

# Scottish Patient Safety Programme

## Acute Adult

## Deteriorating Patient

### Measurement Framework

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# How to use this Measurement Framework

Measures are essential to help teams to learn if the changes they are making are leading to an improvement. The measures contained in this framework will assist you and your team to measure key changes in the SPSP Deteriorating Patient change package. It is designed to be used in conjunction with the Essentials of Safe Care change package and measurement framework.

The [readiness for change and prioritisation tool](#) may help you in selecting the changes you want make from the SPSP Deteriorating Patient change package. This measurement framework will describe the associated measures and provide guidance on how best to collect and display the data.

**This measurement framework contains a suite of measures and teams should decide which change concepts they wish to test and select the measures they need to guide their own improvement journey. The SPSP Deteriorating Patient driver diagram, change package and measurement plan are not exhaustive. Teams may identify change concepts that are appropriate to their local context and should seek local quality improvement support to develop alternative measures if required.**

Please note there is no mandatory national reporting requirement for the process measures in this measurement framework.

NHS boards will be required to submit quarterly outcome data accompanied by a narrative submission to SPSP which can include progress made on improving clinical processes.

To learn more about measurement click on the link: [The Improvement Journey - Measurement \(NHS Education for Scotland\)](#)

## 1.1 Why measure

This measurement framework is intended to be used alongside the SPSP Deteriorating Patient Change Package to measure the impact of key changes that you want to make. Measurement helps you to:

- Recognise the variation that exists within your system and processes.
- Work out whether your changes are making an improvement.
- Help tell your improvement story.

To learn more about measurement click on the link: [Introduction to measurement for improvement \(NHS Education for Scotland\)](#)

## 1.2 Choosing Measures

This measurement framework contains a selection of measures for assessing and improving safety. This measurement framework can be used alongside other measurement systems, for example, Essentials of Safe Care, Excellence in Care, incident reporting systems and assurance reporting systems.

An improvement project should have a small family of measures that track the progress of the project over time. These should include:

- **Outcome measures:** to tell the team whether the changes it is making are helping to achieve the stated aim. For example, number of falls in your service.
- **Process measures:** to tell the team whether things that have to be done to achieve the desired outcomes are happening reliably. For example, carrying out routine checks to assess for deterioration.
- **Balancing measures:** to check for possible consequences elsewhere in the system. For example, staff experience.

To learn more about measures click on the link: [Developing your measures \(NHS Education for Scotland\)](#)

## 1.3 How to measure

When planning your data collection you will need to consider:

Collecting your data	Displaying your data
<ul style="list-style-type: none"><li>• Who will collect the data?</li><li>• What data will you collect?</li><li>• When will you collect the data?</li><li>• How will you collect/record the data?</li></ul>	<ul style="list-style-type: none"><li>• What chart type you will use?</li><li>• How will you share and use your data?</li></ul>

To learn more about data collection click on the link: [Data collection \(NHS Education for Scotland\)](#)

