IntelliSpace Critical Care and Anesthesia Success Stories 2013

Learn how Philips Healthcare solutions are being used to enhance clinical outcomes
Sharing Success

At Philips, we aim to improve people’s lives through meaningful innovation.

We’re proud that clinicians and clinics use our solutions to simplify clinician workflow, improve financial outcomes, and help improve and save lives. With this booklet, we showcase customer stories about how they have used Philips IntelliSpace Critical Care and Anesthesia to improve clinical outcomes.

From improving compliance to enhancing patient education – these stories show how the IntelliSpace Critical Care and Anesthesia solution helps clinicians to closely analyze and manage the care they give, in order to improve practice and implement new protocols.

We hope sharing these “lessons learned” will inspire and inform you about how Philips can help improve patient care in your clinical environment. We appreciate your support and look forward to your continued success.
1. Early diagnosing by an improvement of 120% in the accomplishment of inborn errors metabolism program.
   HOSPITAL MATERNO INFANTILE TERESA HERRERA – A Coruña, Spain, 2012
   Use of ICIP clinical advisories improved compliance of metabolic screening from 40 to 100% in the NICU ensuring the integral care of the patient.

2. A clinical information system reduces medication errors in paediatric intensive care.
   IMPERIAL COLLEGE LONDON – London, UK, 2012
   Prospective audit of prescribing errors and omitted doses showed a significant decrease of prevalence of omitted doses from 8.1% to 1.4% when using ICIP for electronic prescribing in PICU.

3. 100% compliance with the ICCA bundle over a sustained period helps to eliminate CRBSI.
   GIG CYMRU NHS – Wales, UK
   Retrospective analysis of the use of ICIP CRBSI bundle showed a significant increase from 55% to 100% compliance with the care bundle. This resulted in a significant and sustained reduction in CRBSI rate.

4. Classification of diagnostic at discharge of a critical care unit, using the clinical information tool ICIP.
   HOSPITAL SANTA BARBARA – Puertollano, Spain, 2012
   Use of ICIP enabled the analysis of the encoded diagnostics at ICU discharge through ICD-9-MC system. The diagnostics encoded are 11% coronaries, 28% medical-surgical and 62% antecedents.

5. Automated notifications and reports to enhance patient care
   ST. VINCENT’S HOSPITAL MELBOURNE VICTORIA – Fitzroy, Australia
   Use of ICIP helped to generate meaningful alerts and reports for key decision makers in the hospital. The goal in future is to alert key decision makers earlier to shorten time to treatment and prevent clinical deterioration.

   HOSPITAL UNIVERSITARIO FUNDACIÓN ALCORCÓN – Alcorcón, Spain, 2012
   Retrospective analysis of patient data stored in the ICIP showed that 83% of patients with mechanical ventilation received adequate ventilation. This drove to re-audit the ventilation patterns and plan to establish an alert system to avoid unwanted results.
Early diagnosing by an improvement of 120% in the accomplishment of inborn errors metabolism program

Fdez. Trisac Jose Luis. UCIN. Hospital materno infantil Teresa Herrera. CHUAC. A Coruña. Spain

**CHALLENGE**

Inborn errors of metabolism programs give response to the need of an early diagnosing to treat serious, common, and able to be treated diseases, improving affected patients quality of life.

Neonatal Intensive Care Units treat newborns in critical condition, many of whom need ventilation and hemodynamic support to survive. Frequently, main effort is focussed in ensuring survival, so that these secondary needs may be relegated to the background, specially at the initial time of the episode.

In case of newborns in critical condition, this kind of programs are often postponed, as other kind of not specific critical care tests, because all the attention is focussed on survival.

**SOLUTION**

In January of 2010 an advisory was configured for NICU in our clinical information system (Philips ICIP). For admitted patients, the third day of life, this advisory reminds the need to perform tracking of inborn errors of metabolism.

**RESULTS**

Before adding this rule in ICIP metabolic screening compliance at third day of life was around 40-45%, what means it was determined in recommended range of time, for less than the half of patients.

Since we introduced this advisory, the tracking test fulfillment has been 100%

**CONCLUSION**

A clinical management system for critical care, like ICIP, can be configured for the integral care of the patient. It allows to run advisories and reminders about actions that, even when they’re not specific for critical care, are so important for subsequent development, once the patient exceeds the critical care phase. And these actions sometimes are delayed or ignored during critical care.

