PHILIPS

IntelliSpace

Critical Care and Anesthesia

Success stories

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.

Contributing authors
Hospital materno infantil Teresa Herrera (A Coruña, Spain)
Imperial College (London, UK)
GIG CYMRU NHS Wales (Wales, UK)
Hospital Santa Barbara (Puertollano, Spain)
St. Vincent's Hospital (Melbourne, Australia)
Hospital Universitario Fundación Alcorcón (Alcorcón, Spain)

Table of contents

1. Early diagnosing by an improvement of 120% in the accomplishment of inborn errors metabolism program, Hospital materno infantil Teresa Herrera

SERVIZO GALEGO de SAÚDE | Xerencia Xestión Integrada A Coruña

Early diagnosing by an improvement of 120% in the accomplishment of inborn errors metabolism program

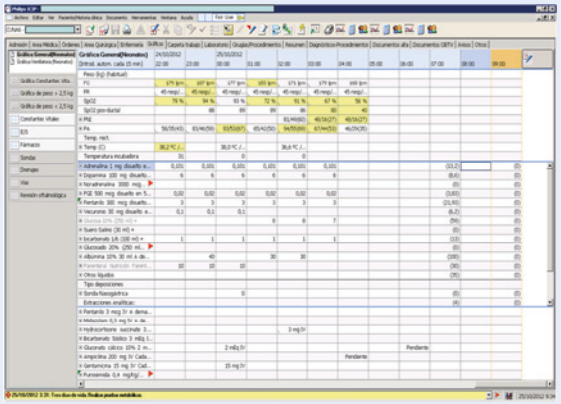
Fdez. Trisac Jose Luis. UCIN. Hospital materno infantil Teresa Herrera. CHUAC. A Coruña. Spain

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

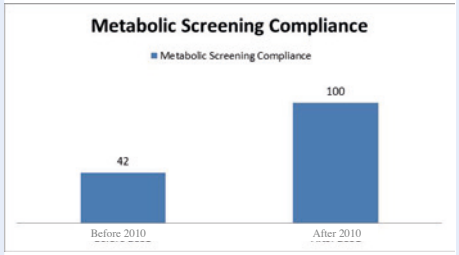
In January of 2010 an advisory was configured for NICU in our clinical information system (Philips ICIP). For admitted patients, the third day of life, this advisory reminds the need to perform tracking of inborn errors of metabolism.

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 developement, once the patient exceeds the critical care phase. And these actions sometimes are delayed or ignored during critical care.



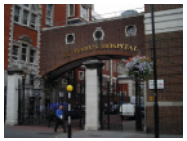
LESSONS LEARNED

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, inmunization schedule reminders,…

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

2. A clinical information system reduces medication errors in paediatric intensive care, Imperial College London

Imperial College London



A clinical information system reduces medication errors in paediatric intensive care

Catherine Warrick (1), Hetal Naik (2), Susan Avis (1), Penny Fletcher (1), Bryony Dean Franklin (2,3) David Inwald (4)

1.Paediatric Intensive Care Unit, St Mary's Hospital, Imperial College Healthcare Trust, London W2 1NY,
2.The School of Pharmacy, University of London, London WC1N 1AX
3.Centre for Patient Safety and Service Quality, Imperial College, London W2 1PG
4.Department of Paediatrics, Imperial College (St Mary's Campus), London W2 1PG

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 occuring 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.

SETTING

The study was performed at the PICU in Imperial College Healthcare NHS Trust, London, UK, which has 8 beds and admits approximately 400 patients per year. ICIP was introduced in April 2009 with prescriptions based on standard weight based orders and user alerts for nursing staff when drugs due.

