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Introduction

In May 2006 the National Leadership and Innovation Agency for Healthcare (NLIAH) launched the Welsh Critical Care Improvement Programme (WCCIP).

The twin aims of the programme are firstly, the improvement in quality of critical care provision throughout Wales by the implementation of the Ventilator and Central Line Care Bundles and secondly, the promotion and evaluation of a collaborative methodology as a means of fulfilling the NLIAH organisational development aims of spreading change methodologies throughout Wales. This paper evaluates the progress of this programme at its midterm point.

Background

Patients receiving critical care are at risk of infection associated with prolonged ventilation and central line dwell time. There are significant costs associated with this risk both in financial and quality of care terms.

It has been suggested that by combining a number of evidence based interventions in a ‘care bundle’ and administering these interventions to every critical care patient on every day of their stay, these risks to the patient may be significantly lowered (Berenholtz et al, 2002)\(^1\).

Care bundles have been advocated by the Institute for Health Improvement and Centre for Disease Control in the US and have been promoted by the Modernisation Agency and Department of Health in the UK as one of the ‘High Impact Changes’.

The level one evidence supporting the Ventilator and Central Line Bundles was widely accepted by Welsh clinicians but although care bundles were in place in some critical care areas in Wales, there was no uniformity of definition or measure of application; this programme has worked towards standardisation of this otherwise disparate approach.

Goals and measurable outcomes

Making a direct impact on patient care
The two goals of WCCIP were used to form two phases to the programme. Compliance rates with each of the goals are being measured daily and analysed on a monthly basis to ensure changes are sustained from phase one to phase two. These two phases were:

Phase/Goal: to agree and implement nationally the Welsh Ventilator Care Bundle
The programme was launched in May 2006 at an event which was attended by approximately 80 delegates representing medical, nursing and managerial workforces of every critical care unit in Wales.
An ‘All Wales’ definition of the Ventilator Care Bundle was agreed following extensive consultation and debate at this event. All fourteen critical care sites across Wales have adopted and implemented the Ventilator Care Bundle.

■ Measurable outcome: Compliance rates
The programme has set a target of compliance of above 95% on a consistent basis. Compliance rates for the majority of Trusts for the Ventilator Care Bundle are consistently greater than 95% (figure 1-4).

Phase/Goal: to agree and implement nationally the Central Line Care Bundles
A learning event was held in July at which all fourteen critical care sites and Velindre Cancer Centre were represented. An ‘All Wales’ definition of the Central Line Insertion and Maintenance Bundles were agreed following extensive consultation and debate. These bundles have now been implemented across all sites.

■ Measurable outcome: Compliance rates
The programme has set a target of compliance of above 95% on a consistent basis. Compliance rates for those sites posting their data on the WCCIP database are consistently greater than 95% (figure 1-4).

Eight sites have implemented or are in the process of implementing the bundle but were not posting data in September 2006. It is anticipated that these sites will begin posting data shortly.
Figures 1 – 4: Bundle Compliance Rates by Trust, June to September 2006

**Figure 1: June 2006 Compliance Rates**

- Bro Morgannwg
- Bronglais
- Carmarthenshire
- Galw Camp
- Llandough
- Neath Hal
- NEW
- NWW
- Royal Glamorgan
- Royal Gwent
- Swansea
- Prince Charles
- UHW
- Velindre
- Withybush

Percentage

- Ventilator Bundle
- CVC Bundle

**Figure 2: July 2006 Compliance Rates**

- Bro Morgannwg
- Bronglais
- Carmarthenshire
- Galw Camp
- Llandough
- Neath Hal
- NEW
- NWW
- Royal Glamorgan
- Royal Gwent
- Swansea
- Prince Charles
- UHW
- Velindre
- Withybush

Percentage

- Ventilator Bundle
- CVC Bundle
Figure 3: August Compliance Rates

Figure 4: September Compliance Rates
The implementation of care bundles has enabled practice to be challenged and systems of care to be evaluated locally. Improvements in care processes have been reported and steps have been taken towards collecting and sharing outcome results across Wales.

The programme is developing beyond its initial goals, as all participating critical care units are now looking at implementation of the Sepsis Resuscitation and Management Bundles.

The programme has also collaborated extensively with the Welsh Healthcare Associated Infection Programme (WHAIP) in working towards satisfaction of the Strategic and Financial Framework (SaFF) target for infection surveillance in critical care. It is anticipated that the reporting system for WCCIP will be utilised in the collection of infection data.

Critical care has not traditionally been an area where patient and carer involvement has been accepted or encouraged. As a result of this programme, four sites now have patient representation upon their improvement groups. It is anticipated that this will increase due largely to the efforts of the National Steering Group Patient Representative.
A collaborative methodology has been adopted for this programme and is being evaluated as one of the aims of the programme itself. Two national events have been held which serve to agree the bundle contents, inform on programme progress and national critical care policy, and decide the direction for the smaller local improvement groups.

These improvement groups comprise clinical and executive leads as well as patient and therapies representation. They are led by the Programme Managers who are generally senior nurses who have taken the lead in training ICU staff. The teams implement the programme locally, collect and process the data.

Project Management

During the preparation for the programme an overarching project plan was developed by the national team, outlining the various milestones of the programme against projected timescales and resources. This is being monitored using the buffer technique (figure 5):

**Figure 5: Percentage of project complete versus amount of project buffer used**

The above graph compares the percentage of the project completed against the expected amount of project buffer used at that stage. The buffer is an expression of the time safety margin before project completion. The project is well ahead of projected schedule (the diagonal line from bottom left to top right of the graph).
Training and development
The local Programme Managers carry a huge responsibility for the success of the programme and it was therefore considered vital that the programme be of benefit to their career and personal development.

Monthly study days for the Programme Managers are held which have focussed upon change management skills, leadership, team-building and support through action learning. Thus, it is intended that change skills are learned and utilised within all critical care areas in Wales.

Clinical Engagement
Medical involvement has been a key element of the programme throughout planning and implementation. The Welsh Intensive Care Society as a whole, led by Chairman Dr Ian Greenway, has shown consistent support. The learning events have provided the opportunity for clinicians to meet and discuss the scientific and practical aspects of the bundles. This has resulted in consensus for national guidelines, process and outcome measures. Clinicians are generally enthused by the simple way that care bundles link theory to actual behaviours, resulting in benefits to patients. Collaboration with nurses, AHPs and managers from not only their own trust, but from around the country, has been a positive experience for the doctors involved.

