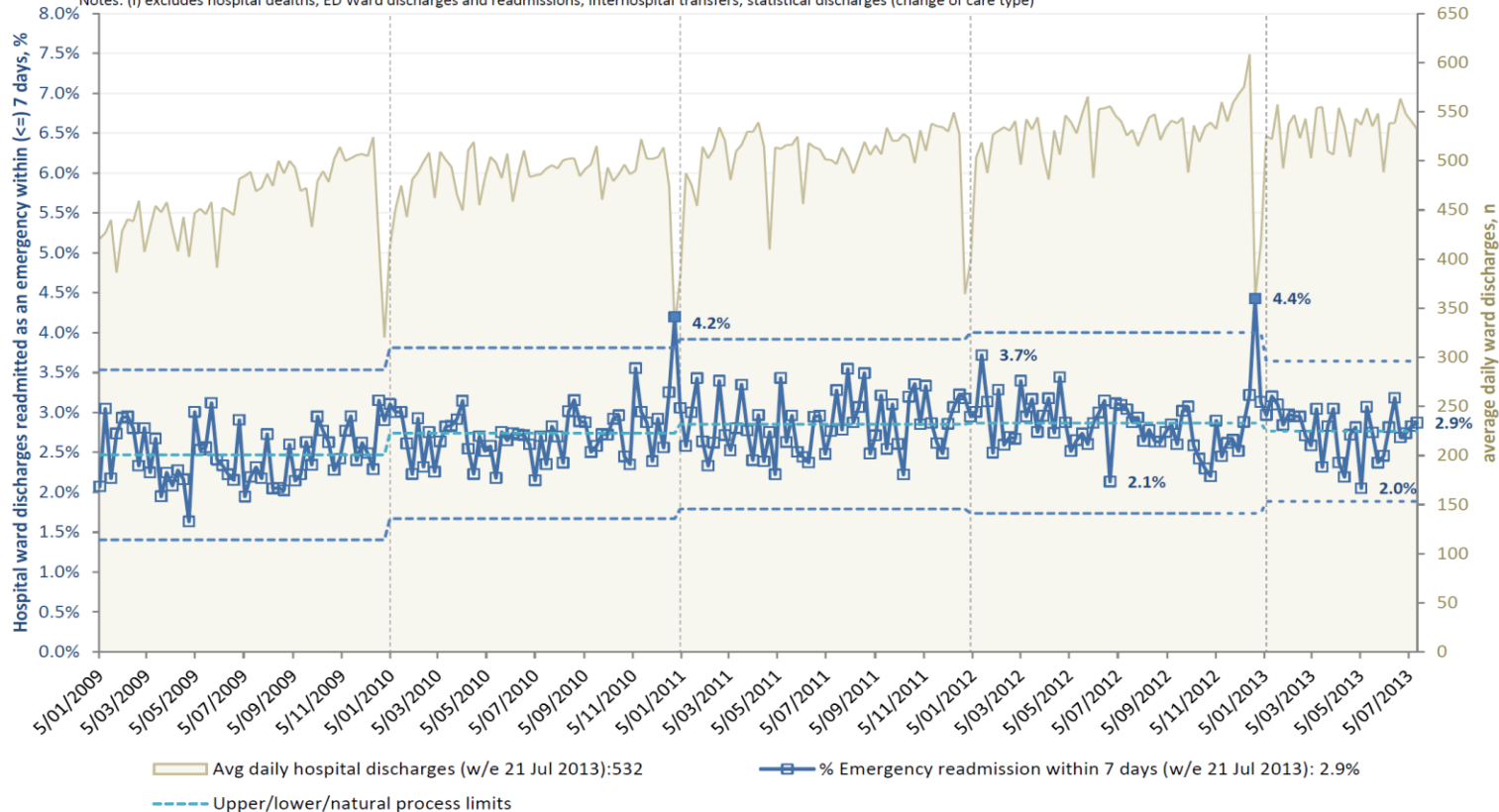
Emergency re-admissions – data derived by Health Department WA

WA Adult Tertiary Hospitals weekly emergency readmissions within 7 days, 5 Jan 2009 to 21 July 2013

Weekly proportion hospital ward discharges readmitted as an emergency within (<=) 7 days, %; average daily ward discharges, n

Sources: WebPAS/TOPAS extract, taken August 2013, covering activity for selected tertiary sites w/e 11 Jan 2009 to w/e 21 July 2013

Notes: (i) excludes hospital deaths, ED Ward discharges and readmissions, interhospital transfers, statistical discharges (change of care type)



Interpretation

Re-admissions, as calculated, are stable across the three sites but the trend should continue to be monitored at a site level as a balance measure.

Description

- This graph shows the weekly emergency re-admissions within 7 days of discharge for the period from 5th January 2009 to 21st July 2013, across the three adult tertiary hospitals in WA.
- The blue line shows the % emergency re-admissions against the scale on the left of the chart.
- The number of average daily discharges is depicted by the grey shaded area against the scale on the right of the chart.

Executive Summary of Recommendations – Responsibilities

Recommendation	Responsibility
Improve patient flow – securing links in the chain	
<ul style="list-style-type: none"> • Establish greater clinical and managerial ownership of patient flow throughout the emergency care patient pathway including weekends • Routine interpretation with action outputs based on weekly site level review of 4 hour performance time-series, and associated data <ul style="list-style-type: none"> — length of stay, re-admission rates, outliers, over-census and detailed reasons for breaches • Embed Estimated Date of Discharge (EDD) in all wards with a multi-disciplinary buy-in to drive effective discharge and capacity planning • Rationalise the use of, and review the number and complexity of, IT systems involved in managing patient flow to <ul style="list-style-type: none"> — to release clinical time — improve visibility throughout the patient journey in all relevant departments to promote pull systems — avoid complexity of data analysis • Minimise (avoid) routine creation of surge capacity(e.g. extra beds or ‘corridor beds’) • Promote morning and weekend discharges from all clinical areas 	<p>All areas – senior clinical and management team with engagement with all staff</p> <p>All areas – senior clinical and management team with engagement with all staff</p> <p>All areas – senior clinical and management team with engagement with clinical staff</p> <p>ED & inpatient bed areas – senior clinical and management team</p> <p>All areas - senior clinical and management, bed & flow management</p>
Reduce complexity of internal ED systems	
<ul style="list-style-type: none"> • Maximise and prioritise performance of discharge stream (minors) to reduce occupancy and support timely decision making • Eliminate multiple hand-offs and physical moves for admitted patients within ED, including short stay ED areas • Provide alternative hospital pathways for specific patient groups attending ED, including for emergency psychiatric patients and patient groups whose care could be transferred from emergency to planned care e.g. transfusion for patients with anaemia 	<p>ED – senior medical and nursing staff</p> <p>ED – senior medical and nursing staff</p> <p>ED – senior medical and nursing staff with relevant hospital speciality</p>
Reduce the complexity of the admission interface between ED and AAU/ASU	
<ul style="list-style-type: none"> • Manage outflow from ED so the patient is cared for in the right place, first time – avoid front-door outliers and switching on and off surge capacity <ul style="list-style-type: none"> — Embed ED consultant admission rights to AAU and ASU — Explore direct admissions or rapid access clinics for defined patient sub-groups to AAU/ ASU from primary care to bypass ED • Eliminate unnecessary hand-offs and transactions between clinical disciplines, patient flow staff and information systems (including bed management) • Broaden the inclusion criteria for AAU/ ASU and ensure they are recognised safe havens 24/7 	<p>ED & inpatient bed areas – senior clinical and management team</p> <p>All areas – senior clinical and management team with engagement from all staff AAU & ASU – Senior clinical team with engagement with all clinical staff</p>

Executive Summary of Recommendations – Responsibilities

Recommendation	Responsibility
Optimise the admission flow between ED and specialist wards; and between AAU/SU and sub-specialty inpatient wards	
<ul style="list-style-type: none"> • Establish effective pull and push systems to ensure effective patient flow and avoid delay between departments and clinical specialties <ul style="list-style-type: none"> — ensure the patient is cared for in the right place, first time – avoid outliers and routine use of surge capacity • Streamline and prioritise specialist opinion process in ED, AAU and ASU to eliminate delays in all clinical decision making and management, particularly AAU – develop pull systems as the norm 	<p>ED AAU and ASU & inpatient bed areas – senior clinical and management team with engagement with all staff</p> <p>ED & AAU and ASU & inpatient bed areas – senior clinical and management team</p>
Provide continuity of patient care	
<ul style="list-style-type: none"> • Ensure timing of consultant decision making is matched to patient need in all clinical areas throughout the week <ul style="list-style-type: none"> — AAU/ ASU to provide continuity of care, twice daily ward round for all patients and clinicians to be free from all other duties — improve consultant input on inpatient ward areas at weekends to improve discharges and timely investigations • Consider adopting a team of consultants providing continuity of care rather than individual consultant teams in areas where consultant cover is intermittent, particularly for inpatient medical wards and at weekends • Align multi-disciplinary team (including nurses, therapists and pharmacists) at ward level to support timely decision making and treatment (right place, first time) seven days a week 	<p>AAU & ASU – senior clinical team with engagement with all clinical staff</p> <p>All areas – senior clinical and management team with engagement from all staff</p> <p>All areas – senior multi-disciplinary clinical team with engagement with all clinical staff</p>
Optimise physical and staff capacity – doing today’s work today and making Mondays better	
<ul style="list-style-type: none"> • Improve the consistency of patient care seven days a week <ul style="list-style-type: none"> — design staffing profiles to provide more effective patient care at weekend • Ensure support services are provided in a more timely fashion –e.g. echocardiography, pharmacy pre-packs and process for provision of discharge medications • Minimise (avoid) outliers thus maximising physical capacity • Ensure protected emergency theatre time seven days a week • Review all weekend elective activity including zero lengths of stays, particularly in relation to medical and nursing resource utilisation to ensure that it is not dependent on staff committed to emergency care flow 	<p>All areas – senior clinical and management team with engagement from all staff</p> <p>All areas – senior multi-disciplinary clinical team</p> <p>AAU and ASU & inpatient bed areas – senior clinical and management team</p> <p>Theatres – senior clinical and management</p> <p>Surgical – senior clinical and management</p>

Additional Observations and Recommendations

Mental Health - Observations

- Mental health patients had prolonged waits in ED, described on all three sites as routine.
 - restraint, close observation and sedation described as common
 - access to involuntary beds identified as a major block
 - dignity and experience compromised
 - process for organising police support for transfer is convoluted but we note is under review
 - child/adolescent pathway identified as a particular issue
- Primary Care believe that support services for these patients could be improved and patients may fall through the gaps and present late in their illness.

Mental Health - Recommendation

- Review the mental health pathway at State wide and multiagency level and develop patient centred approach to redesign of this flow.

