8-year surveillance 2016 – Acutely ill adults in hospital (2007) NICE guideline CG50

Appendix A: decision matrix

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
Physiological observations in acute hospital settings			
50 – 01 Which physiological observations should be undertaken in acute hospital settings? (1.1 – 1.2)			
3-year surveillance (2010) No relevant evidence identified.	No relevant evidence identified.	**Staff competencies education and training- Recommendation 1.1.** A topic expert highlighted the need to place greater emphasis on staff education and on the benefits of having adequate staffing levels in hospital wards, to prevent clinical deterioration in patients. Three references were provided to support this view: The first one was an observational study [1]. This study assessed the impact of an Immediate Life Support course on in-hospital cardiac arrest calls. An audit was performed 6 years after the course was given in a London teaching hospital. The introduction of this educational programme was associated with a reduction in the number of in-hospital cardiac arrests and unsuccessful	New evidence is consistent with guideline recommendations. **Staff competencies education and training.** Three studies were highlighted by topic experts. Two were observational studies addressing the impact of staff education programmes and/or skills in different important outcomes of the patients (including cardiac arrest and mortality). A third study described a model to help hospitals in developing processes to prevent and detect acutely ill patients. CG50 recommends that physiological observations should be recorded (and acted upon) by staff that have the competencies to do so. The guideline

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
		cardiopulmonary resuscitation attempts. The second study was a European observational study (9 EU countries involved- administrative data [2]. The study assessed if the differences in patient to nurse ratios and nurses' educational qualifications could have an impact on hospital mortality after common surgical procedures. It included 300 hospitals in nine different EU countries. An increase in a nurses' workload by one patient increased the likelihood of dying within 30 days of admission. An increase in bachelor's degree nurses was associated with a lower mortality. The interventions included in these two studies are not directly related to which parameters need to be measured in acutely ill patients but highlight the relevance of the skills needed to do this. The evidence found could also be related to questions 50 – 05 (recommendation 1.7) and 50 – 07 (recommendation 1.17) about the competencies that the staff caring for patients in acute hospital settings or working in general wards should have. It is also related to the education and training that should be provided to help them to recognise and	also recommends that staff education and training should be provided to guarantee they can show these skills. The interventions included in the new evidence are not directly related to which parameters need to be measured in acutely ill patients but highlight the relevance of the skills needed to do this which is consistent with current recommendations. This evidence and conclusion is also relevant to questions 50 – 05 and 50 – 07. **Minimum physiological observations** Topic experts identified one study assessing the role of nurses' concern in the identification of acutely ill patients. This study is in line with CG50 which recommends minimum parameters that should be recorded, and states that in specific circumstances additional monitoring should be considered (recommendations1.2, 1.5, and 1.6). CG50 also recommends that a response strategy for acutely ill patients should be triggered by track and trigger score or clinical concern (recommendation 1.8).

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
		understand the acutely ill patients' needs (including physical, psychological and emotional needs). The last paper identified was about a 'chain of prevention [3]. This chain has five rings representing 1) staff education, 2) monitoring, 3) recognition, 4) call for help, and 5) the response. This chain is a complement to the 'chain of survival', a tool that has been useful in the improvement of quality of the response to cardiac arrest. **Minimum physiological observation-Recommendation 1.2.** A topic expert identified a systematic review about the signs and symptoms that trigger nurses to be worried or concerned about a patient's condition (called 'worry or concern' signs) [4]. In this systematic review, 37 signs and symptoms were identified and summarised in 10 general indicators. The authors recommend introducing these signs and symptoms into the nurse assessment of the patient and the decision to call for assistance.	