**LESSONS LEARNED**

The benefits of using advisories can be extendend to any other areas of improvement in the NICU. That’s why we included rules and advisories for many of the interventions are often delayed during critical care: head circumference measurement every Monday, immunization schedule reminders,...
A clinical information system reduces medication errors in paediatric intensive care

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INTRODUCTION

Medication errors are one of the major preventable sources of harm in healthcare and the most common cause of adverse events. Prescribing errors occur in 1.5 – 9.2% of medication orders written for hospital inpatients. Paediatric patients are at particular risk of medication errors, with medication errors occurring up to three times more frequently.

Electronic prescribing (EP) in Paediatrics and PICU may be of benefit. A meta-analysis performed by Van Rosse et al showed significant decrease in prescribing errors with EP (Pediatrics 2009; 123; 1884-1190). No reduction was shown in adverse drug events or mortality.

AIM

Purpose: To determine the effect of EP with a clinical information system (Intellivue Clinical Information Portfolio (ICIP), Phillips, UK) on prescribing errors and omitted doses in a paediatric intensive care unit (PICU).

METHODS

Prospective audit of prescribing errors and omitted doses for 96 hour periods in three epochs: (1) before ICIP, (2) one week and (3) six months later.

RESULTS

There was a non-significant reduction in prescribing errors: 8.8% (95% CI 4.4-13.2) pre-implementation of EP versus 8.1% (4.4 – 11.8) one week after implementation and 4.6% (2.0-7.2) six months later.

The prevalence of omitted doses decreased significantly – changing from 8.1% (5.8-10.4) pre-implementation to 10.6% (8.5 – 14.7) one week after implementation and 1.4% (CI 0-2.8%) six months after implementation (Table 1).

CONCLUSION

Introducion of EP on ICIP was associated with a reduction in medication prescribing and dispensing errors.

• Pre-defined standard orders for common prescriptions and electronic work lists and alerts for staff probably account for the improvements seen

• Clinical decision errors were not eradicated

• Clinical significance of this system remains to be established
100% compliance with the ICCA bundle over a sustained period helps to eliminate CRBSI

Tamas Szakmany, Cwm Taf NHS LHB, Andrew Hermon, Cwm Taf NHS LHB, Paul Lawrence, Cwm Taf NHS LHB

Introduction
Catheter related bloodstream infection (CRBSI) is still a common problem on the UK ICUs. The surveillance of central venous catheter (CVC) related infections became mandatory in Wales in 2007. Process compliance with all the elements of the care bundle has been shown to be the major factor in reduction of CRBSI rate.

Hypothesis
We investigated if records generated in the clinical information system (CIS) can be used for contemporary monitoring of process compliance and outcome.

Methods
Retrospective audit on the rate of CRBSI for a 3 months period before the implementation of the CVC bundle provided baseline data in 2006. Prospective rolling audit was carried out after the bundle was introduced in 2007. The CVC bundle consisted hand hygiene, barrier precautions on insertion, 2% chlorhexidine skin preparation, using femoral site as last resort, daily review of necessity of central access, daily inspection of insertion site, use of TPN on a dedicated port and maintaining asepsis when accessing the line. Compliance data was collected based on the information recorded in our CIS (Carevue, Philips). Weekly compliance data was presented at the audit meetings and also posted on the noticeboard. CRBSI diagnosis was made according to the HELICS criteria. We collected data on CRBSI rate and if the patient left the unit with a CVC line in situ. For statistical analysis Chi-square and Wilcoxon tests were used.

Results
We have seen a significant increase in the compliance with the bundle (55% to 100%) and it resulted a significant and sustained reduction in CRBSI rate (15.9, 6.4, 4.1, 3.5, 0.0, 0.0, 0.8/1000 catheter days in 2006, '07, '08, '09, '10, '11, '12; respectively) and number of patients transferred to the ward with CVC lines (all p<0.05 compared to baseline). Compliance data was accessible from the electronic care records, with reports generated on a monthly basis.

Conclusion
100% compliance with the bundle over a sustained period was necessary to eliminate CRBSI. The use of the CIS enables us to display real-time compliance data, which reinforces this message, even with high medical and nursing staff turnover. Automated weekly reports on CVCs help to identify any outliers.
CLASSIFICATION OF DIAGNOSTIC AT DISCHARGE OF A CRITICAL CARE UNIT, USING THE CLINICAL INFORMATION TOOL ICIP

Hospital Santa Barbara, Puertollano. Spain. Intensive Medicine Service.

CHALLENGE

The efficiency in the use of resources in Intensive Medicine should start by knowing the casualty of the intensive care units (ICU).