Data Analysis
A scoping exercise prior to the launch of the programme demonstrated that there was no national consensus on outcome measure definition, application or data collection. It was therefore considered of little use to attempt pre-programme baseline measurement of ALoS, ventilator time or infection rates at a national level, although participating organisation have carried out their own baseline assessments, where possible.

Despite the elements of the care bundles being well supported by the highest level of evidence, the bundles approach itself has not been well evaluated in terms of improving outcomes. Instead, the quality improvement approach that has been adopted as part of this programme uses bundles as tools to reduce errors and standardise care packages. Bundle compliance rates then become indicators of quality of care.

NLIAH has developed and hosts a web based database, onto which the local sites enter this daily process data on compliance with the care bundles (figure 6):

Figure 6: Screen Shot of Web-based Data Collection and Reporting Tool
Organisations’ Progress Reports

Each participating site’s Programme Manager has composed a brief outline in the following pages of their progress. Improvement posters outlining their achievements and detailing their projects which were presented at the two learning events have also been included where available.
Prior to commencing the year long project with NLIAH, the Critical Care Unit had already introduced the Ventilation Care Bundle at the Princess of Wales site. Following the launch of the programme with NLIAH we did not have to change any of the elements to our original bundle so work continued to disseminate this to our other site at Neath and Port Talbot Hospital.

The next target was to introduce the Central line Care Bundle by the 1st of August 2006. Prior to this a study day was organised on care bundles to reinforce the elements of the Ventilation Care Bundle and introduce the elements of the Central Line Care Bundle. There was over 70% attendance from both sites and those staff that were on shift and therefore not able to attend were seen on an individual basis.

This approach led to a very successful introduction with excellent compliance to the Central Line Care Bundle and improved compliance to the Ventilation Care Bundle.

Central lines are now removed on average 2 days earlier than prior to our Central Lines Bundle. In addition we now know our infection rate per 1000 line days.

Currently the team is working on disseminating the Central Line Insertion Bundle to Theatres and Casualty.

The next aim is to have a Sepsis Launch Week on the 8th January 2007 to introduce this bundle into Critical Care. This will then be launched to the wards in January 2007 with two study days planned for ward managers to attend. During the same study days we are looking to disseminate information on the Central Line Care Bundle so this can also progress to the wards.

Overall it has been very helpful to be part of an all Wales collaborative approach to clinical practice to improve the quality of care delivered to our patients.

The monthly sessions have ensured motivation, discussion on ideas and how we have overcome any problems.

The presentations have been of an excellent standard and have helped to provide additional skills to ensure successful fruition of the project.
INTRODUCTION OF VENTILATORY CARE BUNDLE

BACKGROUND
The introduction of various care bundles into critical care has followed the work of the NHS Modernisation Agency's project on critical care outcomes, which was active only in England. A “care bundle” is simply a grouping together of individual care elements for particular treatments, such as ventilation, or symptoms or procedures. The elements are chosen because there is evidence to support their use in improving outcomes. Use of the elements can be easily audited so that feedback can be provided and any problems in implementation identified. This means that we can check if what we think we do is what we actually do!

AIMS
The aim of the ventilatory care bundle is to use these elements to reduce ventilation associated complications such as pneumonia and thromboembolism and to reduce the duration of ventilation. ALL elements of the bundle should be routine care for ALL patients unless they are specifically excluded.

ELEMENTS OF THE BUNDLE
- **30° head up positioning**
  This has been shown to reduce the incidence of microbiologically confirmed ventilator associated pneumonia from 23% to 5% when compared to supine positioning.¹
- **DVT prophylaxis**
  DVT is common in both medical and surgical patients in a critical care setting with rates of up to 56%. Prophylaxis can reduce this significantly.²
- **Gastric ulcer prophylaxis**
  All patients should be protected by ranitidine or omeprazole or enteral feed.
- **Avoidance of excessive sedation**
  Duration of ventilation is known to be a risk factor for ventilator associated pneumonia. In all patients we should aiming for a sedation score of 0 or 1. Use of sedation scores and protocols can reduce ventilator time.³
  A daily sedation hold has been demonstrated to be a safe effective way of reducing duration of ventilation and ITU stay.⁴
  There was NO increase in the incidence of accidental extubation.

WHAT NEXT?
Data has been collected on our current use of the various care bundle elements. The 1st of December has been selected as the date for the project to begin. ALL staff should then make every effort to ensure that this becomes routine care for ALL patients. Nursing staff should feel able to remind junior doctors if any of the prescribed elements have been overlooked.

REFERENCES

Julie Krill & Claire Farley
Critical Care Services, Princess of Wales Hospital, Bridgend
INTRODUCTION OF CENTRAL LINE CARE BUNDLE

BACKGROUND
The introduction of various care bundles into Critical Care has followed the work of the NHS Modernisation Agency project on Critical Care outcomes which were active only in England. In partnership with the National Leadership and Innovations Agency for Healthcare, a collaborative approach is now underway to introduce care bundles throughout Wales.

A care bundle is a grouping together of individual elements that have been proven through research to improve patient care/outcomes.

AIMS
The aim of the central line care bundle is to reduce infection and complications to patients who need a central line. All elements of the bundle should be routine care for all patients unless specifically excluded.

ELEMENTS OF CENTRAL LINE CARE BUNDLE
Central Line Insertion Bundle
- Wash hands before and after procedure using 4% chlorhexidine gluconate bactericidal skin cleanser and water or other alcohol-based agents
- Use maximal barrier precautions: gown, gloves and drapes
- Sterilise skin with Chlorhexidine and wait until the skin is dry
- Use of jugular or subclavian routes as preferred sites.