Primary Care – Observational comment only as this service was not reviewed

- Universal registration not in place – about 10% of patients do not have a GP although all can access Medicare.
- Variety of pricing profiles for services. Mixture of private and “bulk billing” in place.
- Feeling that people are being discharged “in a sicker condition” with perceived high re-admission rates.
- Discharge and clinic letters cited as an issue in terms of timely receipt of information which may then affect the need for further admission or investigation. GP may never be identified as part of admission process and so communication may fail.
- Lack of blister packs cited as an issue for patients particularly patients in care homes.
- From GP point of view access to emergency care is relatively good but access to out patient review is not with long waits reported for routine outpatient appointments.
- Outpatient access may drive emergency attendances and admissions.

Additional Observations and Recommendations

Ambulatory Care – Observational comment only as this service was not reviewed

- Hospital at Home and Hospital in the Home are in place and provide a range of care options at home. These services may have some available capacity.
 - rehabilitation at home also in place
 - navigating service options can be difficult for users and staff
- Rapid Response discharge support service, allied health and nursing, is available in ED to support return to community but demand appeared poorly understood.
- Additional opportunities may exist to maximise hospital avoidance if pathways are developed for ambulatory care sensitive conditions.
- IT linkages not robust between parts of the system and information sharing complex.
- Extended multi-disciplinary roles could be further developed.

St John Ambulance Australia – Observational comment only as this service was not reviewed

- Ramping was described as high and apparently included higher triage categories.
- Ramped patients include inter-hospital transfers.
- Ramping of higher acuity patients common weekday afternoons from 12pm to 6pm and weekends from 3pm to 4pm and from 9pm to 10pm.
- Alternatives to deployment of patients at the three tertiary centres have been developed and could be explored further with St John Ambulance Australia.

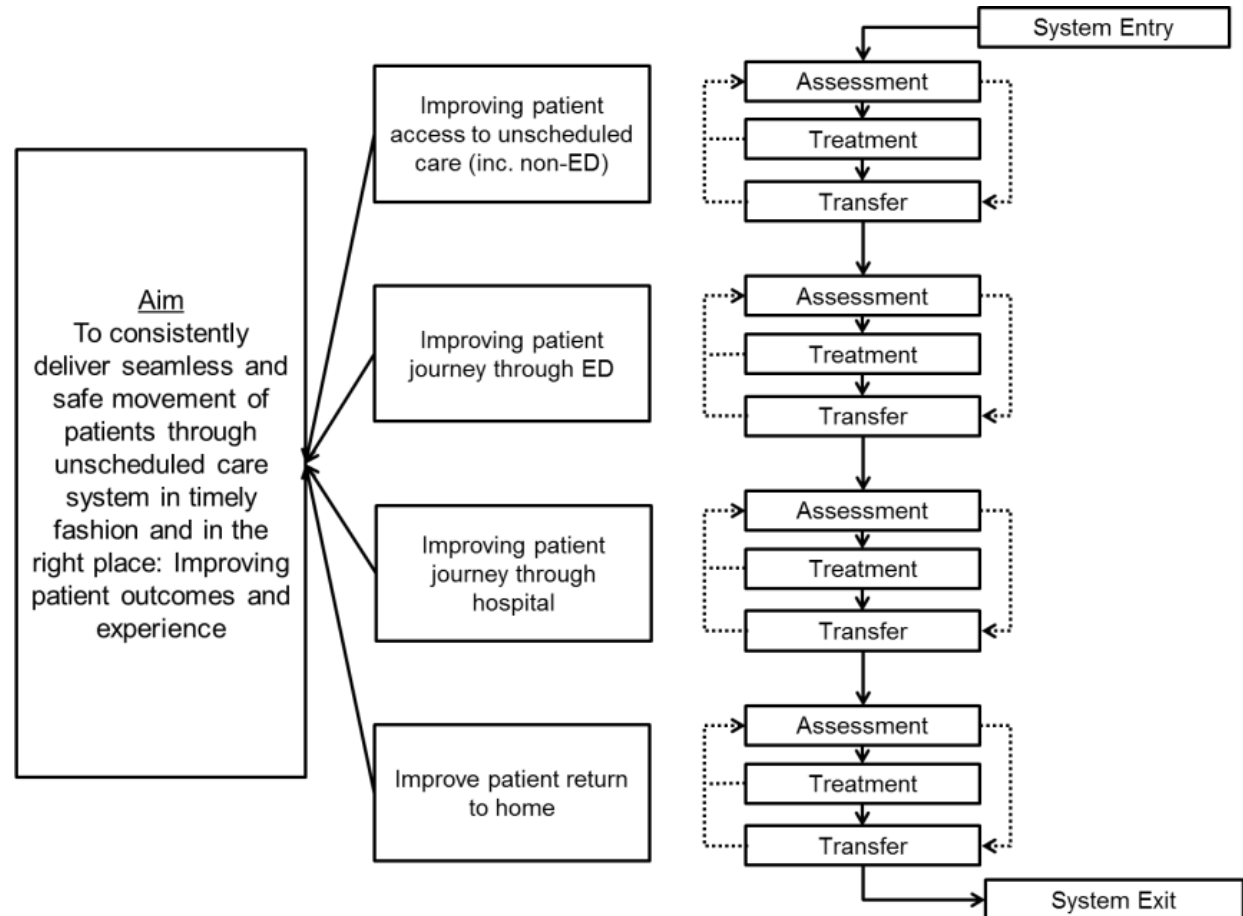
Appendix – UK Visit Team

Led by Professor Derek Bell, the UK visit team was made up of clinicians, academics, analysts, quality improvement experts and health managers.

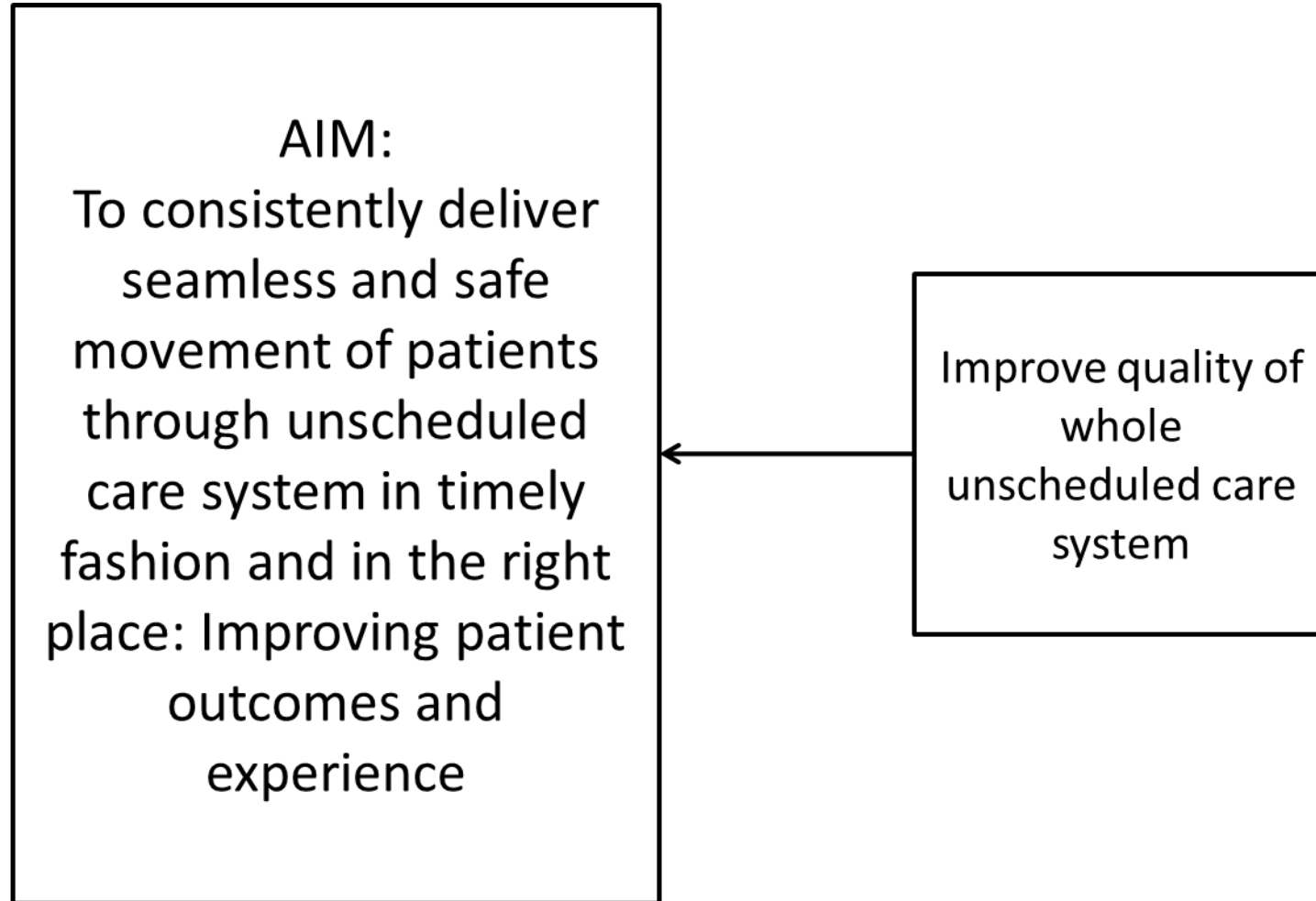
Professor Derek Bell	NIHR CLAHRC for Northwest London, Imperial College London
Martin Hopkins	Scottish Government
Dr. Veronica Devlin	NHS Scotland
Dr. Simon Watkin	NHS Scotland
Sebastian Gough	NHS Scotland
Kenny Grant	NHS Scotland
Shaun Danielli	NHS England (London region)
Patrice Donnelly	NHS England (London region)
Katie Horrell	NHS England (London region)
Dr. Julie Reed	NIHR CLAHRC for Northwest London, Imperial College London
Dr. Tom Woodcock	NIHR CLAHRC for Northwest London, Imperial College London
Chris McNicholas	NIHR CLAHRC for Northwest London, Imperial College London

