U O W

Med+Safe®

Embedding technology for a whole of curriculum approach to numeracy in nursing

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So – what is Med+Safe® ?

- Med+Safe® is an Australian designed software programme that provides a learner centred comprehensive programme for the accrual of knowledge, skills and confidence with regard to numeracy in nursing.

- Numeracy in nursing comprises; medication rights; medication calculations as well as mathematics for clinicians. IntelliLearn hosts, develops and delivers online courseware, including Med+Safe®, specifically for the HealthCare Sector and specifically for Nurses and Midwives.

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Synching with Faculty and University Strategic goals

- 1:2 enabling graduates to be career ready.
- 2:1 Transforming how we teach and assess learning
- 2:2 Modernising, providing real world, inquiry-led, technology enriched, intellectually challenging learning environments
- 2:3 Enabling every student to reach their potential for transition
- 2:4 Making sure that learning is invigorated through innovative learning environments
- 2:6 Ensuring that academic quality is embedded in what we do
- 5:4 Delivering real world solutions in an ever changing digital landscape

Outlining the problem

- Medicines in all of their forms are commonly used as the primary therapeutic modality in modern health care. Medication administration errors, contribute significantly to hospital admission, length of stay and morbidity.
- 2 to 3% of all hospital admissions are medication related (Roughead et al 2016) The error rate (excluding timing errors) of medication administration in Australian hospitals has been reported occurring in around 9% or at rate of one in ten occasions of medication administration (Roughead et al 2016).
- Significant concern has consistently been raised about the adequacy of nurses' knowledge, competency and understanding with regard to; medication calculation skills; mathematical calculation concepts; and estimation and measurement abilities (Roughead et al 2013).

LITERATURE REVIEW

OPEN

The extent of medication errors and adverse drug reactions throughout the patient journey in acute care in Australia

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ABSTRACT

Aim: To provide an estimate of the numbers of medication errors and adverse drug reactions that occur along a person's journey through their hospital stay in Australia.

Methods: A search of databases and online resources was undertaken to identify published literature on medication safety in the acute care setting in Australia from 2008 to 2013. Data on the rates of adverse drug reactions and medication errors associated with hospitalization was extracted from the published studies. This evidence was synthesized with evidence from previous reviews of medication safety in the acute care setting in Australia conducted in 2002 and 2008.

Results: Findings from the Australian literature across the two previous reviews of medication safety and the present review indicate the proportion of all hospital admissions that are medication-related is between 2 and 3%. Studies assessing medication errors on admission to hospital suggest there may be an overall rate of two errors for every three patients at the time of admission to hospital. Large studies examining the rates of prescribing errors in major Australian teaching hospitals give insight into the rates of prescription error and suggest that prescription error rates of up to one error per patient occur in the hospital system. The best available evidence from more recent research suggests that errors (excluding errors of timing) occur in around 9% of medication administrations in hospital. At hospital discharge, errors in medication documentation in discharge summaries may occur at a rate of up to two errors per patient.

Conclusions: Medication safety in the various stages of the patient journey through acute care in Australia continues to be a significant problem. However, the extent of medication-related problems in acute care needs to be interpreted within the context of increasingly complex health care. There are an estimated 230 000 medication-related hospital admissions occurring per year. This suggests an annual cost of medication-related admissions of AU$1.2 billion.

Key words: acute care, adverse drug reaction, Australia, medication error, medication safety