Central Line Maintenance Bundle
- Review necessity of central line every day and remove promptly if it is not needed
- TPN should be given via dedicated lumen.
- Biometers on all ports no 3 way taps.
- Access to line must be made using an aseptic technique.
- Entry site to be checked every day for signs of leaking or inflammation

WHAT NEXT?
Data has been collected on our current use of the various elements in the central line care bundle.
The 1st of August 2006 has been selected as the date for the Central Line Care Bundle to commence. All staff should then make every effort to ensure all elements of the central line care bundle become routine care for all patients.
There will be an ongoing teaching programme to inform staff about the care bundle. In addition, there will be a study day on 17th July 2006.

REFERENCES

Julie Keill, Ashley John, Fiona Rogers, Jo Holdham
Critical Care Services Bro Morganwg NHS Trust
Llandough:
Historically, practices within Intensive Care Units have varied between consultants and in their absence, the junior medical team. This has led to fragmented and uninformed practices of patient care.

Some consultants had implemented elements of the bundles, but this has previously resulted in a haphazard, uncoordinated approach with no discernable benefit to patients.

With the introduction of the care bundles, the following advantages have been noted:

- The proscription of the bundle has resulted in a uniformity of care, resulting in a systematic coordinated approach. All patients receive the same evidence based care.
- This evidence base is reinforced by NLIAH and WAG, this has facilitated the adoption of the bundles by our medical colleagues, who have been less likely to plead ‘clinical judgement’, which previously resulted in fragmented practices. This has been pivotal in the introduction of the bundles, as it is perceived that this change is government led.
- The uniformity of care is national, this results in benefits for:
  1. Patients (who receive the same standard of care, wherever they are treated).
  2. Junior medical staff (who rotate inter-hospital, as the variance in practice is limited, their learning is enhanced).
- Nurses’ morale has improved as they have become involved in a national project, which has implemented wide changes for the benefit of patients.
- Nurses have become more involved in audit and infection surveillance, both roles will gain more importance at a more junior level, with the increasing dependence on evidence based care and clinical governance.
- The introduction of care bundles has necessitated the use of team building strategies and the development of leadership skills amongst the nurses involved with their implementation.
- A multidisciplinary approach has been used, and the links developed between the professions allied to medicine can be used in future projects.

Future:
There are many aspects of care which could be reviewed and implemented as a care bundle e.g. Renal bundle, Nutrition bundle, Weaning bundle.
The programme manager’s days have provided support and valuable input during the introduction of the bundles. A network has been established which consists of nurses who have or are encountering the same problems. They are therefore able to help solve problems and make the transition in practice less eventful. The camaraderie that the managers meetings and learning events provide, helps further develop and improve the care that we implement, which results in an improvement in the patients critical care experience.

**University Hospital Wales:**

**Personal Development:**
At the commencement of the programme I was a Senior Staff Nurse with 10 years Critical Care service. The opportunity to become involved in the WCCIP arrived when I was personally more than ready to develop and extend my knowledge and skills more globally. Involvement in the programme has supported my personal development, particularly through networking with other like-minded Programme Managers at monthly meetings and via E-mail, and also through the NLIAH team.

The monthly meetings maintain my awareness of national/global issues which I am able to report back to my unit. Meeting with like-minded people regularly who are excited and challenged by implementing change and improving patient care helps maintain my motivation which I can spread to my own team.

Leading the team implementing the care bundles within my own unit has increased my exposure to Trust wide management and I have gained experience in presenting, motivating and people management.

My personal development gained through involvement with WCCIP has encouraged me to gain promotion within my unit and I am able to utilise the new leadership skills I have gained throughout my role.

**Team/ Unit Development:**
During the programme I have been working closely with my counterpart at a sister unit which, although part of the same directorate, has very different working practices. The programme has lessened the variation in practice between the units and has engendered an improved working relationship between the nursing staff.

The team directly involved in implementing the bundles and maintaining data collection have all developed personally and as a team. Each has recognised the requirement for varying communication skills and motivational skills.

The skills improved through the programme have also been transferable through other areas of their roles. Within my unit the frontline staff have accepted ownership of the bundles and have been motivated to question practice in the interests of best care for their patient. With monthly results of compliance posted, nurses at the bedside are motivated to improve their own practice if compliance falls. The unit has benefited from a more motivated workforce.
Cardiff and Vale NHS Trust

UHW Ventilator Bundle Results

October 2005 Sepsis Bundle Implemented
Ventilator Bundle Implemented May 2006
September 2006 CVC Bundle Implemented

Local Objectives

- Ventilator Care Bundle
  - May 2005 - June 2006
  - Tailored infection control processes
  - Tailored nutrition support and fluids
  - Tailored sedation protocols
  - Tailored drug therapy for ventilated patients
  - Education for all relevant staff
  - Routine error analysis
  - Data collection by designated lead staff
  - Feedback of data collection and analysis to jewel to drive improvement
  - Sepsis audit of all patients on ventilator
  - Sepsis audit of all patients on ventilator
  - Sepsis audit of all patients on ventilator

- CVC Bundle
  - Baseline
  - 60% of selected patients randomized to CVVH (20%)
  - 40% of selected patients randomized to CVVH (20%)
  - Baseline analysis of daily fluid balance
  - Baseline analysis of daily fluid balance
  - Baseline analysis of daily fluid balance

- Interventions
  - Central Line Infection Bundle
  - Baseline
  - Central Line Infection Bundle
  - Baseline
  - Central Line Infection Bundle
  - Baseline
  - Data Collection
  - Complete data collection
  - Complete data collection
  - Complete data collection

Critical Care Services Cardifff

Llandough Ventilator Bundle Results
Carmarthenshire NHS Trust

Programme Manager Sandra Miles

The Critical Care component of our Critical Care Directorate in Carmarthenshire NHS Trust is made up of three 6 bedded units. Two units are situated in separate areas at West Wales General Hospital, Carmarthen and the third is situated at Prince Philip Hospital, Llanelli.

The project team comprised of two Consultant anaesthetists, the general manager, a directorate nurse, the infection control nurse, three unit sisters, physiotherapist, a patient representative and myself as project manager.

Prior to this project, I had been involved in change management project such as the development and introduction of a Modified Early Warning Scoring system to the Trust. I believe I was chosen as the project manager for my involvement in this project.

I was apprehensive in managing the project and hoped that my lack of knowledge and experience in project management would be superseded by my enthusiasm for the success of the project. Part of my aim was to engender a team spirit and motivation by adopting a collaborative approach introducing change into practice.