Appendix – Action Effect Diagram Workshop Output

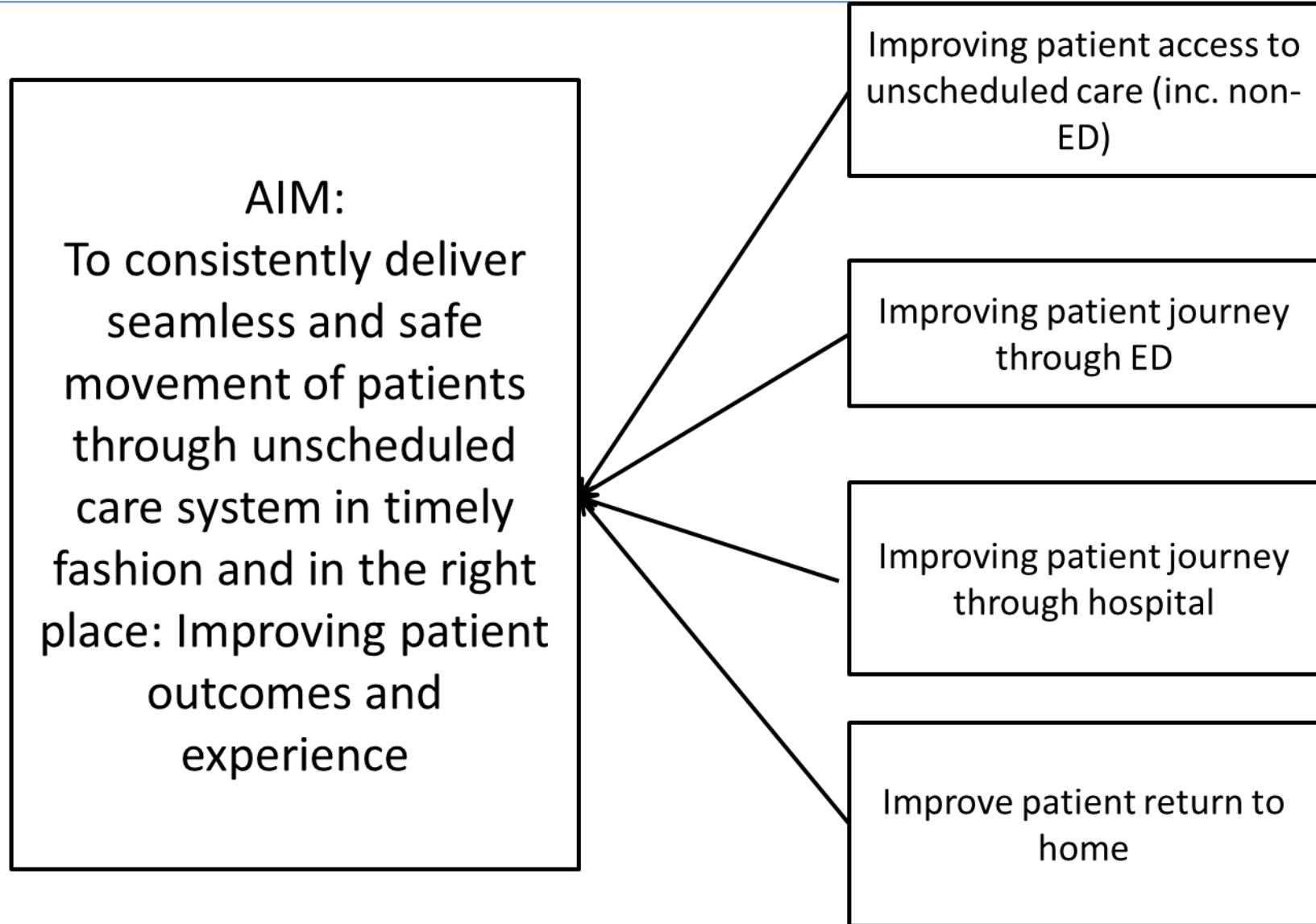
- An introductory workshop was held with over 60 key individuals from across the WA Health system responsible for the delivery of patient care through the emergency care system.
- Action Effect Diagrams (AED) provide a mechanism to bring together an overall aim with representation of a system, interventions to influence change in the system and metrics to support monitoring of the impact of change, together with explicit reference to the evidence and/or guidance that underpins each key connection
- An initial high-level AED for the WA emergency care pathway was developed and is presented to be used as a standard reference point for data, observations and recommendations.



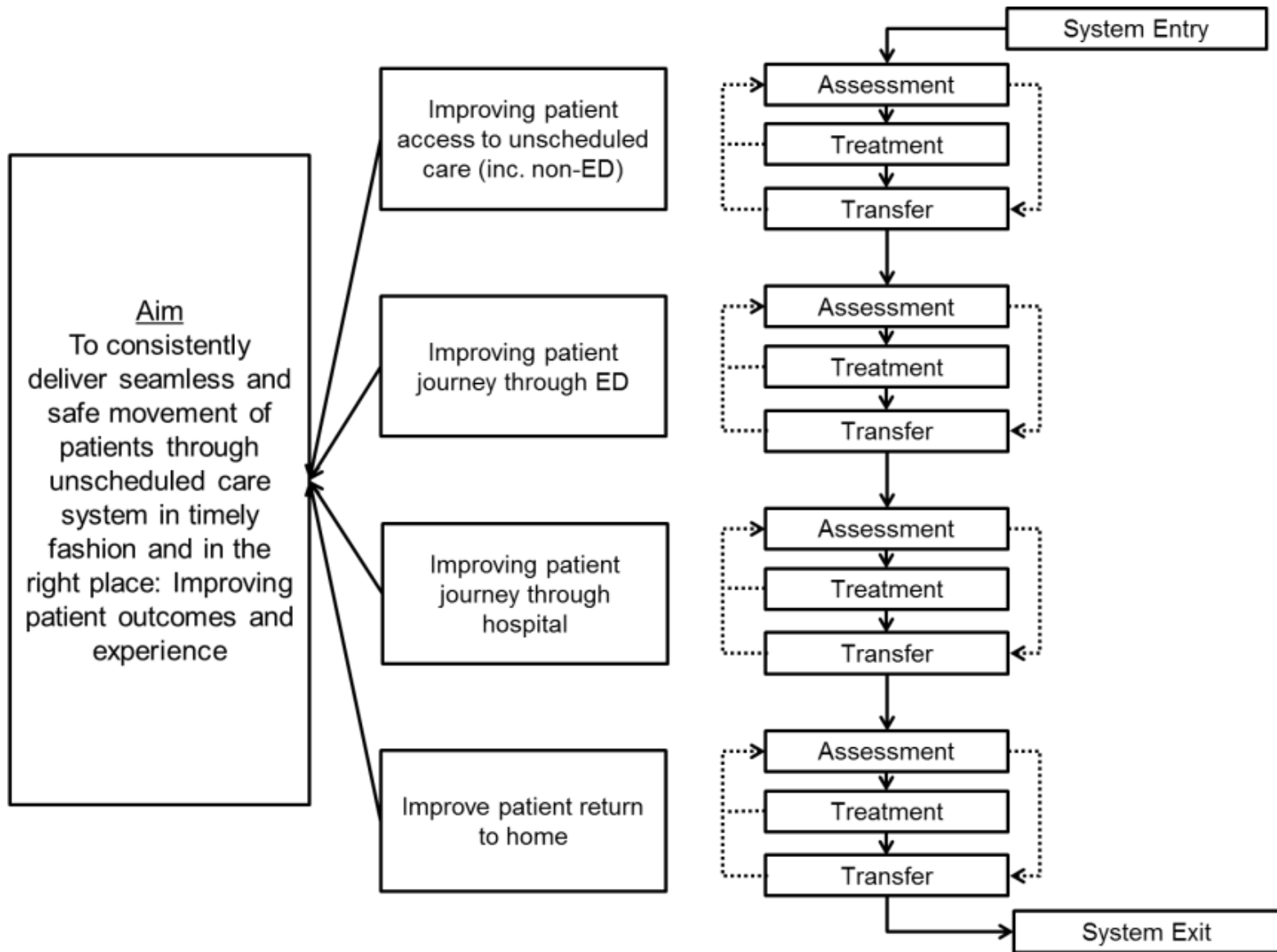
WA Emergency Care Action Effect Diagram as developed in Workshop 30.07.13
(High level – not inc. further breakdown, interventions or metrics)



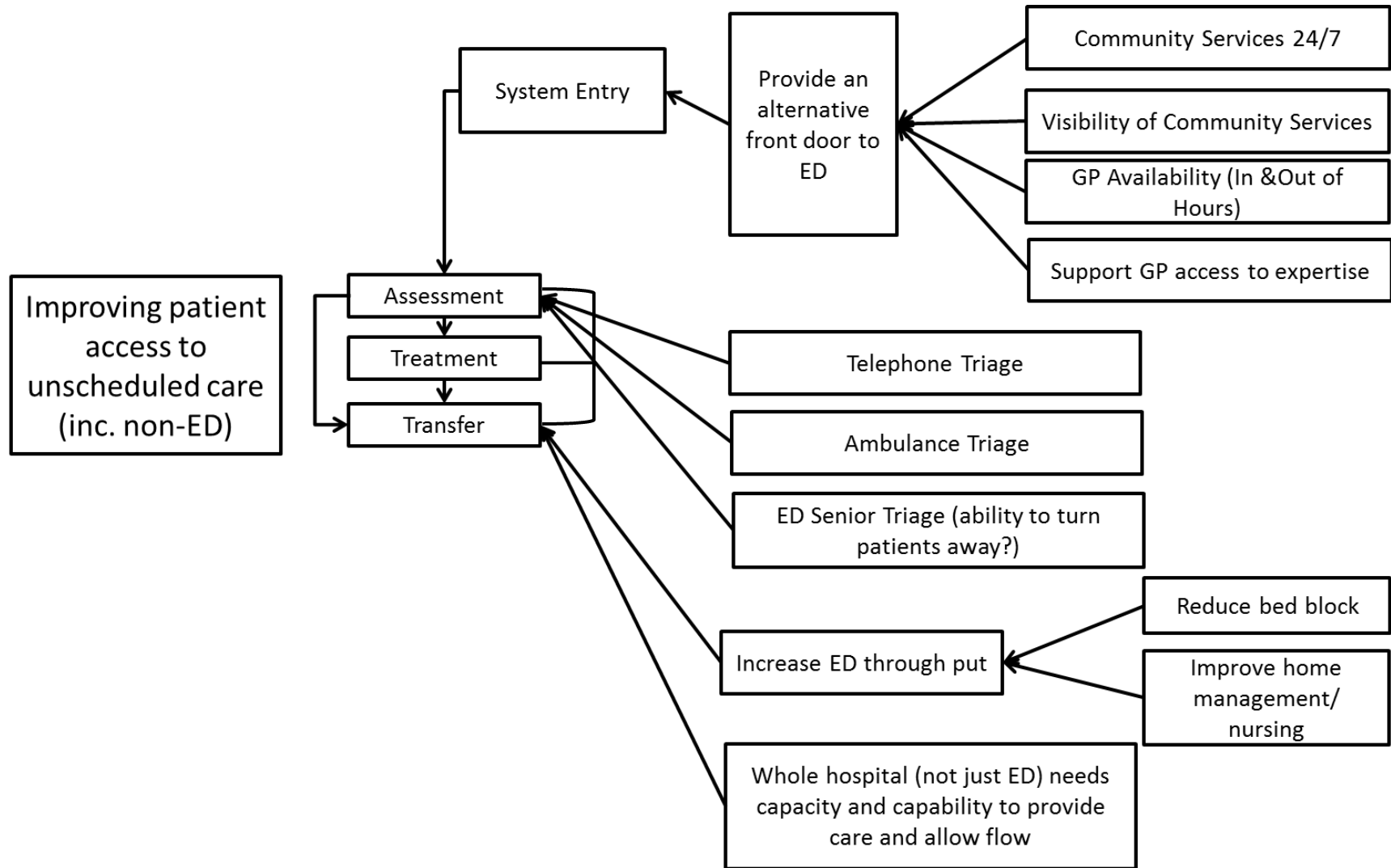
Appendix – Action Effect Diagram Workshop Output (2)