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) preimplementation to 10.6% (6.5 – 14.7) one week after implementation and 1.4% (CI 0-2.8%) six months after implementation (Table 1)

Table 1 – Incidence of prescribing errors and missed doses

	Epoch 1	Epoch 2	Epoch 3
Prescribing errors (n/ number of prescriptions)	14/159 (8.8%)	17/208 (8.1%) ns	12/257 (4.6%) ns
Missed doses (n/total number of doses given)	43/528 (8.1%)	23/216 (10.6%) ns	4/278 (1.4%) p<0.05

Types of error changed – incomplete and illegible prescriptions almost disappeared, as did insufficient information. Clinical decision errors remained a problem (Table 2)

Table 2 – Types of error

Medication Error	Epoch 1	Epoch 2	Epoch 3
Incomplete prescription			
No signature	1	0	0
No start date	0	0	0
No dose	0	4	1
No frequency	0	0	0
No route	0	4	0
Insufficient information			
No patient name	0	0	0
No hospital number	0	0	0
Drug sensitivity box not completed	5	0	0
Illegible prescription	2	0	0
Clinical decision error			
Need for drug	0	0	2
Inappropriate choice of drug	1	0	1
Duplication of therapy	1	1	1
Inappropriate dose	3	3	6
Inappropriate frequency	1	0	0
Inappropriate route	0	0	0
Other error	0	5	1

CONCLUSION

Introduction 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

Warrick C, Naik H, Avis S, Fletcher P, Franklin BD, Inwald D. A clinical information system reduces medication errors in paediatric intensive care. Intensive Care Med. 2011;37:691-4

3. 100% compliance with the ICCA bundle over a sustained period helps to eliminate CRBSI, GIG CYMRU NHS Wales

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

Intoduction

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

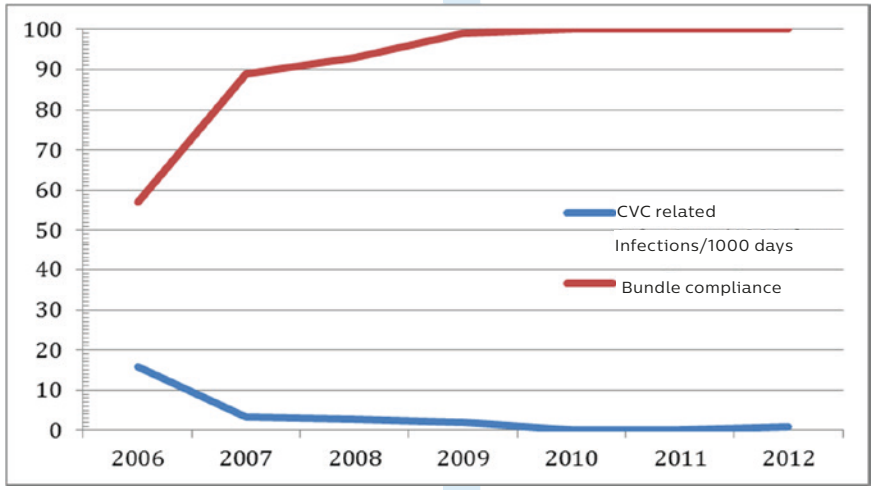
We investigated if records generated in the clinical information system (CIS) can be used for contemporary monitoring of process compliance and outcome.

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 8days 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.

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

4. Classification of diagnostic at discharge of a critical care unit, using the clinical information tool ICIP, Hospital Santa Barbara, Puertollano

CLASSIFICATION OF DIAGNOSTIC AT DISCHARGE OF A CRITICAL CARE UNIT, USING THE CLINICAL INFORMATION TOOL ICIP

F. Prieto, J Villegas, A García, N Parias, A Ferrezuelo, E Moreno.
Hospital Santa Barbara. Puertollano. Spain. Intensive Medicine Service.