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
Identifying patients whose clinical condition is deteriorating or is at risk of deterioration			
50 – 02 Can physiological track and trigger systems correctly identify those patients whose clinical condition is deteriorating or who are at risk of deterioration? (1.3)			
3-year surveillance (2010) Twelve studies were identified through the previous surveillance [5-16]. The greatest number of studies focused on track and trigger systems (TTS) (4 of 12). A high quality evidence (review with 97 studies) reported that there were marked variations in sensitivities and positive predictive values were low, with median (quartiles) of 43.3 (25.4-69.2) and 36.7 (29.3-43.8), respectively [10]. Another observational study suggested the sensitivities of different TTS were largely comparable while stating that different scoring systems may need to be considered as individual systems have their own limitations [12]. Overall there were significant variations in TTS diagnostic predictor variables. Another study (comparative cohort study), evaluated the ability of physiological parameters, either alone or as part of Early Warning Systems (EWS), to predict patient's deterioration and identifying functions with superior accuracy. They	A systematic review assessed the ability of early warning system scores (EWSS) to predict the risk of deterioration in adults admitted to medical or surgical wards [17]. The authors were also interested in the impact of EWSS implementation on health outcomes and resource utilisation. One RCT and 20 observational studies were included in this systematic review; eight addressed the predictive ability of EWSS and 13 addressed the impact of EWSS implementation. EWS tools had a high predictive value for 48 h mortality, with a range of AUROC from 0.88 to 0.93. Similar results were found in the predictive value for 48 h cardiac arrest, with an AUROC from 0.74 to 0.86. Regarding the studies assessing the impact of EWSS implementation, the authors found mixed results. Most of studies included were observational studies with methodological limitations. A good quality RCT did not detect	**Track and Trigger Systems accuracy** Comments from topic experts (these comments are also relevant to question 50 – 03): • NEWS has been introduced in many trusts but sensitivity, specificity and parameters need to be reviewed. • NEWS system has all the limitations of existing early warning scoring systems. This does not change the CG50 recommendations. Six studies were identified by topic experts [18-23]. One of the studies was a retrospective cohort study [22]. The aim of this study was to test the ability of the NEWS to discriminate: patients at risk of cardiac arrest, unanticipated intensive care unit admission or death within 24h of a NEWS value. They compared the results to another other 33 EWS. They tested all the EWS in a vital signs database that included more than 35 000 consecutive acute medical admissions in UK. The	New evidence is consistent with guideline recommendations The evidence from the 3-year surveillance review was mainly from observational studies. Overall, they reported variability in the accuracy of the different TTS, with no clearly defined cut-off or weighting score identified. From the 8yr surveillance review, a systematic review found EWSS had good predictive values for important outcomes but the impact of the implementation of the tool remains uncertain. Studies identified by topic experts also compared TTS ability to predict patient important outcomes according to different cut-off points, and their impact in resource use. NEWS seemed to perform better than other TTS in some of the clinical outcomes measured but the clinical relevance of these differences needs to be assessed in further studies. Regarding the frequency for measuring parameters, some of the observational

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
compared a group of high dependency patients admitted to surgical wards to patients requiring admission to ICU. EWS had good discriminatory power. Heart rate and respiratory rate identified differences between groups at 6 and 8 hrs before ICU admission. Oxygen saturation and discriminant function 2 detected differences between the groups 48 hours before ICU admission [8]. Three studies looked at the aggregate weighted tract and trigger systems (AWTTS) [9,13,15]. The AWTSS was one of the principle emergent themes, and a systematic review noted that although physiological parameters can be used, there is no evidence of clearly identified cut-offs or weighting currently [15]. Following publication of this systematic review, the same research group developed ViEWS. They applied it to a vital signs database that included more than 35 000 consecutive acute medical admissions in UK. They also compared ViEWS to another 33 AWTTS. Using in-hospital mortality with 24h of observations set, the area under the receiver operating characteristic curve (AUROC) for ViEWS was 0.888 (95% CI 0.888 to 0.895). The	differences in mortality, transfers to the ICU, or length of hospital stay. The authors concluded that EWS are good predictors of cardiac arrest and death within 48 h, but given the methodological limitations of the studies included, their impact on health outcomes and resource use remains uncertain.	NEWS AUROC for death within 24h was 0.894 (95% CI 0.887 to 0.902). Using the same outcome, the range of AUROC for the other 33 EWS was from 0.813 (95% CI 0.802 to 0.824) to 0.858 (95% CI 0.849 to 0.867). Similar differences were found for unanticipated ICU admission and for the combined outcome of cardiac arrest, unanticipated ICU admission or death within 24h of NEWS value but not for cardiac arrest alone. The authors concluded NEWS has a greater ability to discriminate patients at risk of the combined outcome of cardiac arrest, unanticipated ICU admission or death than the other 33 EWS. The topic experts also highlighted an additional observational study published by the same group. In this study the authors compared the workloads generated by different NEWS scores [21]. The Royal College of Physicians of London (RCPL) NEWS is activated at values more or equal to 5 or when the score for any single vital sign is 3. They found that when a single component of NEWS scores 3, it produces an increase in doctor's workload by 40% compared to a NEWS aggregated score of 5. This	studies identified by topic experts highlighted the importance of monitoring patients and setting monitoring plans according to their risk-level. Overall, the evidence found is consistent with CG50 recommendations which state that TTS should be used to monitor all adult patients in acute hospital settings. This evidence and impact assessment is also relevant to recommendation 1.9 (50 – 05) which indicates triggers thresholds should be set locally and reviewed frequently to optimise their accuracy.