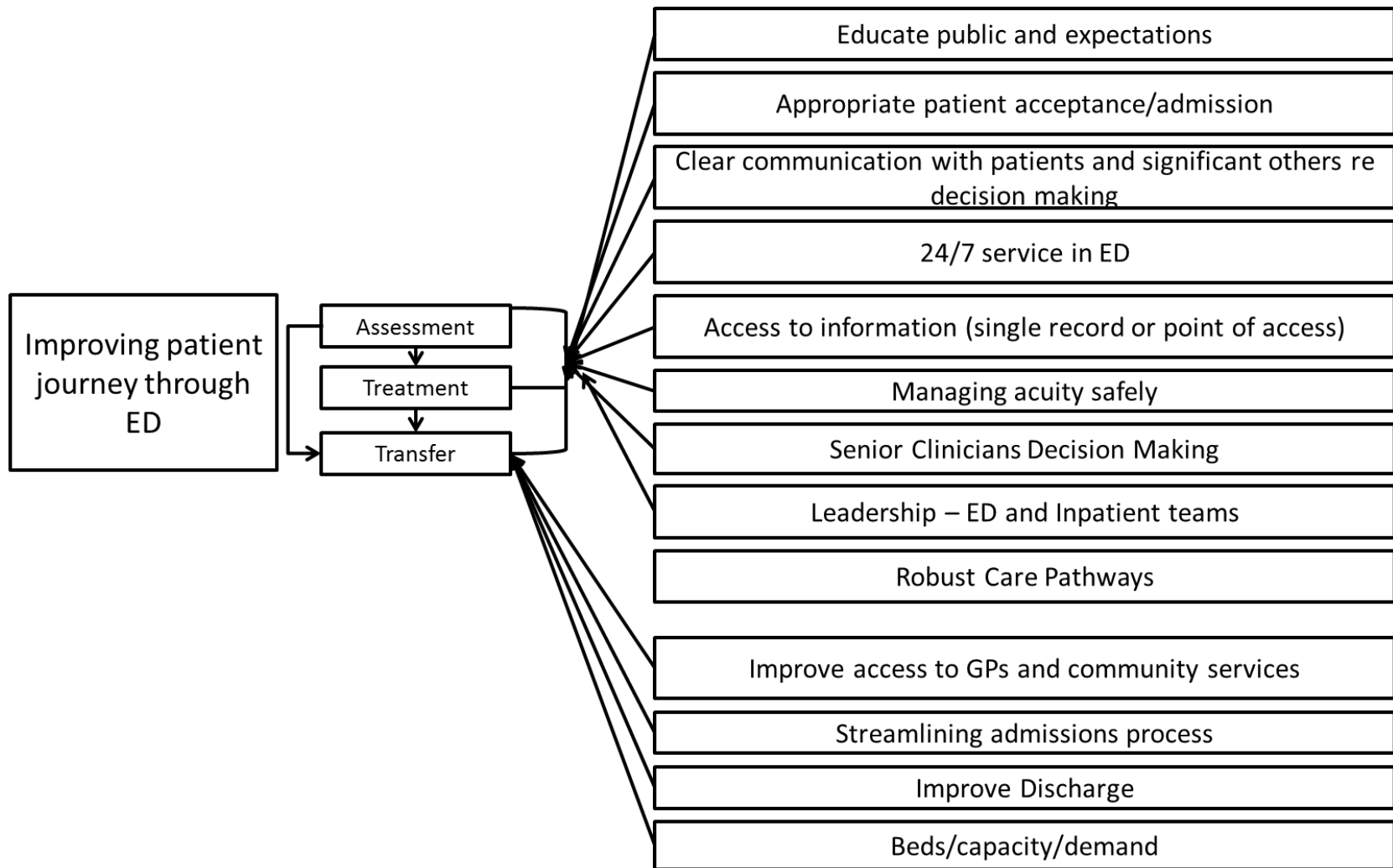
Appendix – Action Effect Diagram Workshop Output (3)



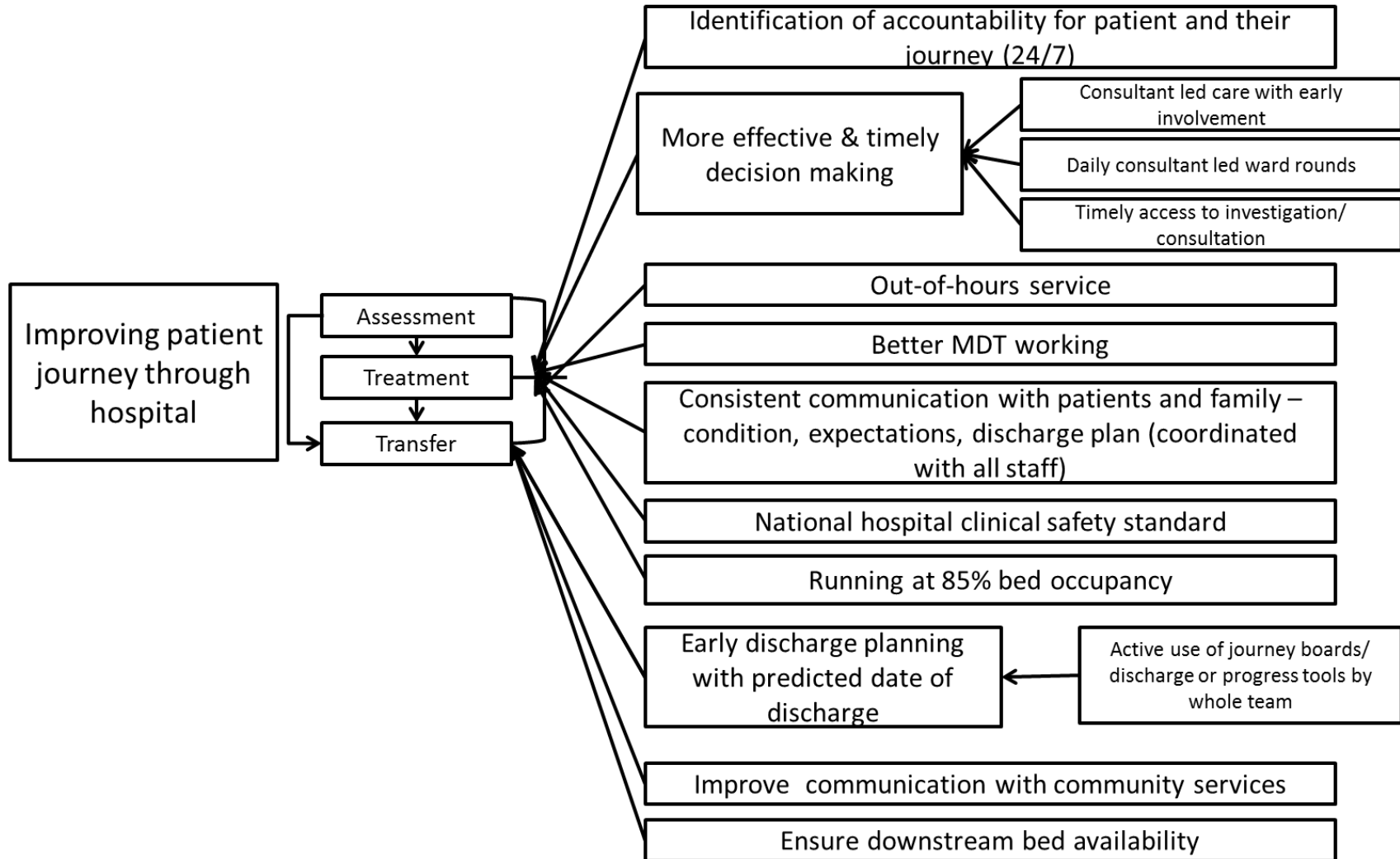
Appendix – Action Effect Diagram Workshop Output (4)



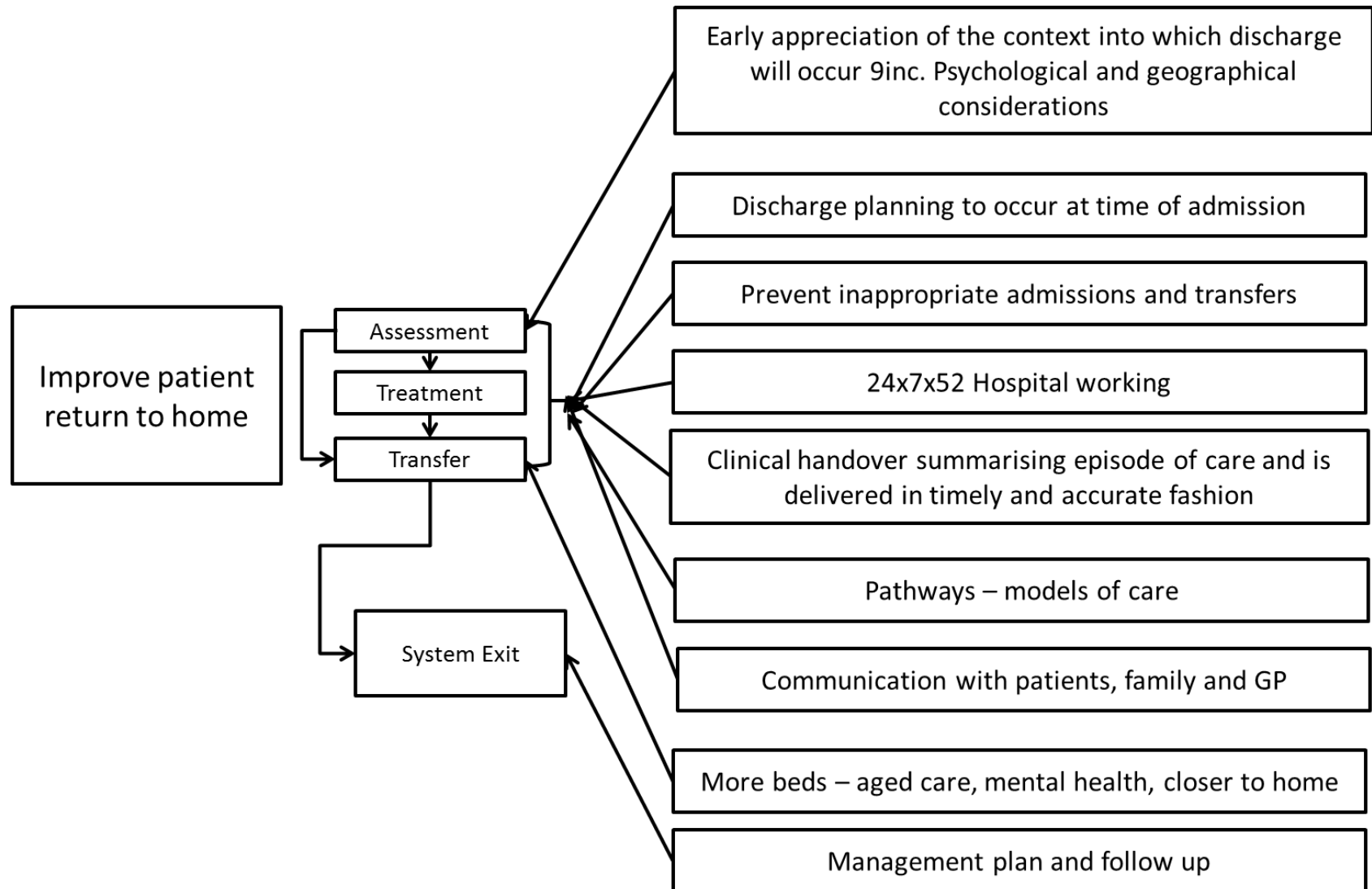
Appendix – Action Effect Diagram Workshop Output (5)



