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

Strengths	Weaknesses
Detect	
• High level of specialist nursing expertise • Nurses possess excellent patient-specific knowledge • Nursing staff consistently use professional judgement alongside formalised observations • Nurses skilled in working with and around technologies to achieve good observations • PTTT includes 'nurse concern' in the score • Family involvement in establishing baseline information • 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	• Electronic recording system disruptive of normal routines • Electronic recording system prevents quick overview of vital signs trends • Electronic recording system data entry time-consuming • Separation of monitoring and recording activity because of lack of portable computers • Parameters for cardiac patients not routinely adjusted; alarms have lost meaning • Ward layout inhibits routine surveillance of children • No formalised method to enable families to communicate concerns
Plan	
• Nurses have good situational awareness of the area they work in • Ward-/organisational-level situational awareness in shift co-ordinator • Variable family involvement through ward round • High level of medical presence on the ward during the day • Pre-populated detailed nurse handover sheet • Medical handover sheet is detailed	• Separate nursing and medical handovers • Inconsistent ward round format excluded nursing staff and sometimes families • No ward-level situational awareness among whole nursing team • No face-to-face communication between nursing shifts; quality of audio variable • Electronic whiteboards infrequently used • Co-ordinator has patient case load; negative impact on workload • Built environment prevents easy location and communication between staff
Act	
• Good intra- and interprofessional working relationships • Trust-level policy clearly defines escalation and response procedures, as well as staff roles and responsibilities	• Doctors difficult to contact, particularly during the evening/night shifts • Junior nurses have difficulty getting doctors to act on concerns • Not all doctors recognise nurse knowledge of individual patients and professional judgements

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

Strengths	Weaknesses
Detect	
• Nurses have high awareness and adherence to the minimum frequency of observation • Importance of clinical judgement highlighted on the observation chart • Nurses used professional judgement – knowing the patient was highly valued • Monitoring system works across organisation from patient admitted on PAU to admission on ward • Core vital signs to be taken clearly displayed on PEWS chart • Observations carried out regularly on ward • Observations generally recorded on chart concurrently with monitoring • Normal parameters included on observation charts • Roles and responsibilities around monitoring clearly understood and appropriate work allocated depending on experience	• Staff concern does not have a value in the PTTT score • Frequency to be determined by doctors regularly not set, requiring nursing staff to determine frequency of observations • Ward layout and individual rooms can make routine surveillance difficult • Family concern not scored on PTTT • Staff unaware of exact details of their observation and monitoring policy • Sometimes time delay in doing observations owing to competing demands • Lack of computers can make the transfer to new electronic system difficult • Laptops carried around to help (i.e. with medication rounds)

continued

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

Strengths	Weaknesses
• Strong supportive culture – junior staff supported and taught by more senior staff • Senior staff endorse always taking new set of observations when doing something new • Equipment to take observations largely available • Family involvement strong: on admission, staff go to meet families and staff inform them about use of buzzers and to come out to find them if concerned • Families often come to desk to find staff • Parents help to establish baseline • High visibility of nursing and medical staff on the ward • Continuity of care ensured whenever possible • Monitoring equipment is reserved for the sickest children, allowing some continuous monitoring • All staff encouraged to carry out a new set of observations at the start of every shift	
Plan	
• Large effort to ensure continuity of care • Opportunity to discuss patients in nursing handover • Nurse regularly present during ward round • One lead consultant for each shift – continuity of care • High visibility of medical staff on the ward • Whiteboard shows name of patients' allocated nurse for that day and kept updated • Nurse in charge very proactive – frequent 'check-ins' with rest of the staff and strong awareness of activity on the ward • Nurse in charge using colour coding on chart to categorise patients at risk of deterioration • Patients at risk placed closer to nursing station	• Unstructured nursing handover can mean key details are missed • Separate nursing handovers for two different areas of ward. Nurse in charge attends one and gets an informal handover from other team • Non-medical patients not handed over in the medical team • Not always able to do continuity of care because of skill mix of staff (intravenous drugs, etc.) • Nurses handover sheets are not pre populated with key information • Nurse in charge may be a band-5 nurse 'stepping up' • 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 • Staffing pressures on nursing team when decide to admit to HDU
Act	
• Clear guidance on escalation procedures on the front of each PEWS chart • Escalation procedures run across PAU and ward • Staff confident to raise concerns to doctors, facilitated by medical staff being easily accessible on the ward/good relationships • Staff trust own clinical judgments and feel confident to escalate when needed • Communication between professional groups generally good • Whiteboard clearly shows where patients are located and allocated nurse • Families encouraged to use buzzer and to raise concerns • Parents report confidence in escalating concerns	• Hard for staff to access policy document • Staff concern not included in PTTT score • Family concern not included in PTTT score • No formal guidance to family about how to escalate care and not always made aware of how to escalate concerns • Some families' concerns not taken seriously and described as overanxious parents • Some lack of awareness from agency staff and student nurses of exact escalation procedures • Escalation can be more difficult in evenings when doctors are based in the PAU • Some difficulties in escalating for non-medical patients when responsible doctor is based in adult services • Some tensions, especially during evenings when doctors less available to review