The geography of these units had the potential to make managing this project difficult; however, each unit sister took on a deputy project manager's role and fully supported staff education and data collection process. Tasks were delegated to junior staff within each unit by unit sister’s, which has facilitated staff involvement at every level and contributed to the success of the project.

Nursing staff were committed to the idea of ‘care bundles’ from the very outset. This, I feel was in part due to the fact that fundamentally care bundles is a very simple concept, which reflected the care provided by nursing staff in practice. Staff enthusiasm and motivation facilitated effective education and training. This, together with weekly feedback on performance, resulted in a high degree of bundle compliance.

Bringing together three units and two teams of anaesthetist has been exciting but challenging at times. The project has promoted cross Trust working. It as raised staff motivation and interest in evidence based care, evidence by staff questioning the evidence base supporting current and accepted practice. It has promoted multi-professional working, evidence by nurses, medical staff and infection control staff working collaboratively in information sharing, audit data collection and analysis.

There continues to some challenges ahead, however I believe that continued effective communication, staff involvement in addition to regular feedback on performance will be essential to the projects success and group longevity.
Care Bundles - Taking Patient Care To New Heights

Marlize du Preez - Clinical Lead Physiotherapist, Sandra Miles - Professional Development Nurse for Critical Care, Critical Care Directorate

Ventilator Care Bundle

- The Cornwallshire Care Bundle started in May 2006
- Multi-disciplinary team nationwide
- Baseline audit per 206 across Trust
- 2 audits, 3 critical care units, 18 beds

Ventilator Care Bundles:
- Initial audit performed June 2006
- Staff education across Trust
- Central Line Care Bundle introduced July 2006
- Ongoing compliance audit

Retrospective & Prospective audits in progress:
- VAP incidence audit
- Length of time requiring ventilatory support
- Other projects:
  - Respiratory guidelines
  - Wearing guidelines

Central Line Care Bundle:
- Baseline audit performed September - October 2006
- Staff education across Trust
- Date of introduction in Critical Care, 31 October 2006
- Retrospective CR-BSI incidence audit performed 2005
- Planned prospective CR-BSI incidence audit

The Future:
- Introduce Central Line Care Bundle in Theatres, A&E, and out-Hospital
- Introduce Venous Care Bundle
- Introduce Tracheostomy Care Bundle

Relationships to Designed for Life:
- Effectiveness
- Patient Focus
- Timelessness
- Efficiency
- Safety

Incidence of CR-BSI Retrospective Baseline Audit
- Positive CR-BSI
The project was initially set up by the National Leadership Innovation Agency for Health Care (NLIAH) with all 13 Trusts being signed up for WCCIP (Welsh Critical Care Improvement Programme). It was agreed that all units would commence with the Ventilator Care Bundle in May 2006.

Initially meetings were held with NLIAH and Trusts, to introduce the concept of Care Bundles. In Bronglais, we discussed implementation and incorporated the PDSA cycle: Plan, Do, Study and Act, and fed back to the team by various methods which included team and bed-side meetings and the set up of a meeting with WCCIP at our Trust to discuss with colleagues.

It was then decided to audit our present practice to see what our compliance was. The Ventilator Care Bundle was used for this audit which included 4 elements:

- Prophylaxis of DVT (Deep Vein Thrombosis)
- Prophylaxis of Peptic Ulcer
- Head up position : 30° angle
- Sedation breaks

The results of this audit were 100% compliance which was indeed encouraging as we had only just begun to look at sedation breaks. The Ventilator Care Bundle was quickly introduced and implemented into our unit.

Data is collected for compliance and evaluation. Initially we used a paper audit tool incorporating baseline audit information and then used clinical audit involvement to support data analysis with future data to be collated with computer toolkit/programme.

Presently we are in discussions regarding the next care bundle to be implemented in the very near future.
Introduction of Care Bundles within Critical Care

Aim
To ensure consistency and standards in Critical Care across Wales-(Designed for Life, 2006)

Background
Welsh Critical Care Improvement Programme project with National Leadership Innovation Agency for Health care (NLIAH) to implement Care Bundles in critical care Ventilator Care Bundle to be implemented first

Process
Initial meeting held with NLIAH and Trusts to introduce concept of Care Bundles Implementation incorporated PDSA - Plan, Do Study and Act Feedback to team by:
- Team meetings
- Bed-side teaching
- Meeting with WCCIP at Trust

Audit
Baseline audit completed Criteria involved:
- Prophylaxis of DVT
- Prophylaxis of peptic ulcer
- Position ie 30 degree angle
- Breaks from receiving sedation
Results-100% compliance

Evaluation
Data collated for compliance and evaluation
Use paper audit tool incorporating baseline audit information
Clinical audit involved to support data analysis
Future data to be collated with computer programme
Since the Care Bundles were implemented two years ago at Conwy and Denbighshire Trust, we have noticed a great change in the delivery of care to all our patients. Although previously carrying out many of the elements contained in the Bundles, the nurses feel that their uptake on these are more acute. Care is more standardized but also tailored to individual patient requirements.

Below are some of the comments from the nursing staff and doctors who work on the unit at C&D Trust:

- Care is more nurse-led in many ways; treatment can be started sooner instead of waiting for the doctors to come to the bedside, as with the Sepsis Bundle, bloods and fluids are sorted well in advance now.
- Care is more timely; fewer essentials are missed and care is less dependent on the supervising clinician.
- Junior nurses find the Bundles useful, a bit like a checklist.

We have also noted that ventilator days are less; ICU days are reduced; our drug bill is less; incidences of VAP are greatly reduced; tracheotomies are seldom done and central lines are removed earlier thus reducing the incidence of infection.

Because of the results we as a unit see first hand how the bundles affect our practice for the good; the nursing staff feels proud of the way their practice has changed.
Two Years Post Critical Care Bundles
What are the effects on our patients?

The Ventilator Bundle was implemented in August 2004. The Sepsis and Central line Bundles implemented in February and April 2005 respectively.

Patients no longer report nightmares or hallucinations, unlike their heavily sedated predecessors. Despite caring for 343 more patients in the post-implementation period our pharmacy bill has decreased by £78587.

