TABLE 1 Alder Hey post-implementation system strengths and weaknesses identified by the PUMA team

Strengths	Weaknesses
Detect *Changed*	
• Senior nursing staff trained in advanced care techniques; all nursing staff trained in NICE sepsis screening • New ward-level initiatives designed to improve families' understanding of the ward and their child's families (e.g. by improving orientation to the ward after an episode of HDU/PICU care) • Families consider the care they/their child receives, and everyday communication with ward staff to be excellent • PTTT/MEDITECH-6 system has become normalised; work of using the system has become routine • PTTT/MEDITECH-6 system improved to incorporate sepsis-specific information • Information technology infrastructure/access to computers has improved; easier and quicker for nurses to input patient observations data • Cardiac-specific deterioration policy introduced. Policy formalises appropriate response to PTTT scores and key vital signs observations and provides detail on exact escalation pathway for cardiac patients	• Electronic PTTT: prevents quick overview of historical patient observations (patterns and trends) • Electronic PTTT: patient observations data recorded informally before being transferred to electronic system, at risk of being lost/corrupted • Built environment: layout disrupts previously routine/normalised practices; impedes regular informal communication, prevents quick/easy visual review of patients, reduces space available for patients/families to meet and interact • Staff busy/large workload: little 'extra' time to spend with patients/family, early signs of deterioration may be missed • No formalised method to enable families to communicate concerns • Routine vital signs monitoring work de-prioritised/delayed at times, to protect needs/privacy of patients and family • Alarms frequently ignored/silenced by staff • Senior staff nurse frequently pulled away from AM ward round; busy time, multiple competing concerns (queries from staff nurses, patient transfers, care of sickest children)
Unchanged	
• Nursing staff possess high level of expertise and specialist clinical knowledge • Nursing staff possess high level of patient-specific knowledge/situational awareness • Nursing staff consistently use professional judgement alongside formalised observation/monitoring practices • Nurses adopt creative, adaptive approach to technological constraints/challenges: expert in utilising multiple, diverse technologies, calibrating and adapting to needs of complex environment • Staff engage in conversation with family about patient's condition and typical baseline; information is valued and prioritised • PTTT includes 'parental concern' in score; staff actively listen and respond to family concern • Staff are approachable, operate 'open-door' policy • Vital signs monitoring equipment consistently available and functioning	
Plan *Changed*	
New safety huddle: information on current ward status and clinical status of most unwell patients routinely and consistently communicated throughout nursing team	• Some medical routines (e.g. ward round) consistently exclude nursing staff • Co-ordinator has patient case load; negative impact on workload • Built environment prevents easy location of/communication with co-ordinator

continued

TABLE 1 Alder Hey post-implementation system strengths and weaknesses identified by the PUMA team (*continued*)

Strengths	Weaknesses
Unchanged	
• Clear communication: staff communicate effectively across professional groups, with families/parents and with external wards/organisations • Consistent availability of medical expertise: cardiology team consistently/frequently present on the ward • Detailed senior staff nurse–senior staff nurse handover enables sharing of ward- and patient-level situational awareness among senior nursing team; helps enable effective nurse workforce planning • Nurse handover comprehensive/detailed, printed information easily shared	
Act *Changed*	
• Cardiac-specific escalation policy clarifies roles and responsibilities; enables co-ordinator/nurse in charge to escalate directly to senior medical review • The SBAR tool bundled with escalation policy; structured style of communication reported to be routine • Increased band-6 nursing staff employed on the ward: 24/7 co-ordinator/nurse in charge cover • Improved interteam communication. Consistent senior staff nurse cover provides mechanism for expressing concerns/escalating across hierarchical boundaries • Out-of-hours working SOP designed to alleviate medial workload/increase availability during nights and weekends	None identified
Unchanged	
• Interteam communication: everyday nurse–medic working relationships are good • Trust-level C40 PEWS policy clearly defines escalation and response procedures, as well as staff roles and responsibilities	

TABLE 2 Arrowe Park post-implementation system strengths and weaknesses identified by the PUMA team