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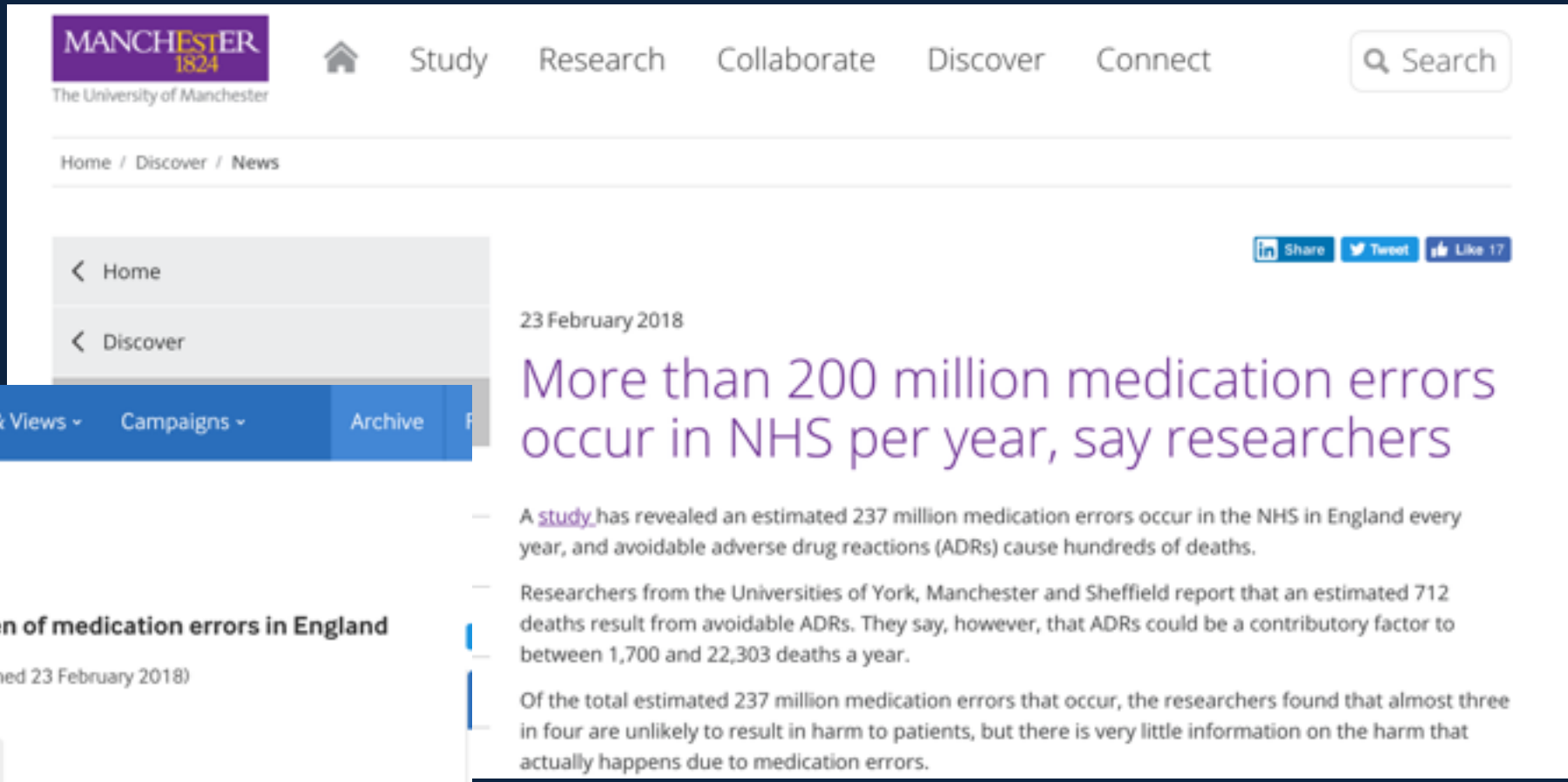