Appendix – Action Effect Diagram Workshop Output (6)

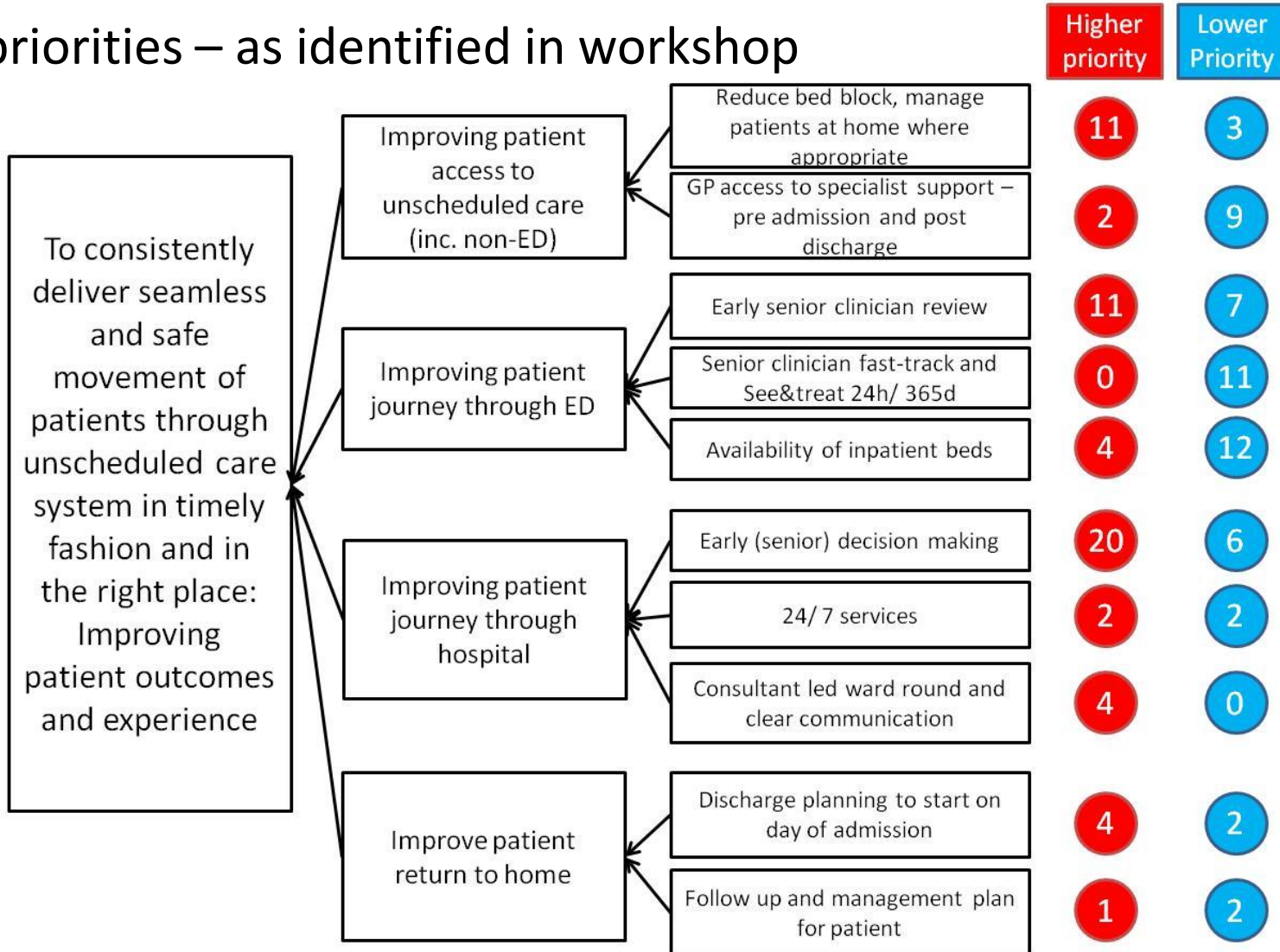


Appendix – Action Effect Diagram Workshop Output (7)



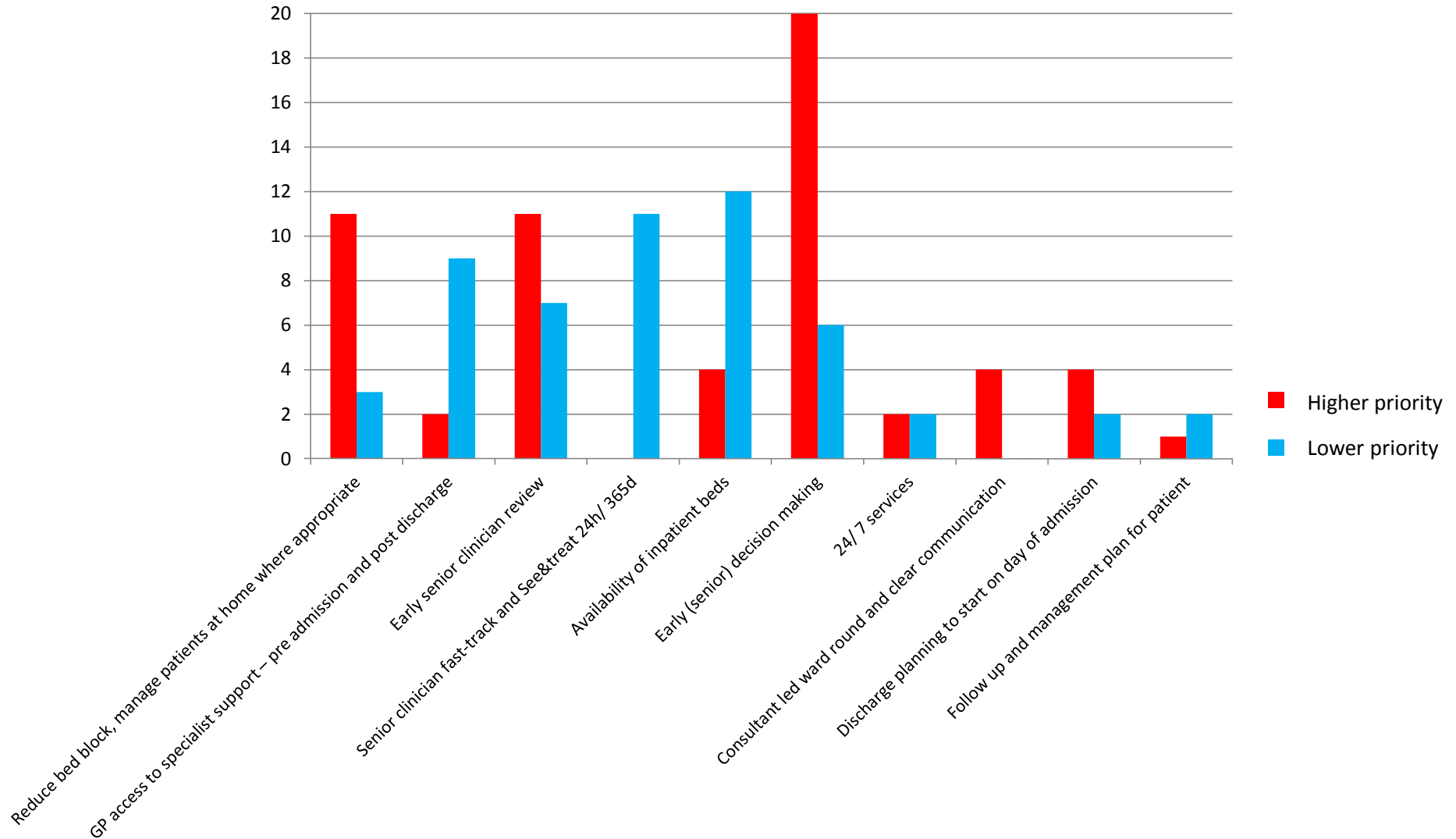
Appendix – Action Effect Diagram Workshop Output (8)