CHALLENGE

The efficiency in the use of resources in Intensive Medicine should start by knowing the casuistry 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

OBJETIVE: *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 July. 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

		AGE[1]	MALE	LENGTH OF STAY (hours)[1]	APACHE II[1,2]	GRACE[1,3]	MORTALITY
ALL EPISODES	583	65,4 ± 15,8	63,4%	120,4 ± 240	22,7 ± 10,5	139 ± 60,4	9,4%
ENCODED	368	65,6 ± 15,6	61,1%	130,8 ± 259,5	22,1 ± 10,2	146,9 ± 60,8	8,6%
NOT ENCODED	215	64,9 ± 16,2	67,4%	97,4 ± 188,6	23,8 ± 11,2	124,4 ± 57,1	10,6%

Table 1: Characteristics of the encoded episodes. 1 mean ± Standard deviation. 2APACHE II: Acute Physiology and Chronic Health Evaluation II. 3GRACE: Global Registry of Acute Coronary Events

CORONARY DIAGNOSTICS		GRACE	LENGTH OF STAY (hours)	MORTALITY
Acute myocardial infarction without q 410.7	34%	132,06	58,8	
Acute myocardial infarction (AMI)[4]	30%	134	48,1	
Coronary intermediate Syndrome 411.1	15%	122,7	31	
Angor pectoris 413	6%	109	55	
Ischemic cardiac disease. Not specified 414.9	6%		57,3	33%
Cardiogenic Shock 785.51	4%	235	62,5	50%
Cardiac arrest 427.5	2%		2	
ventricular fibrillation 427.41	2%		118	
TOTAL	11%[5]	146,5	54,08	4,2%

[4] AMI: 410.4, 410.2, 410.3, 410.5, 410.9. [5] of encoded diagnostics
Table 2: Characteristics of the encoded coronary episodes.

NON CORONARY ENCODED DIAGNOSTICS	APACHE II	LENGTH OF STAY (hours)	MORTALITY
TOTAL	28% 21,9	175,9	9,1%

RESPIRATORY CODES	16%	22,7	123,7	4,7%
COPD (chronic obstructive pulmonary disease) with acute exacerbation 491.21		22,5	58,1	
COPD (chronic obstructive pulmonary disease) without acute exacerbation 491.2		31,2	123	
Hypercápnic respiratory failure 518.84		23	28,6	
Acute respiratory Distress Síndrome ARDS 518.82		18	285,3	

CARDIOVASCULAR CODES	30.5%	20,2	178,9	5%
Congestive Herat failure 428.0	40%	17,5	161,8	
Left Ventricular Failure 428.1		21,5	46,3	
Auriculoventricular Blockade 426.0		20	52	
Acute Myocarditis 422		7	33,3	
Pulmonary Thromboembolism 415.1			25,5	
Auricular Fibrillation 427.31		49	924	
Others		18,5	96	

OTHER PATHOLOGY	36%	23,3	155	10.6%
Acute renal failure 584.9	49%	29	156,7	
Adquirid Hypothyroidism 244		29	88,5	
Shock not specified 786.1		22,3	261,6	
Multiple rib fractures 807.9		13	240	
Others		23,3	139,1	

INFECTIOUS AND INFLAMMATORY CODES	16%	21,4	246	19%
Diagnóstics related to Sepsis*	48%	18,5	166	
Peritonitis 567		26,3	428	
Acute Pancreatitis 577.0		16	154	
Bacterial pneumonia unspecified 482.9		25	305	
Others		21,5	234,5	

Table 3: The non coronary most frequent encoded diagnostics
Diagnostics related to Sepsis: Septic shock 785.52 (50% of the diagnostics related to sepsis. Mean APACHE II 22,7. Mean length of stay 312,6 hours). Other diagnostics: 995.93. 995.91. 995.94. 995.92

ANTECEDENTS	
Hypertension 401.9	36%
Diabetes mellitus 250	17%
Hyperlipidemia unspecified 272.4	13%
Smoking 305.1	11%
COPD 491.2	4.5%
Ischemic heart disease 414.9	4%
Heart failure 428.0	4%
Atrial fibrillation 427.31	3%
Others*	7%
TOTAL	62% of 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 st 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 st 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 codifying all episodes. On this way will be more possible to compare our data along the time, as well as with other units.