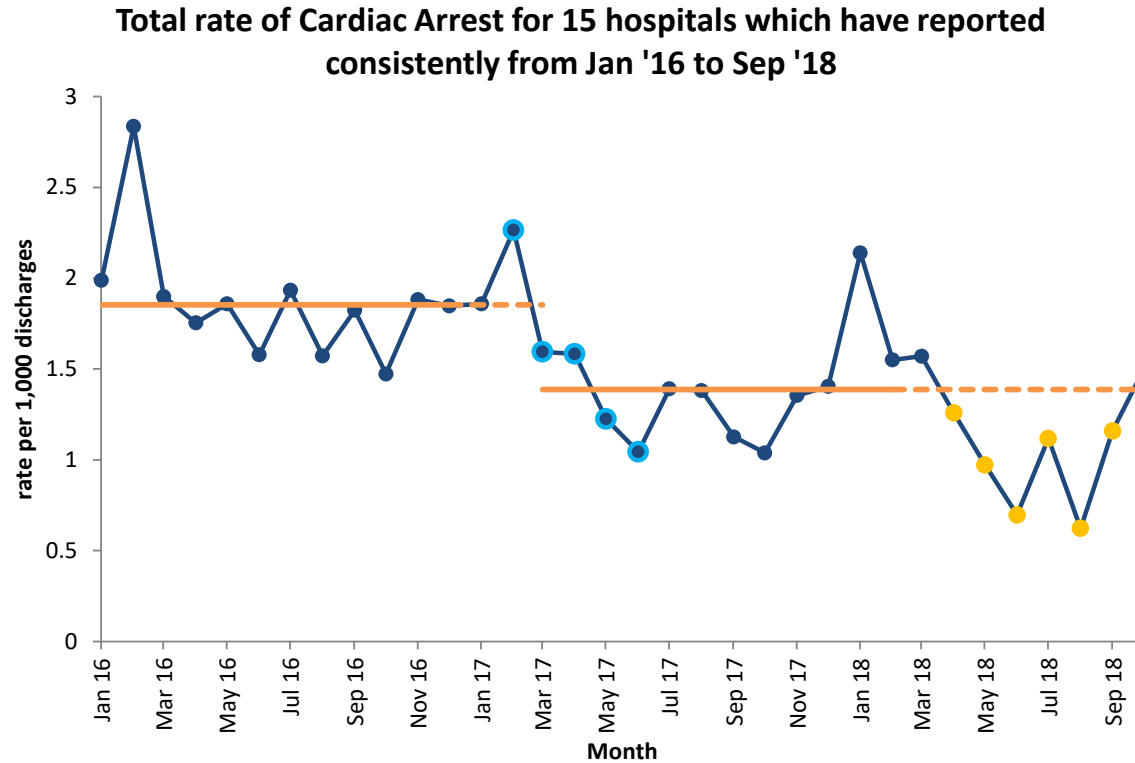
## 1.4 Sampling

Measuring for improvement relies on small sample sizes, often referred to as 'just enough' data to learn from. When it is not possible to access a larger amount of data, it is suggested that a random selection of 5 records per week, giving 20 records per month will gather enough data.

## 1.5 Presenting data

Run Charts (see example below) are an excellent way to present your data to help you to understand what is happening in your service. They are used to distinguish between random variation (variation that affects all processes, people and outcomes equally) and non-random variation, which could be due to the changes you have introduced. A toolkit for generating run charts has been included with this framework.

To learn more about presenting your data in a run chart click on the link: [Presenting your data \(NHS Education for Scotland\)](#)



## 2. SPSP Acute Adult Deteriorating Patient

<p><b>Readiness for change and identifying opportunities for improvement</b></p> <ul style="list-style-type: none"> <li>• Readiness for change and prioritisation assessment</li> <li>• Regular case note review to identify opportunities for improvement</li> </ul>	
Outcome Measures	<ul style="list-style-type: none"> <li>• Cardiac arrest rate</li> </ul>
Process Measures	<ul style="list-style-type: none"> <li>• Recognition of acute deterioration – NEWS2</li> <li>• Sepsis screening</li> <li>• Sepsis response</li> <li>• Delirium screening</li> <li>• Delirium response</li> <li>• Score to door time: Mean time from NEWS2 trigger to Critical Care admission</li> <li>• Generic response</li> <li>• Treatment escalation planning</li> <li>• Review of cardiac arrest/2222 calls</li> </ul>
Balancing Measures	<ul style="list-style-type: none"> <li>• Critical care admission rate</li> <li>• Overall hospital standardised mortality ratio</li> <li>• Patient and family experience of ‘end of life’ discussions (<i>Qualitative</i>)</li> <li>• Staff experience (<i>Qualitative</i>)</li> </ul>