Initial priorities – as identified in workshop

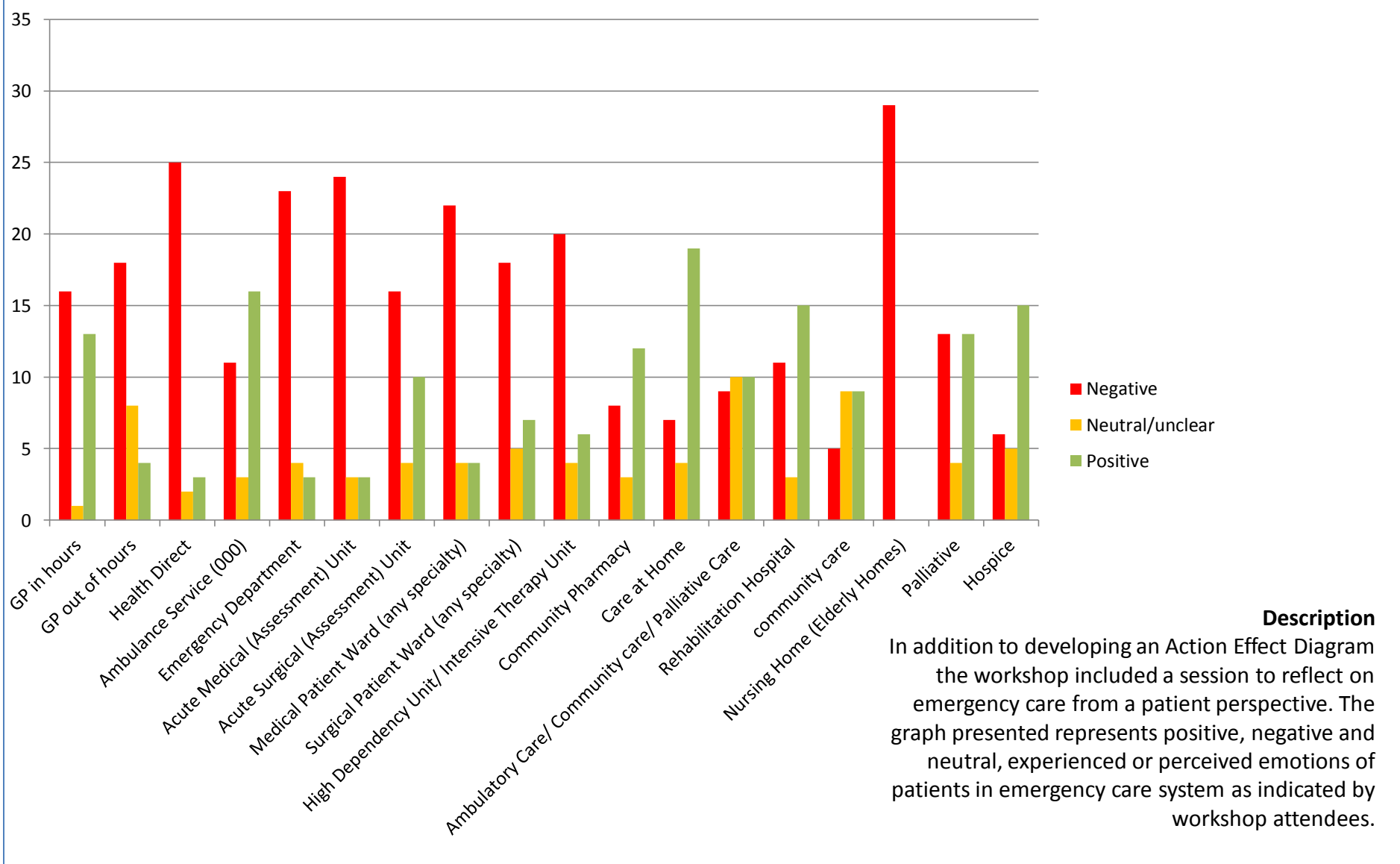


Appendix – Action Effect Diagram Workshop Output (9)

Initial priorities – as identified in workshop



Appendix – Action Effect Diagram Workshop Output – Emotional Mapping



Description

In addition to developing an Action Effect Diagram the workshop included a session to reflect on emergency care from a patient perspective. The graph presented represents positive, negative and neutral, experienced or perceived emotions of patients in emergency care system as indicated by workshop attendees.

Appendix – London NHS Emergency care standards

Emergency Departments

No.	Standard	Supporting sources
1	A trained and experienced doctor (ST4 and above or doctor of equivalent competencies) in emergency medicine to be present in the emergency department 24 hours a day, seven days a week.	CEM (2011) Emergency Medicine The Way Ahead ACEM (2008) Guidelines on constructing an emergency medicine medical workforce WA DH Stokes (2011) Four Hour Rule Program Progress and Issues Review
2	A consultant in emergency medicine to be scheduled to deliver clinical care in the emergency department for a minimum of 16 hours a day (matched to peak activity), seven days a week. Outside of these 16 hours, a consultant will be on-call and available to attend the hospital for the purposes of senior clinical decision making and patient safety within 30 minutes.	CEM (2011) Emergency Medicine The Way Ahead ACEM (2008) Guidelines on constructing an emergency medicine medical workforce WA DH Stokes (2011) Four Hour Rule Program Progress and Issues Review
3	<p>24/7 access to the minimum key diagnostics:</p> <ul style="list-style-type: none"> - X-ray: immediate access with formal report received by the ED within 24 hours of examination - CT: immediate access with formal report received by the ED within one hour of examination - Ultrasound: immediate access within agreed indications/ 12 hours with definitive report received by the ED within one hour of examination - Lab sciences: immediate access with formal report received by the ED within one hour of the sample being taken - Microscopy: immediate access with formal result received by the ED within one hour of the sample being taken <p>When hot reporting of imaging is not available, all abnormal reports are to be reviewed within 24 hours by an appropriate clinician and acted upon within 48 hours.</p>	CEM (2011) Emergency Medicine The Way Ahead RCR (2009) Standards for providing a 24-hour diagnostic radiology service WA DH Stokes (2011) Four Hour Rule Program Progress and Issues Review
4	<p>Emergency department patients who have undergone an initial assessment and management by a clinician in the emergency department and who are referred to another team, to have a management plan (including the decision to admit or discharge) within one hour from referral to that team.</p> <p>When the decision is taken to admit a patient to a ward/ unit, actual admission to a ward/ unit to take place within one hour of the decision to admit. If admission is to an alternative facility the decision maker is to ensure the transfer takes place within timeframes specified by the London inter-hospital transfer standards.</p>	CEM (2011) Emergency Medicine The Way Ahead London standards for inter-hospital transfers WA DH Stokes (2011) Four Hour Rule Program Progress and Issues Review

Appendix – London NHS Emergency care standards

Emergency Departments

No.	Standard	Supporting sources
5	A clinical decision/ observation area is to be available to the emergency department for patients under the care of the emergency medicine consultant that require observation, active treatment or further investigation to enable a decision on safe discharge or the need for admission under the care of an inpatient team.	CEM (2011) Emergency Medicine The Way Ahead
6	A designated nursing shift leader (Band 7) to be present in the emergency department 24 hours a day, seven days a week with provision of nursing and clinical support staff in emergency departments to be based on emergency department-specific skill mix tool and mapped to clinical activity.	CEM (2011) Emergency Medicine The Way Ahead Emergency Nurse Consultant Association (2009) Royal College of Nursing & Faculty of Emergency Nursing
7	Triage to be provided by a qualified healthcare and registration is not to delay triage.	Clinical expert panel consensus WA DH Stokes (2011) Four Hour Rule Program Progress and Issues Review
8	Emergency departments to have a policy in place to access support services seven days a week including: - Alcohol liaison - Mental health - Older people's care - Safeguarding - Social services	HM Government (2012) Alcohol Strategy Clinical expert panel consensus
9	Timely access seven days a week to, and support from, onward referral clinics and efficient procedures for discharge from hospital.	CEM (2011) Emergency Medicine The Way Ahead WA DH Stokes (2011) Four Hour Rule Program Progress and Issues Review
10	Timely access seven days a week to, and support from, physiotherapy and occupational therapy teams to support discharge from hospital.	Clinical expert panel consensus WA DH Stokes (2011) Four Hour Rule Program Progress and Issues Review

Appendix – London NHS Emergency care standards

Emergency Departments

No.	Standard	Supporting sources
11	<p>Emergency departments to have an IT system for tracking patients, integrated with order communications.</p> <p>A reception facility with trained administrative capability to accurately record patients into the emergency department to be available 24 hours a day, seven days a week. Patient emergency department attendance record and discharge summaries to be immediately available in case of re-attendance and monitored for data quality.</p>	<p>CEM (2011) Emergency Medicine The Way Ahead WA DH Stokes (2011) Four Hour Rule Program Progress and Issues Review</p>
12	<p>The emergency department is to provide a supportive training environment and all staff within the department are to undertake relevant on-going training.</p>	<p>CEM (2011) Emergency Medicine The Way Ahead ACEM (2008) Guidelines on constructing an emergency medicine medical workforce WA DH Stokes (2011) Four Hour Rule Program Progress and Issues Review</p>
13	<p>Consultant-led communication and information to be provided to patients and to include the provision of patient information leaflets.</p>	<p>London Health Programmes (2011) Adult emergency services standards</p>
14	<p>Patient experience data to be captured, recorded and routinely analysed and acted on. Review of data is a permanent item on the trust board agenda and findings are disseminated.</p>	<p>London Health Programmes (2011) Adult emergency services standards</p>

Appendix – London NHS Emergency care standards

Acute medicine and emergency general surgery

No.	Standard	Surgery, Medicine, Both	Supporting sources
1	All emergency admissions to be seen and assessed by a relevant consultant within 12 hours of the decision to admit or within 14 hours of the time of arrival at the hospital.	Both	NCEPOD (2007) Emergency admissions: A journey in the right direction? RCP (2007) The right person in the right setting – first time RCS (2011) Emergency Surgery Standards for unscheduled care
2	Prompt screening of all complex needs inpatients to take place by a multi-disciplinary team including physiotherapy, occupational therapy, nursing, pharmacy and medical staff. A clear multi-disciplinary assessment to be undertaken within 14 hours and a treatment or management plan to be in place within 24 hours. An overnight rota for respiratory physiotherapy must be in place.	Both	RCP (2007) The right person in the right setting – first time RCS (2011) Emergency Surgery Standards for unscheduled care WA DH Stokes (2011) Four Hour Rule Program Progress and Issues Review
3	All patients admitted acutely to be continually assessed using the National Early Warning System (NEWS). The NEWS competency based escalation trigger protocol should be used for all patients. In addition, consultant involvement for patients considered 'high risk' should be within one hour.	Both	RCS (2011) Emergency Surgery Standards for unscheduled care NICE (2007) Acutely ill patients in hospital RCP (2012) National Early Warning Score NCEPOD (2012) Time to intervene?
4	When on-take, a consultant and their team are to be completely freed from any other clinical duties or elective commitments.	Both	NCEPOD (2007) Emergency admissions: A journey in the right direction? RCP (2007) The right person in the right setting – first time RCS (2011) Emergency Surgery Standards for unscheduled care
5	In order to meet the demands for consultant delivered care, senior decision making and leadership on the acute medical/ surgical unit to cover extended day working, seven days a week.	Both	RCP (2007) The right person in the right setting – first time WA DH Stokes (2011) Four Hour Rule Program Progress and Issues Review
6	All patients on acute medical and surgical units to be seen and reviewed by a consultant during twice daily ward rounds, including all acutely ill patients directly transferred, or others who deteriorate.	Both	RCP (2007) The right person in the right setting – first time

