High frequency, low cost ‘routinely’ pathology tests are performed daily as part of the management of critically ill patients in the intensive care unit (ICU). It has been suggested that between 30% - 66% of in-hospital pathology tests are unnecessary [1,2,3,4]. The problem with unnecessary pathology testing is the potential for patients to be exposed to the risks and complications [5,6].

3. Increased likelihood of false-positive results, over investigation, and adverse outcomes due to unwarranted additional intervention [7].

Additionally, there are costs which are more difficult to quantify including nursing hours lost to blood collection and medical staff hours associated with reviewing large volumes of pathology results that may not have contributed to the management of the patient. Furthermore, financial costs to the public health system are under ever increasing pressure to ensure sensible and cost-effective use of healthcare resources.

Aim and Objectives

To change practices around ABG testing and reduce the number of ABGs performed for non-clinical reasons thereby ensuring appropriate utilisation of this resource.

• Reduce the total number of ABG tests performed within the Nepean ICU per annum (p.a) from 11422 to 9137 by July 2019 (equal to a 20% reduction based on 2000 admissions to the Nepean ICU in 2017/18 FYE)

• Reduce the percentage of ABGs performed for non clinical reasons (inappropriate) from 29% to 9% by July 2019 (Based on Nepean ICU survey data 2018)

Method

Project design – Our Diagnostics came from retrospective data focusing on high frequency ABGs commonly performed within an adult ICU. The study period was 1st July 2017 - June 30th 2018.

Ethics approval was submitted by the team for Study Reference Number: LNR/18/NEPEAN/129)

Project settings and patients - The project was conducted in the ICU of the Nepean Hospital which is a 22-bed tertiary academic ICU operating a closed model of case. The case mix is both medical and surgical. During the day, the rostered consultant intensivist leads on-floor patient management. Overnight, a consultant intensivist is on-call. Registrars and JMOs have greater participation in the management of patients overnight.

Data collection – Unidentified clinical and laboratory patient data was collected from the electronic medical record during the study period. Clinical data for the study period included: number of admissions to the ICU; average age of the patient; average length of stay; admission type (medical vs surgical); number of patients requiring ionotropes; number of patients requiring ventilation/non-invasive ventilation; and average length of stay (LOS) in the ICU. The laboratory data was provided locally by Pathology NSW - NSW Health. Laboratory data included: total number of ABGs ordered within ICU during the study period and their cost; and the date and time ABGs were performed. An anonymous opt out survey for nursing staff was conducted over a two week period in Feb/March 2018. This survey was completed at the time the ABG was performed and was aimed at understanding why the ABG had been performed. Staff feedback was canvassed regarding their understanding of when ABGs are useful and clinical indications. Further and most importantly informal discussions were had with patients about their experiences when having ABGs taken.

Diagnostics

Table 1 Demographics of the Study Population

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<tbody>
<tr>
<td>2059</td>
<td>58.9</td>
<td>70.4</td>
<td>75% medical</td>
<td>25% surgical</td>
<td>197</td>
<td>580</td>
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Results

We are in the early phase of implementation with all solutions except solution 8 implemented. Solutions were implemented in February 2019. At this point in time we are conducting surveys and audits to access the efficacy of the solutions thus far.

Table 4 Number of ABGs ordered pre and post intervention for March 2018 vs March 2019

<table>
<thead>
<tr>
<th>Total No of ABGs performed</th>
<th>March 2018</th>
<th>March 2019</th>
<th>Reduction in ABGs</th>
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<tr>
<td>164 surveys were completed (~49% participation)</td>
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Conclusions

• The results of the study demonstrate that there were a total of 11422 ABGs performed within the ICU during the 2017/2018 financial year, costing $487,864.40, utilising 54.4 FTE weeks and requiring 34.27 L of patient blood.

• The pre-intervention survey data suggests that approximately 30% of all ABGs were performed for non-clinical reasons and highlights this as an area for significant change.

• Fluctuations in the number of ABGs performed at specific times within a 24hr period were observed, notably when nursing staff change shifts and when consultants are on-call overnight.

• This project aligns with the internationally recognised “Choosing Wisely” campaign [9]. Choosing Wisely encourages health care providers, patients and their families to discuss how investigations such as blood tests will contribute to the patient’s management.

• This study will inform future quality improvement projects operated under the principles of clinical redesign. Currently other high frequency pathology tests are under consideration as a QI project based on this project with Nepean Hospital.

Acknowledgements

All Nepean ICU staff for their enthusiasm and participation, special mention to Professor Milican (Department Head) and Carmel Zucak (Nursing Unit Manager). Many thanks to Peter Thomas (Executive Sponsor and Medical Director), Intensive Care NSW Clinical Best Practice Group, Sue Cusworth, Helen Badge, NSW Pathology and NSW POC, special mention Donna Barbato.