## 2.1 Readiness for change & identifying opportunities for improvement

Measure Name	What/ How to measure	Data Source	Frequency of Reporting	Chart Type
Readiness for change and prioritisation assessment	<ul style="list-style-type: none"> <li>The readiness for change and prioritisation assessment will support you to identify the key changes you will want to make. The tool supports you to understand what might get in the way of making changes and what will support changes in practice. This is the first step in the process of introducing new changes.</li> </ul>	Readiness for change assessment and prioritisation tool.	N/A	N/A
Regular case note review to identify opportunities for improvement	<ul style="list-style-type: none"> <li>A regular review of case notes or adverse events helps to identify issues and types of potential and actual harm, and inform future opportunities for improvement. There are many recognised tools to support this activity, for example the Global Trigger Tool.</li> <li>The <b>Global Trigger Tool (GTT)</b> can be used to identify adverse events within your system and identify areas for improvement. Developed by the Institute for Healthcare Improvement, the tool is an easy-to-use tool for measuring the rate of harm over time.</li> </ul> <p><b>To learn more follow the links:</b></p> <ul style="list-style-type: none"> <li><a href="#">White Paper on Global Trigger Tool (Institute for Healthcare Improvement)</a></li> <li><a href="#">Global Trigger Tool for Primary Care (Healthcare Improvement Scotland)</a></li> </ul>	<p>Review of electronic record system/case notes/template</p> <p>Number of case notes reviewed each month using locally agreed tool (aim for 20 electronic records/case notes).</p>	Monthly	Pareto Analysis

## 2.2 Outcome Measures

Concept/Measure Name	What/ How to measure	Data Source	Frequency of Reporting	Chart Type
<p><b>Cardiac arrest rate</b></p> <p>Rate of cardiac arrests (per 1,000 discharges)</p> <p><b>DP02</b></p>	<p><b>Definition:</b> All individuals in eligible clinical areas receiving chest compressions and/or defibrillation and attended by the hospital-based resuscitation team (or equivalent) in response to the 2222 call.</p> <p><b>Numerator:</b> The total number of cardiac arrests in the ward/dept./unit for the month</p> <p><b>Denominator:</b> The total number of deaths plus live discharges in the month</p> <p><b>Rate:</b> (Numerator/Denominator) *1000</p> <p><b>Excluded areas (numerator and denominator):</b> Emergency Departments, Coronary Care Units, Intensive Care Units, Maternity Units, Outpatients and Day Case procedures</p>	As per incident management system or local data collection tool	Monthly data points reported quarterly	<p>Run chart</p> <p><b>For rare events</b> – data can be visualised locally as days between.</p>

## 2.3 Process Measures

Concept/ Measure Name	What/ How to measure	Data Source	Frequency of Reporting	Chart Type
<p><b>Recognition of acute deterioration</b></p> <p>Percentage compliance with correct frequency of observations using NEWS2.</p> <p><b>GWP1b</b></p> <p><b>Goal:</b> Process reliability at 95% or greater</p>	<p><b>Definition:</b></p> <p>The National Early Warning Score (NEWS) 2 is an evidence based tool for bedside evaluation based on six physiological parameters: respiratory rate, oxygen saturation, temperature, systolic blood pressure, pulse rate, and ACVPU (includes new confusion (c)) score. NEWS2 provides a standardised score to determine illness severity and support consistent clinical decision making and effective communication across the pathway of care.</p> <p><b>Numerator:</b></p> <p>The total number of patients with <b>all</b> observations performed at the correct frequency as per local policy</p> <p><b>Denominator:</b></p> <p>The total number of patients in sample</p> <p><b>Percentage compliance:</b> (Numerator / Denominator) * 100</p> <p><b>Inclusion Criteria:</b></p> <ul style="list-style-type: none"> <li>• Patients admitted &gt; 24 hours</li> <li>• Check for correct frequency of observations according to local policy</li> <li>• Review should be conducted for no more than the previous three days of the patients stay</li> </ul>	<p><b>Primary data source:</b></p> <p>NEWS2 chart.</p> <p>Check frequency of observations per patient, using a random sample of 20 patients per month per unit (sample 5 patients per week). When looking at all six observations for one patient, this is an all or nothing measure</p>	<p>Monthly</p>	<p>Run chart</p>