Appendix – London NHS Emergency care standards

Acute medicine and emergency general surgery

No.	Standard	Surgery, Medicine, Both	Supporting sources
7	All hospitals admitting medical and surgical emergencies to have access to all key diagnostic services in a timely manner 24 hours a day, seven days a week to support clinical decision making: Critical – imaging and reporting within 1 hour Urgent – imaging and reporting within 12 hours All non-urgent – within 24 hours	Both	RCP (2007) The right person in the right setting – first time RCS (2011) Emergency Surgery Standards for unscheduled care NICE (2008) Metastatic spinal cord compression WA DH Stokes (2011) Four Hour Rule Program Progress and Issues Review AHFG (2012) Guideline 330 Medical Assessment Unit
8	All hospitals admitting medical and surgical emergencies to have access to interventional radiology 24 hours a day, seven days a week: Critical patients – 1 hour Non-critical patients – 12 hours	Both	RCS (2011) Emergency Surgery Standards for unscheduled care
9	Rotas to be constructed to maximise continuity of care for all patients in an acute medical and surgical environment. A single consultant is to retain responsibility for a single patient on the acute medical/ surgical unit. Subsequent transfer or discharge must be based on clinical need.	Both	RCP (2007) The right person in the right setting – first time
10	A unitary document to be in place, issued at the point of entry, which is used by all healthcare professionals and all specialties throughout the emergency pathway.	Both	RCP (2007) The right person in the right setting – first time
11	Patients admitted for unscheduled care to be nursed and managed in an acute medical/ surgical unit, or critical care environment.	Both	RCP (2007) The right person in the right setting – first time
12	All admitted patients to have discharge planning and an estimated discharge date as part of their management plan as soon as possible and no later than 24 hours post-admission. A policy is to be in place to access social services seven days per week. Patients to be discharged to their named GP.	Both	NCEPOD (2007) Emergency admissions: A journey in the right direction? RCP (2007) The right person in the right setting – first time WA DH Stokes (2011) Four Hour Rule Program Progress and Issues Review

Appendix – London NHS Emergency care standards

Acute medicine and emergency general surgery

No.	Standard	Surgery, Medicine, Both	Supporting sources
13	All hospitals admitting emergency general surgery patients to have access to a fully staffed emergency theatre immediately available and a consultant on site within 30 minutes at any time of the day or night.	Surgery	NCEPOD (1997) Who operates when? ASGBI (2010) RCS (2011) Emergency Surgery Standards for unscheduled care RACP (2008) Position statement emergency surgery
14	All patients admitted as emergencies are discussed with the responsible consultant if immediate surgery is being considered. For each surgical patient, a consultant takes an active decision in delegating responsibility for an emergency surgical procedure to appropriately trained junior or speciality surgeons. This decision is recorded in the notes and available for audit.	Surgery	RCS (2011) Emergency Surgery Standards for unscheduled care
15	All patients considered as 'high risk' to have their operation carried out under the direct supervision of a consultant surgeon and consultant anaesthetist; early referral for anaesthetic assessment is made to optimise peri-operative care. High risk is defined as where the risk of mortality is greater than 10%.	Surgery	RCS (2011) Emergency Surgery Standards for unscheduled care
16	All patients undergoing emergency surgery to be discussed with consultant anaesthetist. Where the severity assessment score is ASA3 and above, anaesthesia is to be provided by a consultant anaesthetist.	Surgery	
17	The majority of emergency general surgery to be done on planned emergency lists on the day that the surgery was originally planned. The date, time and decision maker should be documented clearly in the patient's notes and any delays to emergency surgery and the reasons why recorded. Any operations that are carried out at night are to meet NCEPOD classifications and be under the direct supervision of a consultant surgeon.	Surgery	NCEPOD (2004) The NCEPOD classification of Intervention.
18	All referrals to intensive care must be made with referring consultant involvement and must be accepted (or refused) by intensive care consultants.	Both	NCEPOD (2005) An acute problem

Appendix – London NHS Emergency care standards

Acute medicine and emergency general surgery

No.	Standard	Surgery, Medicine, Both	Supporting sources
19	A structured process to be in place for the medical handover of patients twice a day. These arrangements to also be in place for the handover of patients at each change of responsible consultant/medical team. Changes in treatment plans are to be communicated to nursing and therapy staff as soon as possible if they are not involved in the handover discussions.	Both	RCP (2007) The right person in the right setting – first time
20	Consultant-led communication and Information to be provided to patients and to include the provision of patient information leaflets.	Both	
21	Patient experience data to be captured, recorded and routinely analysed and acted on. Review of data is a permanent item on board agenda and findings are disseminated.	Both	
22	All acute medical and surgical units to have provision for ambulatory emergency care.	Both	RCP (2007) The right person in the right setting – first time
23	Single call access for mental health referrals to be available 24 hours a day, seven days a week with a maximum in person response time of 30 minutes.	Both	AoMRC (2008) Managing urgent mental health needs in the acute trust
24	Hospitals admitting emergency patients to have access to comprehensive 24 hour endoscopy services that has a formal consultant rota 24 hours a day, seven days a week.	Both	British Society of Gastroenterology
25	All hospitals dealing with complex acute medicine to have onsite access to levels 2 and 3 critical care (i.e. intensive care units with full ventilatory support). All acute medical units to have access to a monitored and nursed facility.	Both	
26	Training to be delivered in a supportive environment with appropriate, graded consultant supervision.	Both	RCS (2011) Emergency Surgery Standards for unscheduled care Temple (2010) Time for training? WA DH Stokes (2011) Four Hour Rule Program Progress and Issues Review

Appendix – Day of care survey – overview of findings

- The Day of Care survey tool and criteria was developed by a UK National Expert Working Group using a variety of methods, including collecting expert opinion, assessing consecutive patients admitted to an acute hospital and measuring them against the criteria on a daily basis, and testing and receiving feedback on the criteria and methodology at a number of hospitals. Criteria has then been further tested prospectively in over 2500 acute hospital inpatients.
- A minor number of changes to the survey were agreed before the survey was used in WA to take account of general variations in practice and terminology between UK and WA settings.
- The day of care survey provides a snapshot of inpatients to determine the appropriateness of them being in hospital. The survey also identifies the most appropriate alternative place of care for patients that are deemed not suitable for hospital and further identifies the number of outliers across the hospital.
- Every adult inpatient (excluding critical care, mental health and obstetric patients and patients identified for definite discharge) at each hospital was assessed against the criteria by a consultant and one other member of staff.
- The overview findings for each hospital are shown in the table below:

<i>Hospital</i>	<i>Patients surveyed [n]</i>	<i>Occupancy</i>	<i>Patients outlying</i>	<i>Patients not meeting acute care criteria</i>	<i>Of patients that did not meet criteria:</i>		
					<i>Delay of discharge within site control</i>	<i>Delay of discharge out of site control</i>	<i>Delay of discharge mixed/other</i>
Royal Perth	500	98%	9%	22%	48%	21%	31%
Fremantle	346	99%	13%	21%	42%	36%	22%
Sir Charles Gairdner	447	104%	20%	27%	48%	29%	23%

- Please see additional word document for further details of the survey and hospital and ward specific findings.

Appendix – Evidence List for Emergency Flow

Improving the quality of Emergency Care Pathways

1. Banerjee A, Mbamalu D, Hinchley G. The impact of process re-engineering on patient throughput in emergency departments in the UK. *International journal of emergency medicine*. 2008;1(3):189-92
2. Berwick DM, Hackbarth AD. Eliminating Waste in US Health Care. *JAMA*. 2012;307(14):1513-6.
3. Chien AT, Rosenthal MB. Waste Not, Want Not: Promoting Efficient Use of Health Care Resources. *Annals of Internal Medicine*. 2013;158(1):67-U142.
4. Connolly V, Hamad M. The acute medical take: an outpatient specialty. *Clinical Medicine*. 2008;8(1):21-4.
5. Litvak E. Optimizing patient flow by managing its variability. From front office to front line: Essential issues for healthcare leaders. Institute for Healthcare Improvement. 2004:91-112.
6. Nicholas J. An integrated lean-methods approach to hospital facilities redesign. *Hospital topics*. 2012;90(2):47-55.

Patient flow to access appropriate services without delay

1. Asplin B, Blum F, Broida R, Bukara W, Hill M, Hoffenberg S, et al. Emergency department crowding: high impact solutions. *American College of Emergency Physicians*. 2008.
2. Jensen A, Boyle J, Khanna S. Visualising patient flow. *Studies in health technology and informatics*. 2012;178:77-82.
3. Rautava V, Valpas T, Nurmikari M, Palomäki A, editors. Establishing a new emergency department: effects on patient flow. 33rd International Symposium on Intensive Care and Emergency Medicine; 2013 2013-03-19: Critical Care.
4. Tan KW, Wang C, Lau HC, editors. Improving patient flow in emergency department through dynamic priority queue. 2012 IEEE International Conference on Automation Science and Engineering (CASE); 2012; Seoul, South Korea.
5. Thompson SM, Day R, Garfinkel R. Improving the Flow of Patients Through Healthcare Organizations. *Handbook of Healthcare Operations Management*. 2013;184:183-204.
6. Wang J, Li J, Howard PK. A system model of work flow in the patient room of hospital emergency department. *Health Care Management Science*. 2013;April:1-11.
7. Wilson MJ, Siegel B, Williams M, Matters U. Perfecting patient flow: America's safety net hospitals and emergency department crowding: National Association of Public Hospitals and Health Systems; 2005.
8. Zhu T, Zhang X, Luo L, Shi Y, Cao Y, editors. Analysis of Patient Flow in Emergency Department Based on Markov Chain. *The 19th International Conference on Industrial Engineering and Engineering Management*; 2013: Springer Berlin Heidelberg.

Appendix – Evidence List for Emergency Flow

Improving process and eliminating waste

1. Banerjee A, Mbamalu D, Hinchley G. The impact of process re-engineering on patient throughput in emergency departments in the UK. *International journal of emergency medicine*. 2008;1(3):189-92.
2. Berwick DM, Hackbarth AD. Eliminating Waste in US Health Care. *Jama-Journal of the American Medical Association*. 2012;307(14):1513-6.
3. Chien AT, Rosenthal MB. Waste Not, Want Not: Promoting Efficient Use of Health Care Resources. *Annals of Internal Medicine*. 2013;158(1):67-U142.
4. Connolly V, Hamad M. The acute medical take: an outpatient specialty. *Clinical Medicine*. 2008;8(1):21-4.
5. Litvak E. Optimizing patient flow by managing its variability. From front office to front line: Essential issues for healthcare leaders. *Institute for Healthcare Improvement*. 2004:91-112.
6. Nicholas J. An integrated lean-methods approach to hospital facilities redesign. *Hospital topics*. 2012;90(2):47-55.