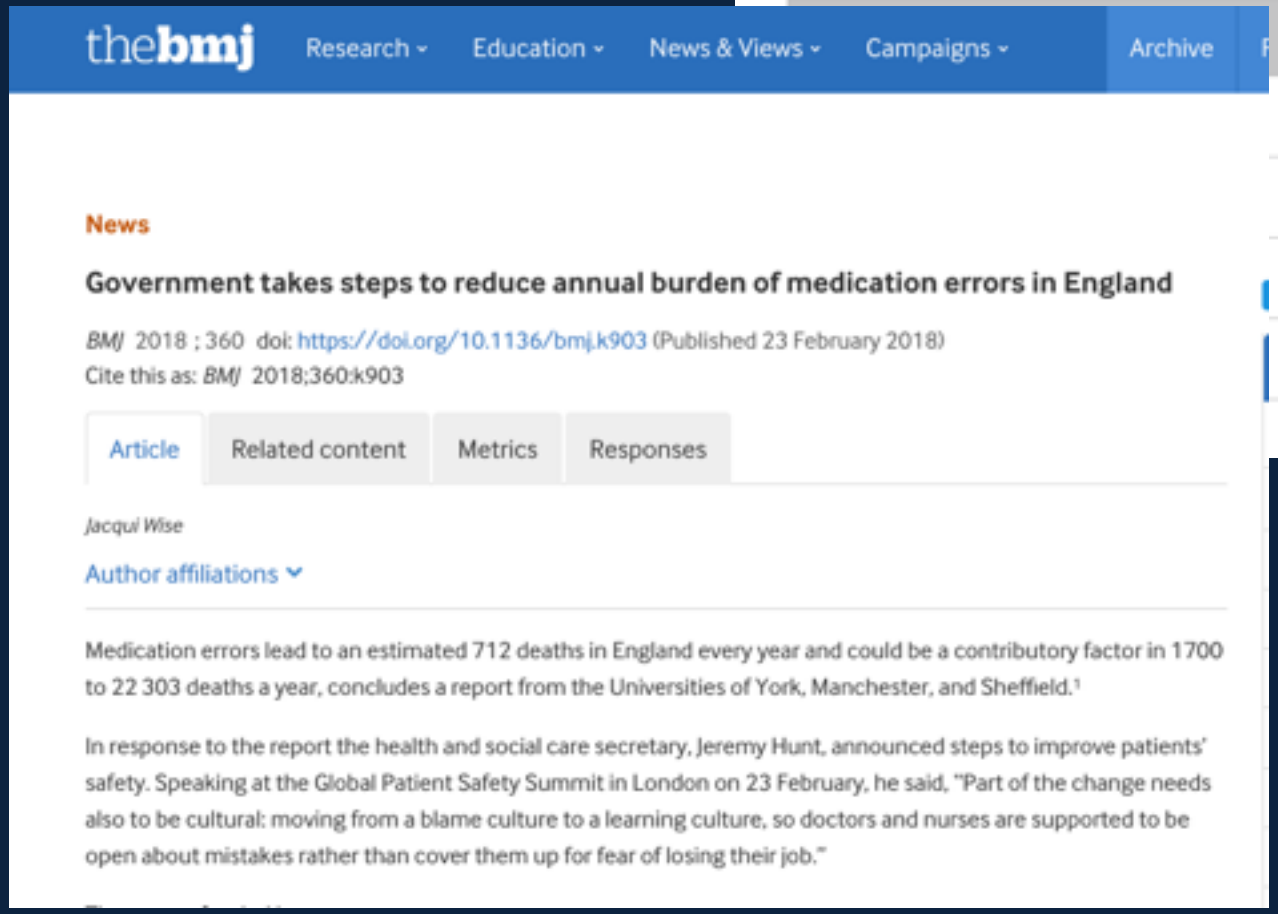

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- Mathematical skill and proficiency are pre-requisites to accurate medication calculations as the preparation of some medications require a number of sequential and complex calculations.
- Two critical thinking skills are necessary to achieve safe and accurate dosing and administration – the ability to calculate mathematically and the ability to extract relevant information from a medication prescription.
- This means competency in taking into account clinically relevant data such as; patient weight; contraindications; allergies; and therapeutic dose range.
- Any knowledge deficits or lack of understanding of any components in the process of medication calculation and administration is likely to increase the likelihood of a medication error.

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- Previously, learning about medication calculation occurred in nine discrete subjects across the three year degree
- Total cost of $146,498.43 for each student to receive 31 hours teaching in numeracy over three years.
- Equity to the subject content and curriculum is essential for delivering an accredited degree programme.
  - Year cohorts are divided into 19 tutorial groups for teaching (12 at Wollongong and 7 at outreach campuses). This requires the coordination of large teaching teams across a large geographical area. This is achieved through the use of Moodle; teaching team leadership; and the use of workbooks to guide tutorials and clinical skills labs.

Despite these measures, there is sometimes variance in specifically what is taught and this sometimes depends on the skills and knowledge of the individual tutors.

- Med+Safe® is an education strategy which provides theoretical and practical learning experiences through its simulated and interactive learning activities and tasks focused on, but not limited to, calculation and critical thinking skills across the spectrum of medication administration.
- Med+Safe® was developed in Australia by Australian clinicians with the intention of enabling users to develop their skills and understanding through training in a simulated environment.
- Uses actual reported case studies
- Learners able to self assess and be assessed