Concept/ Measure Name	What/ How to measure	Data Source	Frequency of Reporting	Chart Type
<p><b>Sepsis screening</b></p> <p>Percentage of patients with Sepsis Six performed within 1 hour of time zero</p> <p><b>SSP9</b></p> <p><b>Goal:</b> Process reliability at 95% or greater</p>	<p><b>Definition:</b></p> <p>Early identification of sepsis as a cause of deterioration</p> <p>Sepsis Six:</p> <ul style="list-style-type: none"> <li>• Oxygen therapy to target saturation</li> <li>• Blood culture performed</li> <li>• Commenced on IV antibiotics</li> <li>• IV fluid challenge</li> <li>• Serum lactate and full blood count</li> <li>• Accurate assessment of urinary output</li> </ul> <p><b>Numerator:</b> The total number of patients that have <b>all</b> elements of Sepsis Six completed within 1 hour of time zero.</p> <p><b>Denominator:</b> The total number of patients in the sample</p> <p><b>Percentage compliance:</b> (Numerator / Denominator) *100</p> <p><b>Inclusion Criteria:</b> Patients who score 5 or more (or 3 in a single parameter) on NEWS2 (or locally defined trigger) with a documented suspicion of infection</p> <p><b>Time Zero:</b> ACUTE – triage time SPECIALTY – time of meeting inclusion criteria</p>	<p><b>Primary data source:</b></p> <p>The patient’s medical notes, medication chart, NEWS2 chart, and fluid balance chart</p> <p>Sample five patients weekly per ward/department or include all patients if numbers less than 20/month</p> <p>In specialty ward areas it will be helpful to batch similar wards together to ensure a denominator of &gt;10</p>	<p>Monthly</p>	<p>Run chart</p>

Concept/ Measure Name	What/ How to measure	Data Source	Frequency of Reporting	Chart Type
<p><b>Sepsis response</b></p> <p>Percentage of patients who are commenced on IV antibiotics within 1 hour of time zero</p> <p><b>SSP5</b></p> <p><b>Goal:</b> Process reliability at 95% or greater</p>	<p><b>Definition:</b> Timely response to deterioration where sepsis is the suspected or confirmed cause.</p> <p><b>Numerator:</b> The total number of patients that have commenced IV antibiotic therapy within 1 hour of time zero</p> <p><b>Denominator:</b> The total number of patients in the sample</p> <p><b>Compliance:</b> (Numerator / Denominator) * 100</p> <p><b>Inclusion Criteria</b> Patients who score 5 or more (or 3 in a single parameter) on NEWS2 (or locally defined trigger) with a documented suspicion of infection</p> <p><b>Time Zero:</b> ACUTE – triage time SPECIALTY – time of meeting inclusion criteria</p>	<p><b>Primary data source:</b></p> <p>The patient’s medical notes, medication chart, NEWS2 chart, and fluid balance chart.</p> <p>Sample five patients weekly per ward/department</p> <p>or include all patients if numbers less than 20/month</p> <p>In specialty ward areas it will be helpful to batch similar wards together to ensure a denominator of &gt;10</p>	<p>Monthly</p>	<p>Run chart</p>

Concept/ Measure Name	What/ How to measure	Data Source	Frequency of Reporting	Chart Type
<p><b>Delirium screening</b></p> <p>Percentage compliance with 4AT screening</p> <p><b>DRP1</b></p> <p><b>Goal:</b> Process reliability at 95% or greater</p>	<p><b>Definition:</b></p> <p>A new onset Delirium or confusion is a clinical condition that can indicate that a patient has deteriorated and is unwell. Delirium is a medical emergency. The 4AT tool (<a href="http://www.the4at.com">www.the4at.com</a>) is designed to be used by any health professional at first contact with the patient, and at other times when delirium is suspected.</p> <p><b>Numerator:</b></p> <p>Total number of patients with a completed 4AT score as per locally defined delirium screening criteria</p> <p><b>Denominator:</b></p> <p>The total number of patients in the sample</p> <p><b>Percentage compliance:</b></p> <p><math>(\text{Numerator} / \text{Denominator}) * 100</math></p> <p><b>Inclusion criteria:</b></p> <p>All patients who meet the locally defined delirium screening criteria</p>	<p><b>Primary data source:</b></p> <p>The patient’s medical and nursing notes including NEWS2 and 4AT/TIME chart as per local documentation</p>	<p>Monthly</p>	<p>Run chart</p>