The average length of stay on ICU has reduced from a mean of 5.6 days to 2.9 days – a reduction of a mean of 2.7 days despite matched apache scores: pre 17.3 post 17.4.

This reduction in length of stay has created extra capacity within the ICU and we have been able to accommodate an additional 343 patients in the two years post implementation.

The average length of mechanical ventilation has reduced by a mean of 2.7 days and the number of patient requiring a tracheostomy has almost halved, arguably because of their daily sedation breaks.

Patient mortality has decreased within the ICU and of those ICU patients who are discharged to the wards.

Author: S O’Keeffe
Nevill Hall:
My leadership and my approach to implementing change have resulted in a 100% uptake of the care bundles by medical and nursing staff. I have been very visible during this time and bundles have been on display everywhere in intensive care.

I have facilitated and empowered a small team of intensive care nurses allowing them to develop ownership of the care bundles, which allows auditing and teaching to continue when I am off duty.

Intensive care is a cohesive multi-disciplinary team with the consultants supportive of the nursing staff. The Lead Consultant for care bundles discusses and supports any plans I make acting as a filter as needed.

In September 2005 we joined the Surviving Sepsis Campaign with the implementation of the Sepsis Bundle hospital wide. In March and April 2006 intensive care added into patient care the Ventilator, Tracheostomy and Central Line Bundles.

Working outside Intensive Care within the critical care continuum has allowed me to develop relationships with ward staff, Emergency Department, Coronary Care Unit, Outreach service and Pathology department. I am welcomed in all departments and regularly liaise with them concerning the Sepsis Bundle.

This year has increased my self-confidence in undertaking presentations, teaching and giving feedback at meetings.

My plans for the future are to continue with the existing care bundles in intensive care also to start implementation of the Total Parental Nutrition (TPN) and Renal Care Bundles.

Outside intensive care my next step is to take the Central Line and Tracheostomy Bundles to the wards and departments as a combined approach with Outreach.

Initial Trust board support has continued and I plan to feedback in November via the Clinical Standards Audit group and Nurse Executive.

Following the recent directorate meeting a business case is to be developed for continuation of the care bundle project, including protected time for leadership and audit.
**Care Bundle Across the Critical Care Continuum**

**Individual Patient Care may Include One or all Care Bundles**

Lead Nurse - Sylvia Ireland
Lead Consultant - Steve Edwards
Administration - Claire Hughes

**Nestle Hall Hospital**

**SEPSES**

- **Ventilator**
- **Tracheostomy**
- **Central Lines**

**Future Plans**
- Weaning / Extubation
- Nutrition Bundle

**RECENT / TIN**

**Outreach**

September 2005 - October 2006
Royal Gwent:

Journey to High Standards of Care

The National Leadership and Innovation Agency for Healthcare (NLIAH) team identified the importance of developing an all Wales group to establish standardised criteria to ensure quality healthcare across Wales. This would improve patient care in Wales by implementing standard Critical Care Bundles and was named the Welsh Critical Care Improvement Programme.

I was very excited at the prospect of becoming involved as a Programme Manager in a national intervention and prepared myself and the staff for the launch date in May 2006.

The Ventilator Bundle was introduced on June 12th 2006 following a pre-audit. The use of PDSA (Plan, Do, Study, Act) cycles assisted the implementation process although it took time to become accustomed to this method of change management.

After a few teething problems the Ventilator Bundle has now become an established part of the daily routine and we are in the process of implementing the Central Line Bundle.

It has been a very rewarding experience; working collaboratively with other critical care staff across Wales and sharing in negative and positive aspects of the job of Programme Manager.

The NLIAH team have facilitated the development of new skills in people management which have assisted in persuading staff to become interested and committed to the project.

They have also given us the opportunity to develop skills in project management and facilitating change, as well as supporting us through the whole progression of the implementation of care bundles.

Although the job has had highs and lows it has been overall a very positive experience and I am continuing to enjoy the process.
A JOURNEY TO HIGH STANDARDS: ROYAL Gwent HOSPITAL

MEET THE NUJAH TEAM
1. Identify the job
2. Meet the team involved
3. Discuss the implications

WRITE PDSA TO START THE PROCESS OF IMPLEMENTATION

CREATE OBJECTIVES
1. Plan with manager
2. Discuss with clinical team

COMPLETE PRE-AUDIT

IMPLEMENT THE 1ST CARE BUNDLE: VENTILATOR CARE BUNDLE

PDSA TO IMPLEMENT 2ND CARE BUNDLE: CENTRAL VENOUS CATHETER (CVC) BUNDLE IMPLEMENTATION - NOVEMBER 2006.

PDSA Objective: Successful implementation of ventilator care bundle
DD: Presentation on education board. Teaching sessions, 2-3 days/week, when on duty to explain rationale for implementation and provide opportunity for feedback. Encourage ownership of the project.
RESULTS: Bundle and data collection tool in process of successful implementation. Members of staff appear to be committed to the project.

19th April 2006 Commencement of Pre-implementation audit to assess current practices. Assessment and validation of the data collection tool. Analysis of data to identify educational priorities. Education of all members of the multi-disciplinary team.
12th June 2006 Launch ventilator care bundle

INFORM, EDUCATE AND INVOLVE THE CRITICAL CARE STAFF

PDSA Objective: Introduction of central line bundle
DD: Presentation on education board. Teaching sessions, 2-3 days/week from care bundle team, to explain rationale for implementation and provide opportunity for feedback. Encourage ownership of the project.
RESULT: Members of staff appear to be interested and supportive to the project. Need to get microbiology on board.

CHALLENGES:
Maintain staff motivation - Commence compliance charts. Continue to collect data when programme manager not present - shift leaders taking responsibility. Consensus of aspects of CVC bundle - Multi disciplinary Innovations group established.
Introduction
In March 2006, Tracey Harris, Practice Development Nurse on the Intensive Care Unit of the Wrexham Maelor Hospital, and Dr Campbell Edmondson, Consultant Anaesthetist and clinical lead for the programme, commenced a programme of staff education with regards to the theoretical and operational applications for the implementation of the Care Bundle approach.