Strengths	Weaknesses
Detect *Changed*	
Medical staff are now able to access patient observations remotely	• Changes in staff and increased use of agency staff means that new and junior staff are often unfamiliar with where to direct their concern • More work needed to look at patient's trend on the electronic system. This impedes pattern recognition and can make it more difficult to exercise professional judgement • The ability to quickly refer to the front of the paper observation chart to confirm what vital signs need to be taken for a certain patient has been lost, which has meant that some more junior staff struggled to remember precisely what needed to be observed • Batching of patient vital signs is now common • Lack of computers an issue, particularly during busy periods such as ward round

TABLE 2 Arrowe Park post-implementation system strengths and weaknesses identified by the PUMA team (*continued*)

Strengths	Weaknesses
Unchanged	
• Staff confident to raise any concerns that they might have. There is usually a doctor present on the ward, which facilitates this • There is a strong culture of supporting newly qualified and junior staff • Continuity of care is ensured whenever possible • Families are still routinely involved in defining baselines and to assist with identifying any changes • All staff emphasise their family-centred approach to care • Nurses are easily visible on the ward and approachable • All staff encouraged to carry out a new set of observations at the start of every shift • Nursing staff confident to adjust observation frequency as needed • Monitoring equipment mostly available	• Family concern not part of PTTT • Judgements about certain families made • Not all family concern is recognised and acted on • No formal guidance to family about how to escalate care • Instances of families escalating to the consultant when they felt their concerns were not listened to • Staff concern not an item on the PEWS • Doctors still not determining frequency of observations, despite this being a requirement
Plan *Changed*	
• Using the SBAR tool for nursing handover has made handover more efficient • Post-ward round meeting usually attended by a senior nurse • Introduction of the morning safety huddle ensures that all staff working on the ward have awareness of at-risk patients • Safety huddle has changed language on the ward – 'watcher' is now more routinely used • Doctors are now able to access patient notes remotely • Inclusion of all patients on medical handover sheet	• Nurse in charge now less likely to attend doctors' handover • Increased staffing pressures and reliance on external agency staff affect the ward when a patient is admitted to the HDU
Unchanged	
• Large effort to ensure continuity of care • Patient allocation after handover ensures awareness of all patients for nurses • Nurse in charge very proactive – frequent 'check-ins' with rest of the staff and strong awareness of activity on the ward • Regular telephone calls/conversations throughout the day between senior nurses and doctors • One lead consultant on each shift – continuity of care • Patients at risk placed closer to nursing station	• Nurse in charge may be a band-5 nurse 'acting up', particularly on weekends and night shifts • Nurse in charge has a case load • Doctors' handover takes place off the ward during the evening • Doctors can be difficult to locate at times when needed
Act *Changed*	
Clear and succinct handovers, facilitated by the SBAR tool	• Ability to quickly refer to the escalation policy has been lost with the introduction of electronic recording equipment • Agency staff more likely to be unfamiliar with responsibilities around escalation
Unchanged	
• Staff trust own clinical judgments and feel confident to escalate when needed • Strong supportive environment on the ward • Generally good open communication across hierarchies • Whiteboard clearly shows where patients are located and allocated nurse	• Families not always made aware of how to escalate concerns • Some difficulty with escalating for non-general patients • Some tensions, especially during evenings when doctors are less available to review

TABLE 3 Noah's Ark post-implementation system strengths and weaknesses identified by the PUMA team