Concept/ Measure Name	What/ How to measure	Data Source	Frequency of Reporting	Chart Type
<p><b>Delirium response</b></p> <p>Percentage compliance with TIME bundle implementation within 2 hours for patients with a 4AT score of <math>\geq 4</math></p> <p><b>DRP2</b></p> <p><b>Goal:</b> Process reliability at 95% or greater</p>	<p><b>Definition:</b></p> <p>The TIME bundle in conjunction with the 4AT tool is a process to aid the detection and management of the patient experiencing delirium. All patients with a 4AT score of <math>\geq 4</math> should have the TIME bundle implemented within 2 hours of trigger score.</p> <p>TIME bundle</p> <ul style="list-style-type: none"> <li>• Think, exclude and treat possible triggers</li> <li>• Investigate and intervene for possible underlying causes</li> <li>• Management plan initiated</li> <li>• Engage and explore in discussion with the family</li> </ul> <p><b>Numerator:</b></p> <p>The total number of patients with a 4AT score of <math>\geq 4</math> who have evidence of the 4 elements of the TIME bundle documented within 2 hours of the trigger score</p> <p><b>Denominator:</b></p> <p>The total number of patients in the sample.</p> <p><b>Percentage compliance:</b></p> <p>(Numerator / Denominator) * 100</p> <p><b>Inclusion criteria:</b></p> <p>Patients with a new confusion, who have been screened and have a 4AT score of <math>\geq 4</math>.</p>	<p><b>Primary data source:</b></p> <p>The patient’s medical and nursing notes including NEWS2 and 4AT/TIME chart as per local documentation</p> <p>Sample five patients weekly per ward/department with a 4AT score of <math>\geq 4</math> or include all patients if numbers less than 20/month</p>	<p>Monthly</p>	<p>Run chart</p>

Concept/ Measure Name	What/ How to measure	Data Source	Frequency of Reporting	Chart Type
<p><b>Score to door time (STDT)</b></p> <p>Mean time from NEWS2 trigger to Critical Care admission per month</p> <p><b>DPP1</b></p> <p><b>Goal:</b> Mean 'Score to door' time of ≤ 4 hours.</p> <p><b>For island, remote and rural NHS boards, goal may need to be adjusted dependent on local context. This may also be 2 measures if the NHS board has a High Dependency area.</b></p>	<p><b>Definition:</b> Time from NEWS2 trigger or clinical concern to time of admission to a higher level of care (High Dependency, Coronary Care, Intensive Care Unit or time Emergency Retrieval Service accepts referral of the patient for island, remote and rural NHS boards where applicable).</p> <p><b>Numerator:</b> Cumulative total score to door time for all patients in sample.</p> <p><b>Denominator:</b> The total number of patients in the sample.</p> <p><b>Mean STDT:</b> Numerator / Denominator</p> <p><b>Inclusion criteria:</b> All patients who were emergency admissions to Critical Care from general downstream wards</p> <p><b>Exclusions:</b> Patients transferred from Emergency Departments, Maternity Units and Outpatients, High Dependency and Coronary Care areas to Critical Care</p>	<p><b>Primary data source:</b></p> <p>The patient's medical and nursing notes including NEWS2 chart to identify NEWS2 trigger time and admission to Critical Care time.</p> <p>Local electronic systems may track patient NEWS2 trigger time and time of admission to a Critical Care environment</p>	<p>Monthly</p>	<p>Run chart</p>