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

Strengths	Weaknesses
Detect	
• Awareness of observation policy • Close relationship with families • Continuity of nursing care • Nurses use clinical judgement to make holistic assessment of child's status • Talking to parents to establish 'normal' baseline • Staff involve families in monitoring activity and teach appropriate skills • Family concern highlighted during handover • Families told to come find staff if they have concerns • Parents supported to stay at all times • Minimum frequency of observations, tailored to needs • Equipment available for continuous monitoring in some rooms	• High levels of external agency staff • 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 • Low level of availability and function of equipment (thermometers/computers) • Some malfunctioning equipment (thermometers) • Ward layout makes access to equipment difficult • Patient folders not always available outside patient room so delays between monitoring and recording activity
Plan	
• Regular face-to-face handovers for both nursing and medical teams • Nurses' safety briefing highlighting patients at risk • No systematic method of identifying sick children in the medical handover • 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	• Whiteboard not always up to date and sick children not consistently identified • Fragmented situational awareness between nursing and medical teams • Lack of shared situational awareness between nursing and medical teams • Challenges of working with remote paediatric and adult specialists
Act	
• 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	• Communication more difficult when doctors not present on the ward • Challenges for junior nurses getting doctors to act on concerns, particular at night and out of hours • Challenges in communicating with multiple specialist doctors

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

Strengths	Weaknesses
Detect	
• All children have vital signs monitored every 4 hours, unless otherwise directed by doctor • Additional clinical observations communicated at handover and recorded on whiteboard in treatment room • Staff understand roles and responsibilities in relation to detection • Nurses encouraged to understand normal parameters for each child and 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	• Staff do not explicitly refer to or orient work around observation policy • Appropriate equipment not always functioning and/or available • Heart/pulse rate not checked manually • Fewer staff available at night and during weekends, making it difficult to conduct observations • Different observation charts used in ward and PAU, which undermined monitoring continuity • No visual reminder on chart to indicate whether or not the plotted observation readings were in normal parameters • No system in place for storing charts – sometimes difficult to locate • Observations sometimes recorded on pieces of paper before being recorded on chart, leading to delays in interpretation of trends
Plan	
• Medical handovers occur with explicit purpose of identifying children of most concern • Nurse in charge attends medical board round • Children at risk of deterioration moved closer to nursing station • Information reviewed and updated on whiteboard	• Complex shift system, making communication and continuity of care more challenging • Nurses unable to attend ward rounds • Whiteboard not always kept up to date when ward busy
Act	
• Escalation policy based on RCN guidelines • Nurses confident to seek senior medical review if required • Strong informal support between senior and junior nurses • Doctors often present on ward or in attached HDU, making communication easier • Systems in place for reviewing mortality and critical events	• No standardised score or trigger that prompted action • Low awareness of escalation policy