The Ventilator Care Bundle
At the end of April, following the pilot period for the Ventilator Care Bundle, the care bundle approach had been generally well accepted by all staff. Changes in unit culture were already beginning, e.g. the reintroduction of sedation scoring which although advocated as standard practice had become ad hoc.

Full implementation commenced on the 10th of May 2006, with the compliance rate running consistently above the target of 95% (July showed a 100% compliance rate). The nursing staff have commented on the positive step of standardizing care; an increased awareness of the needs of the ventilated patient; and the fact that both nurses and doctors are embracing the process which further supports the success.

The CVC Bundle
The CVC Bundle has been piloted and is going to encompass a larger cohort of patients and staff, e.g. theatres, coronary care etc. Nursing staff are again positive as they feel that it is a way of implementing evidence based care; will improve the care of lines, and thus anticipate it will reduce the incidence of catheter related bloodstream infections.

Conclusion
The Care Bundle approach on the whole is seen as a positive experience/process to improve the delivery and equity of evidence based care given to patients within the critical care environment. Inevitably there has been some resistance amongst Consultant staff in particular, but when the Care Bundle approach was added to new Consultant work patterns introduced in September 2006, there has been a noticeable improvement in unit cohesiveness.
The CVC care bundle

Central venous catheters (CVC’s) provide vascular access, which is essential within the critical care setting. Their use does however put patients at risk from local and systemic complications. The use of these catheters is associated with both mechanical and infective complications. In critical care the catheter is often manipulated several times a day. It may be in situ for an extensive length of time and patients can subsequently be colonised with hospital – acquired organisms.

This ‘Care Bundle’ has two main areas to it: insertion and maintenance (to include line necessity review).

This bundle commenced at the beginning of November 2006 and again will be audited against compliance with all elements of both areas.

Along the way we have:

- Continued to work as a team
- Brought more people on board
  - Infection surveillance
  - Link nursing sister
  - Theatre staff
  - Coronary Care staff
- Changed the audit form again and again and again…… following feedback from staff
- Collected data from Pathology to inform infection surveillance

The Ventilator Care Bundle

- Continues to show above 95% compliance rate.
- Practice Development Nurse progressing with ‘Nurse led weaning’ policy.

...the story continues with the Sepsis care bundle
The Welsh Critical Care Improvement Programme has provided me with an exciting opportunity in project management and allowed me responsibility for organising, overseeing and implementing a programme of change and improvement in Critical Care.

The Ventilator Care Bundle was implemented on the 22nd May 2006, followed by the Central Venous Catheter Bundles on the 4th September 2006. It is anticipated that the Sepsis Resuscitation and Management Bundles will commence in January 2007.

I would like to thank all the nursing staff of the Intensive Care Unit who have embraced the programme from the outset, both in their willingness to change and in completing daily data forms. The implementation and success of the programme has been a real team effort.

The programme has positively impacted on the Intensive Care Unit at Prince Charles Hospital in several ways:

- Nursing practice in the management of intensive care patients who are both mechanically ventilated and have central venous catheters is now more structured and consistent, based on clinically proven evidence-based guidelines, while maintaining the freedom of clinical judgement essential for individualised care.

- Nursing staff of all grades and experience have been engaged in the programme and are actively encouraged to question any practice or treatment in relation to recent evidence-based literature. This can then be discussed openly with a view to making appropriate changes if necessary.

- Following closer collaboration between nursing and anaesthetic staff in agreeing and implementing the programme guidelines, a forum group has been set up to review policies and procedures, discuss clinical issues and achieve greater co-operation. The group involves myself, the clinical nurse manager and the five consultant anaesthetists who have formal input to the intensive care unit.

- The Infusion Devices and Resuscitation groups have expressed an interest in the future roll-out, throughout the Trust, of the Central Venous Catheter Care Bundle and the forthcoming Sepsis Care Bundle.

- Infection surveillance will commence shortly in partnership with the Consultant Microbiologist and Senior Infection Control Nurse, monitoring ventilator-associated pneumonia rates and catheter-related bloodstream infection rates.

The staff at Prince Charles Hospital sincerely hope that the programme continues, at least another year, and look forward to the development and roll-out of further care bundles in the management of tracheostomies, renal failure and nutrition, at a local level.
CVC MAINTENANCE BUNDLE
- ‘Aseptic’ technique for access
- Dedicated TPN line
- Daily site inspection
- Daily assessment of need
- Implemented 4th Sept 2006

CVC INSERTION BUNDLE
- Hand hygiene
- Chlorhexidine skin prep.
- Sterile barrier precautions
- Sterile patient body drapes
- Optimal site choice

BACKGROUND
- 90% of catheter-related bloodstream infections are caused by central venous lines
- Mortality rate between 4 & 20%
- Patient length of stay increased by approximately 7 days

WELSH CRITICAL CARE IMPROVEMENT PROGRAMME
AIMS AND OBJECTIVES
- IMPROVE QUALITY & EQUITY OF CARE
- IMPROVE EFFICIENCY & CAPACITY
- REDUCE AVOIDABLE ADVERSE EVENTS
- PROMOTE ALL-WALES COLLABORATION
- ADDRESS ‘DESIGNED FOR LIFE’ AGENDA
- USING A CARE BUNDLE APPROACH

DATA ANALYSIS
- Insertion bundle compliance
- Maintenance bundle compliance (Target compliance > 95%)
- CVC related infections
- Average length of stay

THE FUTURE OF CARE BUNDLES AT NORTH GLAMORGAN?
- Roll-out CVC care bundle to theatres, A&E, MAU and wards
- Develop further care bundles: tracheostomy care, TPN, enteral nutrition, sepsis management

CARE BUNDLE
A group of evidence-based care elements for a particular condition, intervention or treatment, which when used in combination, will improve patient outcomes

Vince Espley
Programme Manager
There are many documented benefits of implementing care bundles, most of them seen and commented on to varying degrees during the past few months on ICU at Ysbyty Gwynedd.

However the most noticeable benefits of implementing the programme for our ward have been cultural changes that are harder to display or prove but equally important.

Due to the geography of the hospital and lack of movement of staff (particularly nurses), the unit has felt isolated from the rest of Wales and has operated independently. Now that links have been made with other hospitals, improvements and guideline developments that are happening are done in conjunction with other trusts. We have borrowed ideas and saved a lot of time by using guidelines that are already tried and tested from other trusts such as the ventilator weaning protocol (thank you Swansea!).