Concept/ Measure Name	What/ How to measure	Data Source	Frequency of Reporting	Chart Type
<p><b>Generic response</b></p> <p>Percentage compliance with generic response</p> <p><b>DPP2</b></p> <p><b>Goal:</b> Process reliability at 95% or greater</p>	<p><b>Definition:</b></p> <p>A structured process for responding to patient physiological deterioration incorporating 4 key areas Recognition (typically by the bedside nurse), Response (typically by the trainee medical team member), Review (by the trainee or senior medical team member) and Refer (to a higher level of care or to adjusted treatment goals as appropriate).</p> <p><i>The following are suggested elements of a generic response process. These may be combined and amended locally to support adaption to context.</i></p> <ul style="list-style-type: none"> <li>• Document a working diagnosis and management plan</li> <li>• Document frequency of observations and review time</li> <li>• Document treatment escalation plan (after discussion with patient and family) including resuscitation status, senior review and goals of care.</li> <li>• A triage decision has been made and recorded in the event of further deterioration (ward based care, High Dependency referral, Intensive Care referral or anticipatory/end of life care). This may be documented in the treatment and escalation plan as per local policy.</li> <li>• Document a review where NEWS/Lactate and Clinical Concern are re assessed and referral made (if appropriate)</li> </ul>	<p><b>Primary data source:</b></p> <p>The patient’s medical and nursing notes including NEWS2 chart to identify NEWS2 trigger time and admission to Critical Care time.</p> <p>Local electronic systems may track patient NEWS2 trigger time and time of admission to a Critical Care environment</p>	<p>Monthly</p>	<p>Run chart</p>

Concept/ Measure Name	What/ How to measure	Data Source	Frequency of Reporting	Chart Type
<p><b>Generic response</b> Percentage compliance with generic response</p> <p><b>DPP2</b></p> <p><b>Goal:</b> Process reliability at 95% or greater</p>	<p><b>Numerator:</b> The number of patients with complete generic response process within the sample</p> <p><b>Denominator:</b> The total number of patients in the sample.</p> <p><b>Percentage compliance:</b> (Numerator / Denominator) * 100</p> <p><b>Inclusion criteria:</b> Patients with a NEWS2 score of ≥ 5 (or 3 in a single parameter), or a Lactate of ≥ 4 or an expressed clinical concern, or locally defined trigger point</p>	<p><b>Primary data source:</b></p> <p>The patient’s medical and nursing notes including NEWS2 chart to identify NEWS2 trigger time and admission to Critical Care time.</p> <p>Local electronic systems may track patient NEWS2 trigger time and time of admission to a Critical Care environment</p>	<p>Monthly</p>	<p>Run chart</p>

Concept/ Measure Name	What/ How to measure	Data Source	Frequency of Reporting	Chart Type
<p><b>Treatment escalation planning</b></p> <p>Percentage compliance with a Treatment and Escalation Plan for patients who have an NHS Scotland Do Not Attempt Cardio Pulmonary Resuscitation (DNACPR) form completed</p> <p><b>DPP3</b></p> <p><b>Goal:</b> Process reliability at 95% or greater</p>	<p><b>Definition:</b></p> <p>Where patients have a resuscitation decision documented there is a corresponding Treatment and Escalation Plan in place. Treatment Escalation Plans are a communication tool that summaries treatment goals, including resuscitation status, as well as treatment limitations for patients who are unstable or nearing the end of life. This will be based on a patient’s diagnosis, illness trajectory, the reversibility of the acute deterioration and the patient’s preferences and wishes.</p> <p><b>Numerator:</b></p> <p>The number of patients with a completed Treatment and Escalation Plan within the sample.</p> <p><b>Denominator:</b></p> <p>The total number of patients in the sample.</p> <p><b>Percentage compliance:</b></p> <p>(Numerator / Denominator) * 100</p> <p><b>Inclusion criteria:</b></p> <p>Patients with a completed NHS Scotland DNACPR form</p>	<p><b>Primary data source:</b></p> <p>The patient’s medical and nursing notes</p> <p>Sample five patients weekly per ward/department with an NHS Scotland DNACPR form.</p> <p>Include all patients with DNACPR if numbers less than 20/month</p>	<p>Monthly</p>	<p>Run chart</p>