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
range of AUROC for the other 33 AWTTS was from 0.803 (95% CI 0.841 to 0.859) to 0.850 (95% CI 0.841 to 0.859) [13]. This study predicted ViEWS performed better than the 33 other AWTTS for the outcomes tested. Two studies examining MEWS opined that extending the criteria significantly lowered sensitivity and would extend the medical emergency team workload enormously. Restricting the criteria led to missed mortalities where intervention could be beneficial [6]. While another study expressed the multivariate models of MEWS predicted patient's transfer to a higher level of care as well as ward mortality [7].		increase resulted in a 3% improvement in the detection of adverse events. The authors concluded that RCPL escalation protocol warrants review in the guideline, given the additional work produced and the modest benefit in increasing detection of adverse outcomes. Another study published by the same group [20] assessed the binary version of 36 early warning scores and compared them with their own standard version. In general, all the binary EWS had lower AUROC compared to the standard versions. Binary NEWS performed better than the other binaries EWS versions. A binary NEWS trigger point of 3 would detect as many adverse outcomes as are detected by NEWS using a trigger of 5 (requiring a 15% higher triggering rate), but its introduction could lead to significant increase in workload for ward and rapid response team staff. An observational study conducted in a university hospital in Finland was highlighted [23]. Its aim was to compare NEWS (of seven or more) to usual care (conventional dichotomised activation	

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
		criteria) in the prediction of in-hospital serious adverse events, and 30-days mortality. The study was run in two days, and included 615 patients. They concluded NEWS discriminate high risk patients better than the dichotomised activation criteria used as standard care. Other study was a 6 week prospective observational study that explored the performance of the NEWS in the prediction of patient adverse outcomes in an emergency department [18]. They included 300 patients with an Emergency Severity Index score of 2 or 3 who were not admitted to the resuscitation room. The outcomes assessed were 30-day mortality, hospital admission, and length of stay at different time points (arrival, hour after arrival, at transfer to the general ward or ICU. They concluded that NEWS was a good predictor of patient adverse outcomes. Finally, a retrospective cohort study conducted in an academic medical centre in the United States aimed to compare a new cardiac arrest risk triage score to the MEWS in the prediction of cardiac arrest [19]. They found that the new cardiac arrest risk triage score performed better	

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
		(AUROC 0.84; CI 95% not reported) than MEWS (AUROC 0.76; CI 95% not reported) in the prediction of cardiac arrest. This study was included in the SR [17] identified in our searches for this question and included in the summary of new evidence from 8-year surveillance. **Frequency of parameter monitoring** The CG50 recommendation 1.3 gives advice about the frequency individual parameters that need to be monitored. One of the topic experts pointed out the relevance of emphasising the need to ensure adequate observations and monitoring intervals. The topic experts identified three studies related to this area [24-26]. These references are also related to question 50-05 (recommendation 1.10). An observational study was highlighted which was carried out during two months in all adults inpatient areas (except high care areas and critical care units) of a NHS district general hospital in UK [25]. They compared the pattern of vital signs and ViEWS data collected from adult admissions to the hospital's escalation protocol. They concluded there was partial adherence to the vital sign monitoring protocol and the sicker	