<table>
<tr><th>Strengths</th><th>Weaknesses</th></tr>
<tr><td colspan="2">Detect
Changed</td></tr>
<tr><td>• Improvements to availability of monitoring equipment
• Embargo on use of external agency staff – use of own bank staff now routine</td><td></td></tr>
<tr><td colspan="2">Unchanged</td></tr>
<tr><td>• Close relationship with families. Families encouraged to establish 'normal' baseline
• Families supported to stay at all times
• Families regarded as expert if patients had chronic conditions and were actively involved in monitoring activities
• Family concern highlighted during handover
• Families encouraged to come find staff if they have concerns
• Continuity of nursing care
• Nurses use clinical judgement to make holistic assessment of child's status
• Minimum frequency of observations well known; confidence to tailor to needs</td><td>• No reference sources on normal parameters
• Not all nurses skilled in monitoring
• Judgments made about families and their concerns, which can affect the support provided
• Buzzers not always highlighted to families
• No written information on family involvement and how to raise concerns
• Difficult for families to find nurses on the ward because of layout
• Non-compliance with observation policy when balancing other considerations
• Ward layout makes access to equipment difficult
• Patient folders not always available outside patient room so delays between monitoring and recording activity</td></tr>
<tr><td colspan="2">Plan
Changed</td></tr>
<tr><td>• Shared situational awareness of children at risk between nursing and medical staff as a result of the implementation of the 4Ss whiteboard
• Children at risk now routinely identified at the start of the medical handover
• Nursing handover divided into two sections to ensure optimum concentration on patients
• Safety briefing information written on whiteboard in the nurses' staff room, as well as verbally relayed, which gives the opportunity to refer to as needed</td><td>• Ward-level situational awareness of all patients reduced as nursing handover split into two</td></tr>
<tr><td colspan="2">Unchanged</td></tr>
<tr><td>• Regular face-to-face handovers for both nursing and medical teams
• Nurses' safety briefing highlighting patients at risk
• Nurses receive handover on all patients and have situational awareness of whole ward
• Staff and family concerns highlighted during handover
• Observations included in handover
• Nursing handover takes place at patient room allowing visual assessment
• Nurses usually allocated same patients to ensure continuity of care
• Nurse in charge has good overview of ward
• Highly experienced ward manager
• Whiteboard clearly displays key information</td><td>• Challenges of working with remote paediatric and adult specialists</td></tr>
<tr><td colspan="2">Act
Changed</td></tr>
<tr><td>• Implementation of formal escalation policy
• Changes in threshold for acceptance at HDU and PICU meant that staff felt more confident in their concerns being escalated</td><td>• Communication more difficult when doctors not present on the ward
• Challenges for junior nurses getting doctors to act on concerns, particularly at night and out of hours
• Challenges in communicating with multiple specialist doctors</td></tr>
</table>

TABLE 3 Noah's Ark post-implementation system strengths and weaknesses identified by the PUMA team (*continued*)

Strengths	Weaknesses
Unchanged	
• Decision-making support within the nursing team • Most staff confident to escalate when needed • Senior staff highlight to junior staff when they have concerns, to make sure they look out for signs • Mutual respect across professional/hierarchical boundaries	

TABLE 4 Morriston post-implementation system strengths and weaknesses identified by the PUMA team

Strengths	Weaknesses
Detect *Changed*	
• Appropriate equipment available and functioning • Laminated copy of RCN observation and escalation guidelines included in every patient file • Staff have easy access to normal/abnormal thresholds – staff use cards • New colour-coded observation chart indicating normal vital signs thresholds • Same observation chart used in medical and surgical wards and PAU • Change in storage and management of patient information improved access to observation charts • Staff understand roles and responsibilities in relation to detection • Nurses encouraged to understand normal parameters for each child and to share concerns • Nurses encourage parents to ask for help if child's status changed • Nurse involves parents in defining normal physiological parameters for their child • Doctors and nurses regularly seek parents' views on their child's status	• Not clear if staff awareness of policy has improved • Some doctors need to be reminded to return patient notes to treatment room
Unchanged	
	• Fewer staff available at night and during weekends making it difficult to conduct observations
Plan *Changed*	
• 5Ss (safeguarding, same name, bed status, sick children and staffing) covered at every handover • At-risk children consistently designated a watcher status at board round • Whiteboard regularly updated • New acuity tool for nurse facilitates identification of 'watchers'	
Unchanged	
	• Nurse in charge often has full patient load

continued

TABLE 4 Morriston post-implementation system strengths and weaknesses identified by the PUMA team (*continued*)

Strengths	Weaknesses
Act	
Changed	
• Patients moved to HDU more quickly when risk of deterioration is present	• Little evidence of increased awareness of escalation policy
Unchanged	
• Nurses confident to seek senior medical review if required • Strong informal support between senior and junior nurses	