Concept/ Measure Name	What/ How to measure	Data Source	Frequency of Reporting	Chart Type
<p><b>Review of cardiac arrest/2222 calls</b></p> <p>Percentage compliance with a multi-disciplinary review of all cardiac arrests</p> <p><b>DPP4</b></p> <p><b>Goal:</b> Process reliability at 95% or greater</p>	<p><b>Definition:</b> Creation of an organisational safety culture through identifying system learning from adverse events</p> <p><b>Numerator:</b> The number of patients with a completed multi-disciplinary cardiac arrest/2222 review.</p> <p><b>Denominator:</b> The total number of patients</p> <p><b>Percentage compliance:</b> (Numerator / Denominator) *100</p> <p><b>Inclusion criteria:</b> All patients who required intervention by a rapid response team through a 2222 alert call.</p> <p><b>Exclusions:</b> (numerator and denominator): Emergency Departments, Coronary Care Units, Intensive Care Units, Maternity and Outpatient Depts.</p>	<p><b>Primary data source:</b></p> <p>Datix/incident reporting system, 2222 review process documents as per local policy</p> <p>All patients, added to Datix/incident reporting system or call review process documents as a result of cardiac arrest/2222 call event in the month (as per local recording policy).</p>	<p>Monthly</p>	<p>Run chart</p>

## 2.4 Balancing Measures

Concept/ Measure Name	What/ How to measure	Data Source	Frequency of Reporting	Chart Type
<p><b>Critical care admission rate</b></p> <p>Critical Care admission rate (per 1,000 occupied bed days)</p> <p><b>DPB1</b></p> <p><b>Goal:</b> Monitor for impact of wider system changes related to rate of admission to Critical Care</p>	<p><b>Definition:</b> Patients transferred to a higher level of care.</p> <p><b>Numerator:</b> Total emergency transfers to critical care from site</p> <p><b>Denominator:</b> Total occupied bed days per site</p> <p><b>Rate:</b> (Numerator/Denominator) *1000</p> <p><b>Inclusion criteria:</b> All patients who were emergency admissions to Critical Care (High Dependency, Coronary Care, Intensive Care or Emergency Retrieval Service assume responsibility for management of the patient for island, remote and rural NHS boards where applicable) from general downstream wards</p> <p><b>Exclusions:</b> Patients transferred from Emergency Departments, Maternity Units and Outpatients, High Dependency and Coronary Care areas to Critical Care</p>	<p>Local electronic patient management systems may track number of admissions to critical care environments and bed occupancy</p>	<p>Monthly</p>	<p>Run chart</p> <p><b>For rare events</b> – data can be visualised locally as days between.</p>

Concept/ Measure Name	What/ How to measure	Data Source	Frequency of Reporting	Chart Type
<b>Overall hospital standardised mortality ratio (HSMR)</b>	Monitor for impact of wider system changes related to HSMR	Discovery/ISD	Monthly	Run chart for each hospital site or national funnel plot
<b>Patient and family experience</b>  <b>DPB2</b>  Qualitative measure	Patient and family experience of end of life discussions  Refer to <a href="#">Essentials of Safe Care</a> driver diagram, change package and measurement plan	Patient medical and nursing notes, care opinion, local service user feedback mechanisms, informal and formal complaint processes	N/A	Patient and family stories
<b>Staff experience</b>  <b>DPB3</b>  Qualitative measure	Staff experience and perceptions of safety within their clinical environment  Refer to <a href="#">Essentials of Safe Care</a> driver diagram, change package and measurement plan	Local safety climate processes and tools	N/A	N/A

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