Care Plans

1. An Acute Problem? National Confidential Enquiry into Patient Outcome and Death, 2005.
2. The right person, in the right setting – first time. Royal College of Physicians London, 2007.
3. Urgent Care Pathways for Older People with Complex Needs – Best Practice Guidance. Department of Health, 2007.
4. Provision of consultant physician working on site for 12 hours per day 7 days per week. Royal College of Physicians London, 2011.
5. Acute medical care for frail older people. Royal College of Physicians London, 2012.
6. Sprague BL, Dittus KL, Pace CM, Dulko D, Pollack LA, Hawkins NA, et al. Patient satisfaction with breast and colorectal cancer survivorship care plans. *Clinical journal of oncology nursing*. 2013;17(3):266-72.

Appendix – Evidence List for Emergency Flow

Capacity Management to Provide Services Without Delay

1. Bagust A, Place M, Posnett J. Dynamics of bed use in accommodating emergency admissions: stochastic simulation model. *BMJ*. 1999;319:155.
2. Cameron PA. Hospital overcrowding: a threat to patient safety? *Medical Journal of Australia*. 2006;184(5):203-4.
3. Powell E, Khare R, Venkatesh A, Roo B, Reinhardt G. A hospital-wide approach to decreasing emergency department congestion: matching supply with demand. *Acad Emerg Med*. 2009;16(4):S146–S7.
4. Rafman H, Lim SN, Quek SC, Mahadevan M, Lim C, Lim A. Using systematic change management to improve emergency patients' access to specialist care: the Big Squeeze. *Emergency Medicine Journal*. 2013;30(6):447-53.
5. Shepperd S, Lannin NA, Clemson LM, McCluskey A, Cameron ID, Barras SL. Discharge planning from hospital to home. *Cochrane Database of Systematic Reviews*. 2013(1).
6. Vermeulen MJ, Ray JG, Bell C, Cayen B, Stukel TA, Schull MJ. Disequilibrium Between Admitted and Discharged Hospitalized Patients Affects Emergency Department Length of Stay. *Annals of Emergency Medicine*. 2009;54(6):794-804.

Understanding Demand

1. Bed Management: A review of national findings. Audit Commission, 2003.
2. Bagust A, Place M, Posnett J. Dynamics of bed use in accommodating emergency admissions: stochastic simulation model. *BMJ*. 1999;319:155.
3. Lowthian JA, Curtis AJ, Jolley DJ, Stoelwinder JU, McNeil JJ, Cameron PA. Demand at the emergency department front door: 10-year trends in presentations. *Medical Journal of Australia*. 2012;196(2):128-32.
4. Majeed MU, Williams DT, Pollock R, Amir F, Liam M, Foong KS, et al. Delay in discharge and its impact on unnecessary hospital bed occupancy. *Bmc Health Services Research*. 2012;12.
5. Wong HJ, Morra D, Caesar M, Carter MW, Abrams H. Understanding hospital and emergency department congestion: an examination of inpatient admission trends and bed resources. *Canadian Journal of Emergency Medicine*. 2010;12(1):18-26.

Appendix – Evidence List for Emergency Flow

Matching Resources to Demand

1. Bed Management: A review of national findings. Audit Commission, 2003.
2. An Acute Problem? National Confidential Enquiry into Patient Outcome and Death, 2005.
3. The right person, in the right setting – first time. Royal College of Physicians London, 2007.
4. Emergency Surgery: Standards for Unscheduled Surgical Care. Royal College of Surgeons, 2011.
5. Out of hours care statement. Royal College of Physicians London, 2011.
6. Provision of consultant physician working on site for 12 hours per day 7 days per week. Royal College of Physicians London, 2011.
7. Acute medical care for frail older people. Royal College of Physicians London, 2012.
8. Asplin B, Blum F, Broida R, Bukara W, Hill M, Hoffenberg S, et al. Emergency department crowding: high impact solutions. American College of Emergency Physicians. 2008.
9. Health Do. Wait for a bed: Bed management further guidance toolkit. Publication. Department of Health, 2004 2004-06-09. Report No.
10. McGowan JE, Truwit JD, Cipriano P, Howell RE, VanBree M, Garson A, Jr., et al. Operating room efficiency and hospital capacity: Factors affecting operating room use during maximum hospital census. Journal of the American College of Surgeons. 2007;204(5):865-71.
11. Needleman J, Buerhaus P, Pankratz S, Leibson C, Stevens S, Harris M. Nurse Staffing and Inpatient Hospital Mortality. New England Journal of Medicine. 2011;364(11):1037-45.
12. Rodriguez-Alvarez A, Roibas D, Wall A. Reserve capacity of public and private hospitals in response to demand uncertainty. Health Economics. 2012;21(7):839-51.
13. Wong HJ, Morra D, Caesar M, Carter MW, Abrams H. Understanding hospital and emergency department congestion: an examination of inpatient admission trends and bed resources. Canadian Journal of Emergency Medicine. 2010;12(1):18-26.

Appendix – Evidence List for Emergency Flow

Creating Capacity to Meet Demand

1. Bed Management: A review of national findings. Audit Commission, 2003.
2. Discharge from hospital: pathway, process and practice. Publication. Department of Health, 2003 2003-01-28. Report No.
3. Achieving timely simple discharge from hospital: A toolkit for the multi-disciplinary team. Publication. Department of Health, 2004 2004-08-26. Report No.
4. The right person, in the right setting – first time. Royal College of Physicians London, 2007.
5. Best Practice Template: Admission, Transfer and Discharge Protocol for hospital patients in Scotland. Scottish Government, 2009.
6. Allder S, Silvester K, Walley P. Managing capacity and demand across the patient journey. *Clinical Medicine*. 2010;10(1):13-5.
7. Allder S, Silvester K, Walley P. Understanding the current state of patient flow in a hospital. *Clinical Medicine*. 2010;10(5):441-4.
8. Asplin B, Blum F, Broida R, Bukara W, Hill M, Hoffenberg S, et al. Emergency department crowding: high impact solutions. *American College of Emergency Physicians*. 2008.
9. Bagust A, Place M, Posnett J. Dynamics of bed use in accommodating emergency admissions: stochastic simulation model. *BMJ*. 1999;319:155.
10. Baillie H, Wright W, McLeod A, Craig N, Leyland A, Drummond N, et al. Bed Occupancy and Bed Management. Public Health Research Unit, University of Glasgow, 1997.
11. Baker DR, Pronovost PJ, Morlock LL, Geocadin RG, Holzmueller CG. Patient flow variability and unplanned readmissions to an intensive care unit. *Critical Care Medicine*. 2009;37(11):2882-7.
12. Barrett L, Ford S, Ward-Smith P. A bed management strategy for overcrowding in the emergency department. *Nursing economic\$*. 2012;30(2):82-116.
13. Cameron P. Hospital overcrowding: a threat to patient safety? 2006.
14. Health Do. Wait for a bed: Bed management further guidance toolkit. Publication. Department of Health, 2004 2004-06-09. Report No.
15. McGowan JE, Truwit JD, Cipriano P, Howell RE, VanBree M, Garson A, Jr., et al. Operating room efficiency and hospital capacity: Factors affecting operating room use during maximum hospital census. *Journal of the American College of Surgeons*. 2007;204(5):865-71.
16. Proudlove NC, Gordon K, Boaden R. Can good bed management solve the overcrowding in accident and emergency departments? *Emergency Medicine Journal*. 2003;20(2):149-55.

Appendix – Evidence List for Emergency Flow

Escalation Process

1. Banerjee A, Mbamalu D, Hinchley G. The impact of process re-engineering on patient throughput in emergency departments in the UK. *International journal of emergency medicine*. 2008;1(3):189-92.

Clinical decision-making

1. An Acute Problem? National Confidential Enquiry into Patient Outcome and Death, 2005
2. Towards Faster Treatment: Reducing Attendance and Waits at Emergency Departments :: Longwoods.com. *Healthcare Quarterly: UK National Co-ordinating Centre for NHS Service Delivery and Organisation Research and Development*, 2006.
3. The right person, in the right setting – first time. Royal College of Physicians London, 2007.
4. Emergency Surgery: Standards for Unscheduled Surgical Care. Royal College of Surgeons, 2011.
5. Provision of consultant physician working on site for 12 hours per day 7 days per week. Royal College of Physicians London, 2011.
6. Acute medical care for frail older people. Royal College of Physicians London, 2012.
7. Ahmad A, Purewal TS, Sharma D, Weston PJ. The impact of twice-daily consultant ward rounds on the length of stay in two general medical wards. *Clinical Medicine*. 2011;11(6):524-8.
8. Asplin B, Blum F, Broida R, Bukara W, Hill M, Hoffenberg S, et al. Emergency department crowding: high impact solutions. *American College of Emergency Physicians*. 2008.
9. Monforto K, Figueroa-Altmann A, Stevens C, Thiele K, Ely E. Time Changes for Scheduled Nursing Assessments: Impact on Clinical Decisions and Patient Discharge. *Journal of Pediatric Nursing-Nursing Care of Children & Families*. 2012;27(1):26-33.

Streaming of patients

1. Towards Faster Treatment: Reducing Attendance and Waits at Emergency Departments :: Longwoods.com. *Healthcare Quarterly: UK National Co-ordinating Centre for NHS Service Delivery and Organisation Research and Development*, 2006.
2. The right person, in the right setting – first time. Royal College of Physicians London, 2007.
3. Asplund K, Berman P, Blomstrand C, Dennis M, Douglas J, Eriola T, et al. Collaborative systematic review of the randomised trials of organised inpatient (stroke unit) care after stroke. *British Medical Journal*. 1997;314(7088):1151-9.
4. Cooke MW, Wilson S, Pearson D. The effect of a separate stream for minor injuries on accident and emergency department waiting times. *Emergency Medicine Journal*. 2002;19(1):28-30.

Appendix – Evidence List for Emergency Flow

Seamless flow without delay

1. Banerjee A, Mbamalu D, Hinchley G. The impact of process re-engineering on patient throughput in emergency departments in the UK. *International journal of emergency medicine*. 2008;1(3):189-92.
2. Cooke MW, Wilson S, Pearson D. The effect of a separate stream for minor injuries on accident and emergency department waiting times. *Emergency Medicine Journal*. 2002;19(1):28-30.
3. McGowan JE, Truwit JD, Cipriano P, Howell RE, VanBree M, Garson A, Jr., et al. Operating room efficiency and hospital capacity: Factors affecting operating room use during maximum hospital census. *Journal of the American College of Surgeons*. 2007;204(5):865-71.
4. Wilson MJ, Siegel B, Williams M, Matters U. Perfecting patient flow: America's safety net hospitals and emergency department crowding: National Association of Public Hospitals and Health Systems; 2005.

Timely and accessible information

1. Baillie H, Wright W, McLeod A, Craig N, Leyland A, Drummond N, et al. *Bed Occupancy and Bed Management*. Public Health Research Unit, University of Glasgow, 1997.
2. Wilson MJ, Siegel B, Williams M, Matters U. Perfecting patient flow: America's safety net hospitals and emergency department crowding: National Association of Public Hospitals and Health Systems; 2005.