

## Appendix 6

### **Behaviour Change Interventions and Implementation Strategies**

Introduction of the bundles was supported by active engagement of staff, educational programmes, measurement and feedback of outcomes, organisational change and later by the introduction of the Scottish Patient Safety Programme<sup>19</sup> (SPSP) and measurement of insertion bundle processes.

#### Staff Engagement:

We publicised the interventions. Presentations were made at Hospital and Anaesthetic Department Meetings and a regional Intensive Care meeting. Patient stories were told and harm described. The other 6 Intensive Care Consultants and also Anaesthetic Consultants working outwith ICU were engaged and there was open discussion and debate around the evidence base and bundles and sometimes modification of proposals to resolve areas of debate. Some staff members found it difficult to see the area of skin which had been prepared with 2% chlorhexidine / 70% isopropyl alcohol. We agreed that they could use betadine (povidone iodine) initially to colour the skin, followed by the chlorhexidine in alcohol solution before then allowing the site to dry. There was debate with two Consultant Clinicians about the requirement and benefit of using a full aseptic technique for insertion. This was resolved after sharing the evidence on this subject<sup>18</sup>. During 2007 the group met regularly and liaised closely with members of the local Infection Control Team and also representatives of Health Protection Scotland (a national organisation with an interest in infection control).

#### Education

A self guided education programme was developed that included information on the insertion and maintenance bundles, the pathogenesis, recognition and consequences of CRBSI. Trainee doctors were asked to complete this and perform 3 supervised CVC insertions before working alone and to perform and pass a brief “test” involving simple questions relating to the education. A record of names and completion was kept. Training of the nursing staff occurred in the same way with regular updates, presentations and tutorials. Quarterly compulsory education as part of ongoing nurse development programmes (groups of 9-18 from a pool of 64 staff) covered rates of infections and preventative behaviours (insertion and maintenance bundles). We used transient informal methods (discussion and visual displays) and lasting visual information (in form of statistical process control charts) displayed within the ICU. In late 2008 we commenced a requirement for nursing staff to complete the self guided education slide show and test. By May 2009 47 of 60 nurses had successfully completed the training and test.

#### Organisation

CVC insertion checklist prompt stickers were made easily available on the ward. KE (the infection surveillance and quality improvement nurse) initially provided a daytime presence on the unit and prompted medical and nursing staff at the bedside during CVC insertion to follow the insertion bundle as specified and to use the insertion checklist sticker. Staff placed the checklist into the medical notes at the end of the procedure as a record of insertion. We audited handwashing behaviours prior to handling the CVCs and reported results to staff. CVC insertion trays and storage racks were organised to ensure

that the necessary equipment for catheter was insertion easy to locate. Chlorhexidine (2% chlorhexidine gluconate / 70% isopropyl alcohol) was applied using a ChlorPrep stick. Default catheters were non impregnated four or five lumen CVCs (Arrow-Howes: Arrow International) which were dressed with IV 3000 semipermeable transparent dressing (Smith and Nephew).

### Scottish Patient Safety Programme

In March 2008 the Scottish Patient Safety Programme (SPSP) <sup>19</sup> was launched in our ICU and the final 16 months of the study were performed in the context of this national improvement programme using a breakthrough collaborative model <sup>20</sup>. The programme involved a number of resources including national learning sets and meetings, leadership engagement, access to content and improvement experts, telephone calls, coaching, support with collection and interpretation of data and goals including the reduction of CRBSI as defined by either more than 300 days between episodes or zero incidence. The programme had the overt support of the Scottish Government and significant positive implications for leadership, administrative support, prioritisation and infrastructure.

### Insertion Process Reliability

Full aseptic technique, use of chlorhexidine skin preparation and avoidance of femoral site were quickly accepted and adopted as routine behaviours during 2007 and early 2008. Placing the self adhesive “insertion checklist” in the patient record occurred frequently but not every time. Despite two attempts we had been unsuccessful in setting up a system for measurement of insertion bundle reliability until March 2008 (the launch of SPSP). We had been unable to gain agreement for an individual or group to agree to collecting process measurements over the 24hour 7days cycle of ICU work. We were unable to agree a format for data collection that ensured both clinicians and potential data analysts were supportive and we had difficulties with the cultural concept that data collection be embedded as part of routine work. The SPSP highlighted reduction in CRBSI as a goal and expressly supported process measurement, which was also supported by the Scottish Intensive Care Society Audit Group who added new fields to Ward Watcher (Scottish ICU computer database) to support this. We commenced process measurement against the 4 elements of the insertion bundle.

Any patient who had had a CVC inserted in the preceding 24hrs had the case notes inspected by the patient’s nurse for evidence of performance of each element of the bundle which was then recorded. Lack of the “insertion bundle checklist sticker” in the medical notes was taken as evidence that the checklist had not been used. In these cases the evidence for the other elements of the bundle (full aseptic technique, chlorhexidine skin preparation and avoidance of femoral insertion site) was taken from the medical record in the clinical notes. The prompt for the case note inspection came from the Charge Nurse responsible for the shift and the necessity to complete a daily central line insertion bundle as part of the routine data entry into “Ward Watcher”. Reliability was in this sense self reported as entered in the case notes by the operator but actually recorded by a third party (namely the bedside nurse). Process measurements were thus taken from clinician entries in the case notes and we did not seek to further enhance validity of the process measurement. Process reliability was recorded in an “all or nothing” manner for each patient episode; that is, there had to be documentation of use of all 4 elements of the

insertion bundle to be recorded as compliant or reliable. Local exclusions included the following; use of the femoral site if there was a clear clinical contraindication to use of the subclavian or internal jugular sites, use of chlorhexidine if the patient was allergic or hypersensitive to it. Daily data entry into Ward Watcher was already routine in our unit and the difference was the addition of the requirement to complete an additional field. Full completion of the daily CVC insertion data is a mandatory field when it comes to discharging patients from the system at the end of their stay in ICU. We did not perform any other actions to ensure a complete dataset.

When we commenced measuring process reliability was recorded at 80% reliability. We sought to better understand reasons for incomplete process reliability and found that the single cause for non compliance was failure to have placed the “checklist” in the notes. Further enquiry established that this was associated with occasional night time placement of CVCs by medical staff who had multiple competing priorities and who were not always completely familiar with the process. We noted that the checklists were stored in a filing cabinet away from the bed spaces. In November and December 2008 we started testing then introduced the use of a self contained CVC insertion pack that contained nearly every piece of essential equipment and also included a self adhesive checklist within the pack with the aim of making it easier for health care workers to “do the right thing”. In March 2009 a team of three nurses was formed to take more ownership of the CVC maintenance and insertion bundles and greater scrutiny of process reliability was commenced that included root cause analysis when process reliability was incomplete and reasons for failure addressed. If a clinician had not performed all elements of the bundle a discussion was undertaken to gain greater understanding and ascertain why. Insertion bundle reliability was communicated to staff at regular meetings and results displayed in the unit.