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
		patient's observations were often not followed by timely repeat assessments, in spite of being more likely to have more vital signs measurements overnight. Another study identified was a prospective cohort study [26]. This study assessed whether Modified Early Warning Score (MEWS) could identify low-risk-patient who might forgo overnight vital sign monitoring. They analysed electronic records of consecutive adult patients admitted to a university hospital (n=54 096). They calculated the MEWS score more closely to 11 pm and the number of night disruptions for vital signs monitoring between 11 pm and 6 am, and the incidence of ICU transfers for cardiac arrest during the next 24 h (11 pm to 11pm). They found that patients with lower MEWS score had the same number of night disruptions for vital signs monitoring than those patients with a higher score. Another observational study assessed the Standardised Early Warning Score (SEWS) used in the Royal infirmary of Edinburgh [24]. The study identified significant deficiencies in the overnight use of SEWS, and recommended the	

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
		implementation of SEWS education programs for nursing and medical staff.	
Choice of physiological track and trigger system			
50 – 03 What is the role of specific physiological track and trigger systems in identifying patients whose clinical condition is deteriorating or who are at risk of deterioration?(1.4)			
3-year surveillance (2010) No relevant evidence identified.	We identified three relevant systematic reviews through the surveillance process [17,27,28]. One systematic review evaluated the impact of EWS in different outcomes in patient admitted to general wards and in medical admission units [27]. The primary outcomes included were in-hospital mortality, patters of intensive care unit admission and length of hospital stay, cardiac arrest and other serious adverse events. Seven studies were included but a calculation of a combined effect was not possible due to heterogeneity of the results. The study's results were varied and in some areas conflicted. Some of studies found significant reduction of in-hospital mortality rates while others did not find any difference. Same conflicted results were found for cardiopulmonary arrests. ICU mortality and serious adverse events were not improved. The	Topic experts highlighted the following: **Please also see comments for question 50-02.** • Some advancement in early warning scoring systems such as the CART score but it would not change the recommendations. • Early warning scores are still very widely used in clinical practice in the UK. • Track and trigger systems has still yet to be standardised to a single consistent tool. Topic expert feedback included under question 50 – 02 is also relevant to this question and is related to the recommendation 1.4.	New evidence is consistent with guideline recommendations New evidence and topic expert' feedback suggest that there is some advancement in TTS assessment but more work need to be done. Current recommendations are for the use of multiple-parameter or aggregate weighted scoring systems and this is consistent with the new evidence found.

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
	authors concluded that EWS are good tools to recognise acutely ill patients. But there are many EWS, with different thresholds, and a general lack of good quality studies validating their use. Another systematic review assessed the effect of EWS or emergency response teams in the improvement of hospital survival of adults' patients [28]. They classified the included studies in: single parameter systems, aggregated weighted scoring systems (AWSS), medical emergency teams, and multidisciplinary outreach services. Overall, the evidence found was of poor quality. The AWSS seems to be more effective than single parameter systems. The team skills appear to be related to an effective response to deterioration. The last systematic review has been included under question 50-02 [17]. This review found that EWS can predict cardiac arrest and death within 48 hours but given the quality of the evidence, its impact on health outcomes and resource use still need to be determined.		