The ICD-9-CM system (International Classification of Diseases, Ninth revision, Clinical Modification) allows encoding the principal and secondary diagnostics at hospital discharge and it serves as a base to measure the hospital product (classifying into Diagnoses Related Groups (DRGs)) and to assign resources. The ICU as an intermediate Service is not well evaluating through this system.

To encode our diagnostics at ICU discharge, allows us to analyze homogeneous groups of patients to know our case mix, and estimate our resource consumption analyzing the length of stay and severity in every diagnostic group.

SOLUTION

OBJECTIVE: Analyze the encoded diagnostics at ICU discharge through ICD-9-MC system, collected of data base ICIP

METHODS:

Our ICU is a medical and surgical service, equipped with six boxes that receives on average, 300 patients every year. Its computerization began in 2010. Since that date to September of 2012 we have collected 583 episodes in ICU. The ICIP, in addition to the daily clinical and administrative management of the ICU, allows the data storage and processing. It includes the ICD-9 catalogue and a diagnostic and procedures search system into. By means of queries to the database, we describe the principal and secondary diagnostics at ICU discharge, and the mortality, severity and length of stay in every diagnostic group.

RESULTS

<table>
<thead>
<tr>
<th>Diagnostics</th>
<th>Length of Stay (hours)</th>
<th>Mortality</th>
<th>APACHE II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute myocardial infarction without q 410.7</td>
<td>34%</td>
<td>132,06</td>
<td>56,8</td>
</tr>
<tr>
<td>Acute myocardial infarction (AMI)</td>
<td>30%</td>
<td>134</td>
<td>48,1</td>
</tr>
<tr>
<td>Coronary Intermediate Syndrome 411.1</td>
<td>15%</td>
<td>125,7</td>
<td>31</td>
</tr>
<tr>
<td>Angor pectoris 413</td>
<td>6%</td>
<td>109</td>
<td>55</td>
</tr>
<tr>
<td>Ischemic cardiac disease. Not specified 414.9</td>
<td>6%</td>
<td>57,3</td>
<td>33%</td>
</tr>
<tr>
<td>Cardiogenic Shock 785.51</td>
<td>4%</td>
<td>235</td>
<td>62,5</td>
</tr>
<tr>
<td>Cardiac arrest 427.5</td>
<td>2%</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Ventricular fibrillation 427.41</td>
<td>2%</td>
<td>118</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>11%</td>
<td>146,5</td>
<td>54,08</td>
</tr>
</tbody>
</table>

Table 3: The non coronary most frequent encoded diagnostics

<table>
<thead>
<tr>
<th>Diagnostics</th>
<th>Length of Stay (hours)</th>
<th>Mortality</th>
<th>APACHE II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infectious and Inflammatory 16%</td>
<td>21,4</td>
<td>246</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: The non coronary most frequent encoded diagnostics

CONCLUSIONS

63% of episodes were encoded. 467 diagnostics were encoded in 368 episodes of ICU admission, with an average of 1.26 diagnostics every episode. Significant differences between encoded and no encoded groups were not found regarding age, gender, length of stay in ICU, APACHE II and mortality. The score GRACE was significant higher in the encoded episodes (p= 0.012 IC 5,03-39.6).

Although only 63% of the episodes were encoded at discharge of ICU, they could be representative of the ICU admitted overall population. The diagnostics encoded are 11% coronaries, 28% medical-surgical and 62% antecedents.

In the encoded episodes, we differentiate in coronary and medical-surgical episodes. In the coronary episodes, importantly, the acute coronary syndrome without at elevation (Coronary Intermediate Syndrome Angor pectoris Acute myocardial infarction without q) reaches the 55% of the diagnostics, with high severity (GRACE 121,4) and 48,2 hours of length of stay, the similar form to acute coronary syndrome with at elevation.

In the medical/surgical diagnosis, we want to emphasize the high mortality of the episodes encoded within infectious disease and within this septic shock patients, as well as the high prevalence, mortality and length of ICU stay in patients with acute renal pathology.

The diagnostics related to more length of stay were peritonitis, septic shock, shock unspecified and ARDS.

LESSONS LEARNED:

In the future, we must move forward in coding all episodes. On this way it will be more possible to compare our data along the time, as well as with other units.