5. Automated notifications and reports to enhance patient care, St Vincent's Hospital, Melbourne

Automated Notifications and Reports to Enhance Patient Care

David A Reid, John D Santamaria
Intensive Care Unit, St Vincent's Hospital Melbourne

IntelliSpace Critical Care and Anaesthesia

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.

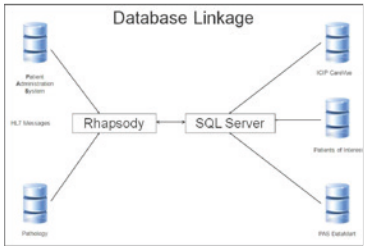


Figure 1. Linked data sources

Level 1: Instantaneous via SMS.
Examples include admission to ICU, sodium >155, patient meeting research criteria.

Figure 2. SMS alert new ICU patient

Figure 3. SMS alert Na+ > 155

Level 2: Instantaneous via email.
Examples include an emergency patient with high CO2, low pH and high lactate: previous ICU patient admitted to emergency department (ED), perioperative medicine patient admitted to hospital, patient known to the ID service admitted to hospital.

Figure 4. Email alert previous ICU patient admitted to ED

Figure 5. Email alert previous ICU patient admitted to ED

Level 3: Aggregated information by email daily.
Examples include ICU admissions & discharges, former ICU patients discharged from hospital, antibiotics prescribed with indications to ICU patients.

Figure 6. Automated daily email ICU antibiotic usage

Level 4: Regular or ad hoc emails.
Examples include weekly use of blood products, patients who present to the ED within seven days of having a particular procedure, Hospital severity adjusted mortality (EWMA chart).

Figure 7. Automated weekly email blood product usage

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.

St Vincent's Hospital Melbourne Victoria, Australia , is a 400 bed hospital containing 15 ICIP beds.

StV ASPIRE ACHIEVE INNOVATE

6. Mechanical ventilation in patients with acute lung injury (ALI)/acute respiratory distress syndrome (ARDS): clinical audit., Hospital Universitario Fundación Alcorcón

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.
- Unnecesary 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.

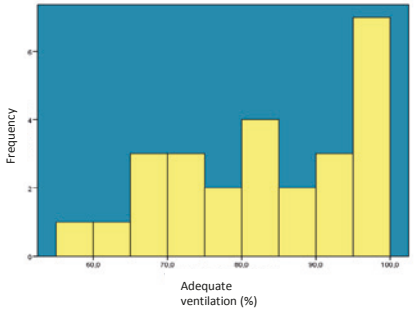
METHODS

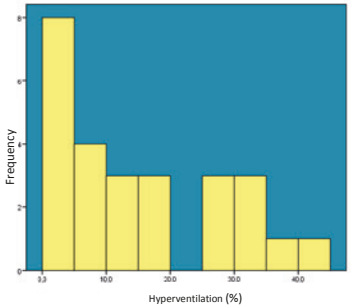
- Six months retrospective audit of records on patients with mechanical ventilation for more than 24 hours using ICIP/PHILLIPS.
- Exclude those records with PaO2/FiO2>300mmHg and/or patients with cardiogenic respiratory insufficiency.
- Build a database with 2 daily redords (7AM/7PM) for each patient.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

OPTIMAL VENTILATION	ACCEPTABLE VENTILATION	UNNECESSARY HYPERVENTILATION
• TV 4 - 6 mL/kg + P plateau ≤ 30 cm H_2O + pH > 7,30	• pH<7,15 with any ventilation • TV 6-11 mL/kg with any pH • P plateau 30 - 35 cm H2O with any pH • TV >11 mL/kg + pH < 7,35 • P plateau >35 cm H2O + pH < 7,35	• 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%) recieved 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.

www.philips.com

4522 991 65581 * DEC 2020