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
Physiological parameters to be used by track and trigger systems			
50 – 04 Physiological parameters to be used by track and trigger systems (1.5-1.6)			
3-year surveillance (2010) A total of seven studies were found to be relevant to this question [29-35]. Four were observational studies [29,30,33,35], two were narrative reviews [32,36] and one was a systematic review [31].The most dominant theme that emerged was the use of serum lactate as a marker [31,33-35]. An additional study examined the role of serum lactate and oxygen saturation [30]. One health technology assessment reported that the serum lactate measurement can be helpful in risk-stratification of critically ill patients, but more information is needed to determinate its routine use a resuscitation end point to improve outcomes [31]. A prospective study pointed out that admission lactate levels failed to show useful predictive accuracy for hospital deaths [33]. Another study carried out in medical and surgical IUCs considered how oxygen saturation and lactate concentration gradients from superior vena cava to pulmonary artery are associated with the survival of critically ill	No relevant evidence identified.	Recommendation 1.6 describes some examples of additional parameters which should be considered in specific clinical circumstances (for example, hourly urine output, biochemical analysis, pain assessment). NICE has a number of guidelines describing the management of diseases or conditions which also make recommendations about specific parameters that need to be measured in specific circumstances during the management of the disease. The assessment of parameters specific to certain conditions is covered in the relevant guideline: • Acute heart failure: diagnosing and managing acute heart failure in adults • Chest pain of recent onset: Assessment and diagnosis of recent onset chest pain or discomfort of suspected cardiac origin • Head injury: Triage, assessment, investigation and early management of head injury in children, young	No new evidence was identified that would affect recommendations. Evidence identified at the 3 year surveillance review was from observational studies that mainly focused on the role of serum lactate and oxygen saturation levels as tools for risk stratification. This new evidence was considered unlikely to impact on guideline recommendations. No relevant evidence was found in this 8yr surveillance review that could have an impact on the recommendations.

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
patients admitted to ICU. They used a central venous access to take blood samples. The results indicated that positive oxygen saturation and lactate concentration gradients were strongly associated with the survival of critically ill patients [30]. Another theme that emerged from the studies shortlisted included examination of varying parameters such as end tidal carbon dioxide monitoring, pulse oximetry, arterial blood pressure monitoring, among others [29] and issues around measurement of tissue hypoxia and oxygenation [32]. Overall, it was concluded that this area is emerging theme for research.		people and adults • Sickle cell acute painful episode: management of an acute painful sickle cell episode in hospital • Venous thromboembolism in adults admitted to hospital: reducing the risk	
Critical care outreach services for patients whose clinical condition is deteriorating			
50 – 05 Does a specific response strategy - provision of critical care outreach service - improve outcomes for patients identified as having a deteriorating clinical condition? (1.7-1.13)			
3-year surveillance (2010) A total of twenty six studies were included at the last surveillance review [6,37-61]. A systematic review and meta synthesis reported using intensive care liaison and outreach services as a bundled intervention for effective service provision.	A systematic review assessed the effect of EWS or emergency response teams in the improvement of hospital survival of adult patients [28]. A total of 22 studies assessing multidisciplinary outreach teams were included as a part of this review. Overall, the evidence found was	Topic experts highlighted the following: • CG50 may wish to place more emphasis on rapid response systems as preferred response to clinical deterioration. • Critical care outreach / medical	New evidence is consistent with guideline recommendations At the 3 yr surveillance review there was a lack of high quality evidence on effectiveness of outreach services. At the 8 yr surveillance review two