There is also an element of healthy competition; staff are eager to take forward new projects so that we don’t lag behind other trusts.

Our team relationships have improved. Different disciplines are working together more collaboratively, mainly because elements of the bundle necessitate discussion, such as whether a patient is suitable for a sedation hold. A representative from all professions in the multi-disciplinary team has been on the care bundle planning team. We will also be working more closely with other wards as the sepsis and central line bundles get implemented there too.

The other cultural change has been the recognition of the importance of data collection and measuring outcomes.
At the start of this programme this Unit had not commenced any work on care bundles and I was quite conscious that I did not want to agree to achieve too much and then not be able to deliver. I therefore agreed to introduce two care bundles only.

As I was new in post I wanted to feel that I was having an impact on the Unit and I looked forward to introducing a change in practice which was evidence based and therefore in the best interests of the patient.

One of the effects the programme has had on the Unit is to encourage communication between the Anaesthetists and the Nursing staff. The junior anaesthetists have played a big part in preparing to introduce the care bundles to the rest of the staff.

The programme manager days have been very worthwhile to me, as we have discussed how to introduce change and how to keep positive when at times colleagues appear to be negative. The fact that it is evidence-based practice that the whole of Wales is participating in gives me the confidence to know that I am right.

The programme manager days have also given me time to discuss other areas of practice with staff from other Trusts, which have helped me to deal with other issues.

The Unit has benefited from this programme as it has given us a time frame to work towards our objective, which we will achieve. The senior staff, at first, were responsible for the care bundles, but now this responsibility has been devolved to all staff so that everyone has some ownership for care bundles, which improves teamwork.
The Programme began in March 2006, will run for a year until March 2007, and was launched at an event on 23 February 2006. The broad aim of the Programme is to accelerate the implementation of best practice and evidence based care within Critical Care Units by the introduction of “Care Bundles” and to address quality improvement goals set out in “Designed for Life”. Every Trust in Wales with a Critical Care Unit (12 in total) plus Velindre NHS Trust is participating. There are two Care Bundles which NLIAH want us to have in place by March 2007, and they are the Ventilation Bundle and the Central Venous Line Bundle.

Initially the implementation of this bundle was difficult as it was hard to get a team together to start the process off. We have now implemented this bundle as set out below and recording data into the website.

Starting with the Ventilation Bundle, the objective is to record set elements of patients requiring ventilation, so improving patient outcome. These elements are:

- Patients should not lie flat (unless there is a good clinical reason), but should be at a 30 degree angle so as to improve lung expansion;
- Patients should receiving gastric prophylaxis;
- Patients should receiving DVT prophylaxis;
- Patients should be given a “sedation break” – this can help with coming off the ventilator and also means that there is an improvement longer term in psychological recovery.

The aim will be to prove that these different aspects have a positive impact on length of time that the patient is ventilated, reduce the length of stay within the Unit and lower mortality rates.

We have now been running the bundle for two months and data has been collected and will go to NLIAH – we must be 95% compliant with all elements of the bundle by March 2007. So far the data collected shows that we are complying.

Moving to the Central Venous Line Bundle, research shows that 90% of catheter related blood stream infections are caused by Central Venous Lines. These are used more routinely than had been the case in the past, and attributable mortality is running at between 4% and 20%.

In addition, it can be shown that catheter related blood infection can increase length of stay by seven days (at a notional cost to the Trust of £1500 per day). The aim of this bundle is to reduce infections and lower the length of stay within the Unit.
There are two elements, and they are presented in two stages – four for insertion and four for maintenance. The detail is as follows:

- **Insertion**
  - Hands washed with soap and water or alcohol based agent
  - Minimal barrier protection used – sterile gloves, gown and drapes
  - Skin sterilized
  - Femoral site avoided unless last resort

- **Maintenance**
  - Review the necessity of the line daily – and remove promptly if not needed
  - TPN should be given via separate line or dedicated lumen
  - Access must be made using aseptic technique
  - Entry site should be checked every day for signs of leakage or inflammation

We have just started to implement the bundle and will be working closely with the Consultant Microbiologist so as to look at current levels of infection, in order that we can make meaningful comparisons.

We are aiming to educate the staff this month and start the data collection of the bundle in November 2006. This has meant a complete change in practice for the whole of the department as we have combined this initiative with how we administer our Intravenous drugs and deliver Total Parenteral Nutrition via a central line. It has been the Care Bundle initiative which has started all this off, which has been very positively received.

Progress has been slow, but a good team is now in place and staff are on board with the Project.
Swansea NHS Trust
Programme Manager Noel Rowley

Background
Prior to the launch of the Welsh Intensive Care Improvement Programme (WCCIP) the Critical Care Department at Swansea NHS Trust had piloted two systems for data collection in relation to Care Bundles. Both these systems were ‘hi-tech’ and neither proved effective.

National Launch - May 2006
The national launch for the WCCIP was May 2006 and the plan was to introduce a Ventilator Care Bundle and possibly one other care bundle in the first instance.

Swansea NHS Launch - 21/03/2006
The Swansea NHS Trust launch was earlier than the national launch in an attempt to capture the enthusiasm produced at the original meeting in Llandrindod Wells.

Early introduction of the concept of care bundles also allowed for the establishment of a culture and habit of care bundles as well as identification of pitfalls prior to the national launch.

Swansea NHS Progress
Care bundles have now become well established as a routine aspect of patient care. Two care bundles are well established (Basic Care Bundle for all patients and a Ventilator Care Bundle).

A ‘low tech’ paper audit tool has been devised and this is well accepted by staff. This low tech approach was influenced by the work presented at the first WCCIP meeting at Llandrindod Wells by units which had successfully introduced care bundles in their areas.

A Central Venous Catheter care bundle has recently been introduced. This is now established on the Moriston Hospital Site and will soon be rolled out to Singleton Hospital.

Spin Offs
As a result of the formation of the Improvement Group there have been further benefits in improved continuity of care for long term patients, better liaison between nurses and physiotherapists regarding manual handling and rehabilitation.