ANTECEDENTS

- Hypertension 401.9
- Diabetes mellitus 250
- Hyperlipemia unspecified 272.4
- Atrial fibrillation 335.1
- COPD 490.2
- Ischemic heart disease 410.4
- Heart failure 428.0
- Atrial fibrillation 427.3
- Others

TOTAL 62% of encoded diagnostics
Background
Clinical information is extremely important in the management of patients. It needs to be accurate but also needs to be delivered to appropriate clinicians in a timely manner. Some information (electrolytes) is needed on a daily basis but other information (high sodium, hyperlactatemia) needs to be known as soon as possible.

The advent of clinical information systems as well as accessible hospital databases provides an opportunity to automate the delivery of critical data to the most appropriate clinician. This approach might help to reduce errors associated with unread results, unexpected admissions of high risk patients, and clinical deterioration.

Methods
By linking data from our ICU clinical information system (ICIP, Philips Medical), the hospital’s patient master index (PAS, CSC Healthcare), Pathology and other local databases using existing software Rhapsody (ORION Health, California, USA) and SQL Server (Microsoft, Washington, USA) we have developed a multi-level approach to information dissemination.

RESULTS
Each day approximately 140,000 messages are processed by the Rhapsody software. Together with data from hospital databases clinical information is automatically distributed to key stakeholders.

On average over a period of one day:
- 13 Level 1 Instantaneous SMSs are sent
- 18 Level 2 Instantaneous emails are sent
- 30 Level 3 Aggregated daily emails are sent
- Each month 21 different Level 4 reports are distributed.

CONCLUSION
We have shown that, by using the clinical information already available within the hospital, we can generate meaningful alerts and reports and have them distributed to key decision makers in appropriate timeframes.

It is our hope that by alerting key decision makers early of information pointing to clinical deterioration, we can further shorten the time to appropriate treatment and, eventually, prevent clinical deterioration altogether.
MECHANICAL VENTILATION IN PATIENTS WITH Acute Lung Injury (ALI)/Acute Respiratory Distress Syndrome (ARDS): CLINICAL AUDIT.

Molina R, Arnal D, García del Valle S.

CHALLENGE

ALI/ARDS and its treatment is one of the most common challenges in critical patients in an ICU.

- Incidence of ARDS varies between 1.5-75/100,000 persons.
- 25-40% of those cases are fatal.
- Use of low Tidal Volumes (TV) is the only measure of mechanical ventilation that has shown to improve survival.
- Unnecessary hyperventilation is a common condition when dealing with ARDS.

OBJECTIVES

- Determine the patterns of Mechanical Ventilation used in our unit in critical patients.
- Compare them to the standard patterns considered as optimal and acceptable ventilation.

METHODS

- Six months retrospective audit of records on patients with mechanical ventilation for more than 24 hours using ICIP/PHILLIPS.
- Exclude those records with PaO2/FiO2>300mmHg and/or patients with cardiogenic respiratory insufficiency.
- Build a database with 2 daily records (7AM/7PM) for each patient.
- Basic statistical analysis of the data obtained.

OPTIMAL VENTILATION

- TV ≤ 6 mL/kg + P plateau ≤ 30 cm H2O + pH > 7.30

ACCEPTABLE VENTILATION

- pH < 7.15 with any ventilation
- TV ≤ 11 mL/kg with any pH
- P plateau ≤ 35 cm H2O with any pH
- TV > 11 mL/kg + pH ≤ 7.35

UNNECESSARY HYPERVENTILATION

- TV > 11 mL/kg + pH ≤ 7.35
- P plateau > 35 cm H2O + pH < 7.35

RESULTS

- 26 patients
- Mean stay in ICU: 14.8 days.
- Mean time on Mechanical Ventilation: 11.9 days.
- 83.2% of the records received Adequate Ventilation.
- 14.6% of the records received Unnecessary Hyperventilation (8 patients)
- 2.1% of the records received Optimal Ventilation.

CONCLUSIONS

- The majority of our patients (83.2%) received Adequate Ventilation.
- We discovered that more than one third of our patients were exposed to Unnecessary Hyperventilation at some point of their admittance in our unit.
- Clinical portfolios (such as ICIP) serve as a valuable tool to: perform clinical audits, make decisions according to clinical standards and guidelines based on the data displayed, and elaborate simple alerts to avoid unwanted clinical outcomes (such as Unnecessary Hyperventilation).
- Data obtained commits us to re-audit our ventilation patterns and determine if following a protocol increases the records of Optimal and Adequate Ventilation, and/or affects the prognosis of our patients.
- After our experience we plan to use ICIP to establish an alert system to avoid unwanted results in our patients.
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