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
Four other studies on CCOS (critical care outreach services) including a Cochrane review maintained that there was a lack of evidence on effectiveness of outreach services and more RCTs needed to be done. The current evidence on CCOS did not seem to suggest a big impact on patients with critical care needs. The greatest number of studies (n=14) examined medical emergency teams (MET), including MET call criteria across various countries and found it to be effective, particularly in averting serious adverse outcomes such as cardiac arrests. Another study stated the limitations of MET implementation as it depends upon staff training, resources and communication to be vital. However, one of the reviews found the evidence for MET was too inadequate for it to be conclusively recommended.	of poor quality but supported a global approach of including TTS and teams with critical care competencies to improve outcome of acutely ill patients. The AWSS seems to be more effective than single parameter systems. The team skills appear to be related to an effective response to deterioration.	emergency teams still do not exist in all trusts. The topic experts also identified two studies relevant to this area [62,63]. One of the studies was a systematic review evaluating the effectiveness of rapid response systems (RRS) in acute care settings [63]. The results indicated that RRS were associated with reduced rates of cardiorespiratory arrest outside of the ICU and reduced mortality. The other study was an observational study [62] assessing the impact of the introduction of RRS on the incidence of in-hospital cardiopulmonary arrest (IHCA) and mortality. They included more than 9 million hospital admissions in 82 public acute hospitals in Australia. They observed a 42% increase in the RRS uptake between 2002 and 2009 with a decrease of 1.49 per 1000 admissions in IHCA (95% CI 1.30 to1.68) and 4.05 per 1000 admissions in mortality (95% CI 3.17 to 4.76). They concluded that the reduction of IHCA incidence rather than an improvement of the post cardiac arrest survival was the most important factor in the reduction of IHCA mortality.	systematic reviews were identified, one of those specifically assessing the effectiveness of RRS. Most of the evidence found in those studies was of low quality. Both reviews support the use of a specific intervention (medical emergency teams, multidisciplinary outreach services or rapid response teams) as an effective way to respond to clinical deterioration. CG50 does not recommend a specific service configuration as a response strategy for individuals identified as having a critical condition. But it states that the personnel need to have core competencies for acute illness and 'these competencies can be delivered by a variety of models at a local level, such as a critical care outreach team, a hospital-at-night team or a specialist trainee in an acute medical or surgical specialty' (recommendation 1.10). The evidence found is in the line with the guideline recommendations. A specific services configuration could not be recommended given the lack of high quality of evidence,

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
		Topic experts also identified an ongoing clinical study, METHOD2. This is an international prospective observational study aiming to develop a tool to allow benchmarking of rapid response teams The first survey was in 2012, but its results have not been published in a journal yet. The second survey is scheduled for February 2016. **Staff competencies, education and training** Topic expert feedback and references summarised under 50 – 01 regarding the need of staff education and training (recommendation 1.7), and clinical concern as a way to activate the response strategy for acutely ill patients (recommendation 1.8) are also relevant to this question. **Frequency of parameter monitoring** Comments and studies from topic experts about adequate observations and monitoring intervals included under 50 – 02 are also relevant to this section.	**Frequency of parameter monitoring** See 50 – 02.

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
Transfer of patients from critical care areas			
50 – 06 Does the timing of transfer of a patient from Critical Care Areas to general wards affect health outcomes?(1.14)			
3-year surveillance (2010) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations.
Care on the general ward following transfer			
50 – 07 What elements of care on the general ward are viewed as important by patients following discharge?(1.15-1.17)			
3-year surveillance (2010) No relevant evidence identified.	**Transferring from Critical Care Areas to general wards** A systematic review assessed the impact on different outcomes on the continuity, coordination, and transitions of care for patients with serious and advanced illness [64]. The study population and the setting of the included studies were not clearly described in the abstract, so it could not be entirely applicable to this CG. Overall, twenty-three prospective controlled studies were included. They assessed patient satisfaction, caregiver satisfaction, quality of life and health care use. A calculation of a combined effect was not possible due to heterogeneity of the results. Some of the studies included in this	Comments from topic experts' feedback and references summarised in 50 – 01 related to staff education and training are also relevant to this question (recommendation 1.17). Some other aspects of care on general wards are cover in the relevant guideline: • Medicines optimisation: the safe and effective use of medicines to enable the best possible outcomes. This NG 'aim[s] to understand the patient's experience, [to do an] evidence based choice of medicines, and ensure medicines use is as safe as possible, make medicines optimisation part of routine practice'. • Delirium: prevention, diagnosis and management. • Safe staffing for nursing in adult	New evidence is consistent with guideline recommendations **Transferring from Critical Care Areas to general wards** The evidence found is in line with the CG50 recommendations. CG50 recommends that the critical care transferring team and the ward team receiving the patient should share responsibility and assure that there is continuity in the patient care; it is supported by a care plan with a formal structure handover (recommendation 1.15). **Patient and caregivers' information** CG50 also recommends that the patient should be informed about their condition,