Possibly the most important spin off has been the appointment of a Patient / Public Representative
The introduction and implementation of the Central Venous Catheter (CVC) bundle has been a fairly straightforward process within Velindre Cancer Centre.

Our involvement in the critical care bundles project has however been limited due to the fact that we do not have critical care beds within our organisation. One aspect of the project that we as a Trust could become involved with was the introduction of a care bundle in relation to the placement of CVCs. We place two different types of CVCs in Velindre which are; Peripherally Inserted Central Catheters (PICCs) and Tunnelled Cuffed Catheters. Both nurses and radiologists are involved in the placement of these catheters and the introduction of the bundle was aided by the fact that there are only 5 practitioners involved in the process.

A document describing the basic principles of care bundles and outlining the specific elements of the care bundle for Velindre was produced. This document specifies the elements within the bundle and the exclusion criteria and was utilised as part of the training programme for the staff.

Some changes to practice have come about since the implementation of the bundles. The placement of the Tunnelled catheters was not preceded by cleansing the skin with chlorhexidine but with betadine. The implementation of the bundle necessitated a change in this practice. During PICC placement, it has become evident that the use of the most suitable site for placement is being adapted more naturally to the practitioners’ routine practice. The maximal barrier precautions which have been followed has been improved.

Overall, the implementation of the bundle has been successful and the compliance rate has been 100% throughout.
Analysis

Critical Success Factors
Following analysis of these progress reports, the following critical success factors (CSF) have been identified as key to the success of local implementation of the Ventilator and Central Line Care Bundles.

■ Development of local champions both clinical and managerial:
Clinical and Managerial support for this programme locally has been essential to the successful implementation and sustainability of the care bundle approach. The programme has required substantial amounts of senior staff time in the planning, implementation and monitoring of the sustainability of the care bundles in the units, and without managerial and clinical support, this resource would not have been made available.

■ Dedicated project management/back-fill for programme manager:
As outlined above, this programme has required significant input from the programme manager, and sites where this role has not been backfilled have struggled at times maintaining the momentum gained so far, as the ‘day job’ overtakes the time available for this programme.

■ Collaborative approach to development and implementation of Care Bundles:
The collaborative approach NLIAH have taken to agreeing and implementing national bundles has ensured buy-in from all sites, clinicians, nursing and therapies staff prior to implementation. This approach is to be externally evaluated to inform future NLIAH programme design.

■ Patient involvement as advocates of change:
At the outset of the programme, patient involvement was not common within critical care across Wales. Patient involvement on the National Steering Group has been key to ensuring the right questions are being asked at key points in the programme, and has promoted local involvement of patients and carers on improvement teams. These teams have since stated that this is a key element of their success, as it provides a unique perspective influence which NHS staff often overlook and underestimate.
Risks analysis

Early on in the programme NLIAH conducted a risk analysis to ensure countermeasures were in place early enough to reduce the impact of the identified risks. Presented below is an analysis of how this process has been managed to date:

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<tr>
<th>Risk</th>
<th>Countermeasure</th>
<th>Results</th>
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<tbody>
<tr>
<td>Level of data collection required and lack of local dedicated data resources within units</td>
<td>NLIAH provided sites with funding allocations to set up data collection processes and potentially back-fill staff</td>
<td>Where this resource has been used efficiently, data collection has assisted the programme locally</td>
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<tr>
<td>Lack of nationally agreed definitions for elements of data analysis – e.g. some outcome measures</td>
<td>Programme worked closely with national team developing minimum data set.</td>
<td>Programme's objectives are to increase compliance with bundles. Data not being used to benchmark. Local teams continuing to monitor their own progress in outcome measures.</td>
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<tr>
<td>Potential duplication/ conflict with aims of the Critical Care Networks to be established at the end of the programme.</td>
<td>Continued close working with WAG and the advisory group established to inform the development of the Critical Care Networks.</td>
<td>Findings from this programme are feeding into the establishment of the Critical Care Networks.</td>
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<tr>
<td>Disengagement of the Welsh Intensive Care Society (WICS) if programme seen as target-driven, top down approach</td>
<td>Clinical Lead appointed due to previous appointment as Chair of WICS, and detailed experience of the bundle approach. Collaborative approach used to ensure national support for way ahead.</td>
<td>Collaborative approach used is to be evaluated to inform the design of future NLIAH programmes, as it has shown to increase engagement and local support.</td>
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<tr>
<td>Lack of change management skills experience within critical care across Wales.</td>
<td>Programme managers’ monthly workshops held to provide change skills, leadership and team building training.</td>
<td>Resource and experience in change skills and project implementation now available locally for further service improvement projects.</td>
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Although all intensive care units in Wales have adopted and implemented the care bundles, some work still needs doing to achieve our targets of 95% compliance with the bundles. We also want to examine reasons for variations in practice between units. This will constitute the majority of the work of the programme in the immediate future.

Our collaboration with the WHAIP project will yield results in terms of critical care infection surveillance in the months up to the December 2007 and we will expand this data collection in January 2007 to involve areas outside of the intensive care.

As the Welsh critical care networks are established in the months to March 2007, we will collaborate closely in the formation of a Welsh critical care minimum data set and development of electronic data collection based upon our existing database.

The collaborative methodology of the programme has stimulated and provided a forum for national debate and has enabled the growth of networks and communities of practice. It is suggested that the collaborative methodology of the programme has been successful and will enable a national approach to other areas of critical care development in the coming years.

These include the adoption of an ‘All Wales Sepsis Bundle’ with the aim of reducing mortality from sepsis. The programme serves as a basis for developing a culture of data gathering and sharing at a national level and for continuing development of clinical guidelines and new care bundles.

It is in the success of the programme managers’ training that the organisational development aims of NLIAH have been fully realised. Change skills have been disseminated throughout Wales via this group and we believe that in collaboration with the Workforce Development Education and Contracting (WDEC) unit the training curriculum has the potential to be consolidated and formalized as a means of creating the Welsh critical care change leaders of the future.

The Programme has already had a profound effect upon the organisation and delivery of critical care services in Wales and will influence the direction of critical care in the future.

The facilitation by NLIAH of this programme has been vital to its success so far, as the agency has been viewed as both impartial and as an excellent resource for service and leadership development.