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
	systematic review found that providing continuity, coordination, and transition for patients with advance illness significantly improves patient and caregiver satisfaction compared to a control group. Similar results were found in the quality of life and health care utilisation. Another systematic review assessed the role of critical care transition programs in the reduction of the risk of ICU readmission or death in patients discharged from ICU. They compared these programs to standard care [65]. This systematic review included in their definition of critical care transition programs any RRT, medical emergency team, critical outreach team, or ICU nurse liaison program that provided follow-up for patients after ICU discharge. Nine before-after studies were included. These studies identified a significant reduction in the risk in the ICU readmission (risk ratio [RR] 0.87; 95% CI 0.76 to 0.99; I^2= 0%). There were no significant differences in the risk of hospital mortality between the interventions (RR 0.84; 95% CI 0.66 to 1.05; I^2=16%). A systematic review assessed risk	inpatient wards in acute hospitals • Patient experience in adult NHS services: improving the experience of care for people using adult NHS services. • Care of dying adults: it is an ongoing CG that will be published soon.	and a shared decision process need to be encouraged (recommendation 1.16). **Staff competencies education and training.** Evidence related to staff education and training was discussed under question 50 – 01.

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
	stratification tools to identify patients with high-risk of adverse events after ICU discharge. This systematic review identified eight observational studies in this field [66]. The primary outcomes reported were ICU readmission, hospital mortality, and both readmissions and hospital mortality. The range of AUROC of the tools included was from 0.66 to 0.92. Only one study compared two different tools. The authors concluded more research is needed in this arena. Although this systematic review is not directly related to this question, it highlights the lack of evidence in the risk-assessment tools to identify patients at risk of adverse events after the ICU discharge. The last systematic review evaluated the effectiveness of interventions to improve safety and efficiency of patient discharge from ICU to general wards [67]. The SR included eleven studies, six of them showed important effects of the interventions in the reduction of the discharge delay, and adverse events. The interventions included liaison nurses to improve coordination and discharge information. For other resource use		

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
	outcomes (for example, length of stay), the results were inconsistent, and no differences were found in the reduction of mortality between the interventions. Again, the authors highlighted the lack of good quality evidence in this field. **Patient and caregivers' information** A systematic review assessed the efficacy of information interventions on reducing anxiety in patients (and careers) discharged from critical settings to general wards [68]. They included only RCTs that used the Validated State Trait Anxiety Inventory to measure anxiety. Five studies were included. Interventions procuring information to family members significantly reduced their transfer anxiety compared to standard care (Odds Ratio [OR] 1.70; 95% IC 1.15 to 2.52). Only one of the studies included, showed a significant reduction in patients' anxiety. Another systematic review assessed decision aids and other exportable tools to promote share decision making in patients with serious illness [69]. This systematic review included randomised and non-randomised control trials that		

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
	tested tools for advance care planning or decisions aids for patients with serious illness. Seventeen RCTs were found; almost all were of moderated to high quality. The decision tools improved the patient knowledge and awareness of treatment choices. The authors concluded that decisions aids are tools that can be used by clinicians to help them in the shared decision making process but more research is needed.		
50 – 08 What interventions can be delivered to patients on general wards following discharge from Critical Care Areas to improve health outcomes? (1.15-1.17)			
3-year surveillance (2010) No relevant evidence identified.	See 50 – 07.	None identified relevant to this question.	New evidence is consistent with guideline recommendations (See 50 – 07).
Research recommendations			
RR – 01 What is the clinical effectiveness and cost effectiveness of automated (electronic) monitoring systems compared with manual recording systems in identifying people at risk of clinical deterioration in general hospital ward settings?			
3-year surveillance (2010) No relevant evidence identified.	We identified two observational studies [70,71] and one RCT related to this research recommendation [72]. The first observational study described the development of a MEWS based on electronical records to improve patient safety in one institution [70]. The second observational was a before –	Topic experts noted: • Electronic observations have advanced significantly and are becoming widely used but it is unlikely there is strong evidence to support their practice. • Increased use of electronic systems for recording observations has	New evidence is unlikely to impact on guideline recommendations. Evidence suggests that EPSS could improve EWS accuracy and reduce adverse outcomes in patient. But there is a lack of high quality evidence to support this conclusion. There is an ongoing trial developed by the University of

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
	after study. The aim of the study was to assess an electronic automated advisory vital sign monitor to assist the monitoring of vital signs and the calculation of EWS scores [71]. The intervention was accompanied by RRT. The intervention was associated with: 1) a rise of RRT calls triggered by respiratory criteria, 2) an increase in survival of those patients that received RRT support, and 3) a decrease in the time required to measure and record vital signs. The last study was an RCT which assessed the effectiveness of real-time alerts sent to RRT compared to control (hidden alerts) in the improvement of patient care [72]. A total of 571 patient admitted to 8 medicine units were included in the study. The main outcomes were number of transfers to ICU, hospital mortality, and hospital length of stay. Real –time alerts did not improve patient outcomes (ICU transfers, hospital mortality or need for subsequent long term care) compared to control. A modest reduction in the length of stay was observed.	probably improved reliability and scoring but not necessarily recognition. • There are inevitably significant costs associated with the introduction of new technologies. • There are new technologies but it may not be affordable by the majority of the NHS trusts. **Effects of introducing a physiological track and trigger system + Electronic physiological surveillance systems (intervention):** Topic experts identified one observational study (described as a pragmatic, retrospective, observational study) which assessed an electronic physiological surveillance system (EPSS) in two acute general hospitals in England [36]. They concluded that the use of the technology improved the accuracy, reliability and availability of patients' vital signs and EWS scores and was associated with a reduction of the mortality in the study.	Nottingham Human Factor Research Group and the Horizon Digital Economy Research Institute testing the introduction of some technology in this field. Therefore, the results of this trial could address this research recommendation in the future. The progress of this trial will be evaluated at the next surveillance review.

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
RR – 02 What are the sensitivities and specificities of track and trigger systems in different clinical settings?			
3-year surveillance (2010) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations.
RR – 03 Can track and trigger systems that have higher sensitivities and specificities than existing scores be developed and validated?			
3-year surveillance (2010) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations.
RR – 04 What is the clinical and cost effectiveness of a structured educational programme to improve recognition of and response to acute illness compared with no structured programme in improving outcomes for people who clinically deteriorate in general hospital ward settings?			
3-year surveillance (2010) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations.
RR – 05 What is the clinical and cost effectiveness of CCOS compared with usual care or educational outreach in improving health outcomes for patients who clinically deteriorate in general hospital ward settings?			
3-year surveillance (2010) No relevant evidence identified.	No relevant evidence identified.	The topic experts identified one study [73] which was a cost analysis of an RRS on a surgical ward. They tested the hypothesis that admitting less severely ill patients to the UCI reduced costs. They found that the cost of the extra unplanned UCI days was high but RRS costs were low. The results indicated that if less severely ill patients are admitted to ICU, the cost of unplanned ICU days could be reduced. Based on these results they	No new evidence was identified that would affect recommendations. The evidence identified is not a full economic evaluation, could have very serious methodological limitations and it is not directly applicable to the UK context (EU-Netherlands).

Summary of evidence from previous surveillance	Summary of new evidence from 8-year surveillance	Summary of new intelligence from 8-year surveillance	Impact
		recommended an earlier referral to ICU in this hospital.	
RR – 06 What is the clinical and cost effectiveness of providing structured educational advice (such as an information booklet) compared with usual care to patients who have been transferred from critical care areas back to general hospital ward settings?			
3-year surveillance (2010) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations.
RR – 07 What is the clinical and cost effectiveness of a transfer facilitator for patients transferred from critical care to a general ward environment?			
3-year surveillance (2010) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations.

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