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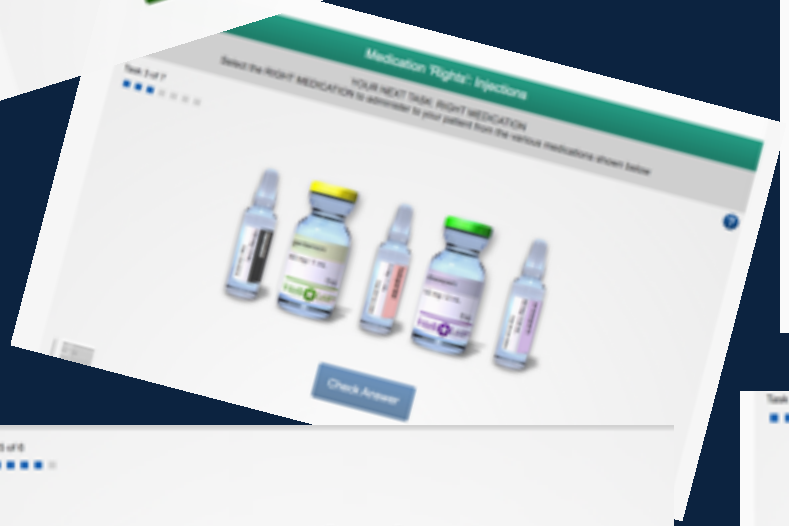
- Students and tutors receive an individual username and password to Med+Safe® which is accessible via most mobile devices that are connected to the internet such as; PC, Mac, Ipad, Iphone; Android tablets and phones. Med+Safe® provides access to simulated clinical scenarios, questions, quizzes, formative and summative assessments, learning resources (downloadable video and pdf files).
- Reports are easily formulated to provided user activity reports and performance reports. Med+Safe® is mapped to Australian Medication Safety Standard 4 (NSQHS Standard 4) and has been endorsed by the Australian College of Nursing (ACN).
- Med+Safe® is currently used by many of the 28 universities offering BN degrees in Australia including; University of South Australia; Flinders University; University of Adelaide; University of Notre Dame; Edith Cowan University; Curtin University; James Cook University; CQ University; Australian Catholic University; Melbourne University; La Trobe University; Monash University; UTS; University of Newcastle and others.



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What did students think?

- Med+Safe® was trialled at UOW in two third year subjects taught concurrently
- NMIH301 is a final year subject for students enrolled in the Bachelor of Nursing (BN) Bachelor of Nursing Advanced (BNA) and two year BN for Enrolled Nurses with advanced standing.
- NMIH322 is a final year subject for nurses enrolled in the Bachelor of Nursing for Overseas Qualified Nurses (BNOQN).
- The link to the Med+Safe® was provided in the subject's Moodle site with an explanatory block and dedicated discussion forum.
- Weekly guided activities were provided to scaffold learning across the semester with the aim of supporting learning and preparing students for the end of session exam.

Evaluating student performance

- Students were set an exam at a specific time and date during the exam period. The ten question Numeracy exam was undertaken online through the Med+Safe® programme with a first sit pass rate of 92%. Only one student failed and was supported through the academic consideration process and with remedial work to resit.
- In previous years a written ten question quiz was undertaken in the classroom with a first attempt pass rate of 60% (average across years). A great number of hours were then required to support students through remedial work and with resit opportunities for the tutors and the Subject Coordinator.

Evaluating MedSafe

- 421 students (381 BN and 40 BNOQN) participated in the trial together with ten teachers and 201 responded to the evaluation survey in Survey Monkey
- Ethical approval was gained from UOW HREC (2017/592) and participants consented to participate in completing an online survey examining; satisfaction; learning experience; confidence; interest and engagement and other parameters.

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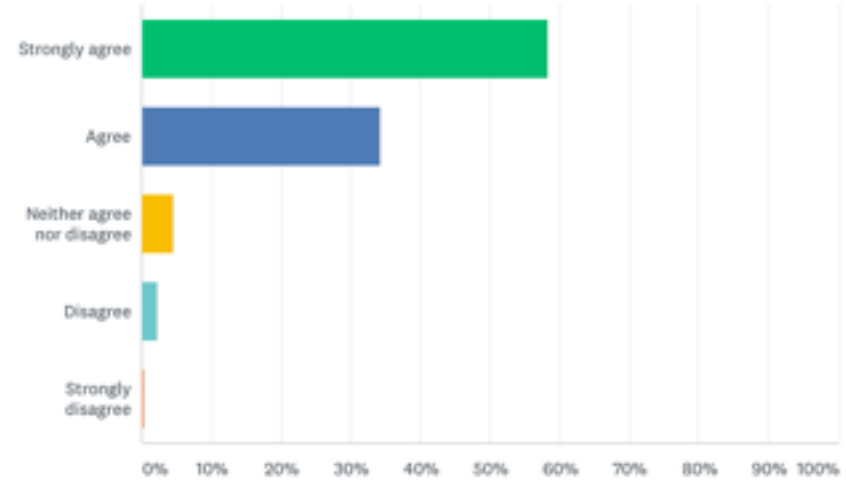
Results

Please answer each of the following questions using the scale: strongly agree/agree/neither agree nor disagree/disagree/strongly disagree The MedSafe online module helped improve my understanding of medication calculation

Answered: 221 Skipped: 0



The MedSafe online module helped improve my understanding of medication administration

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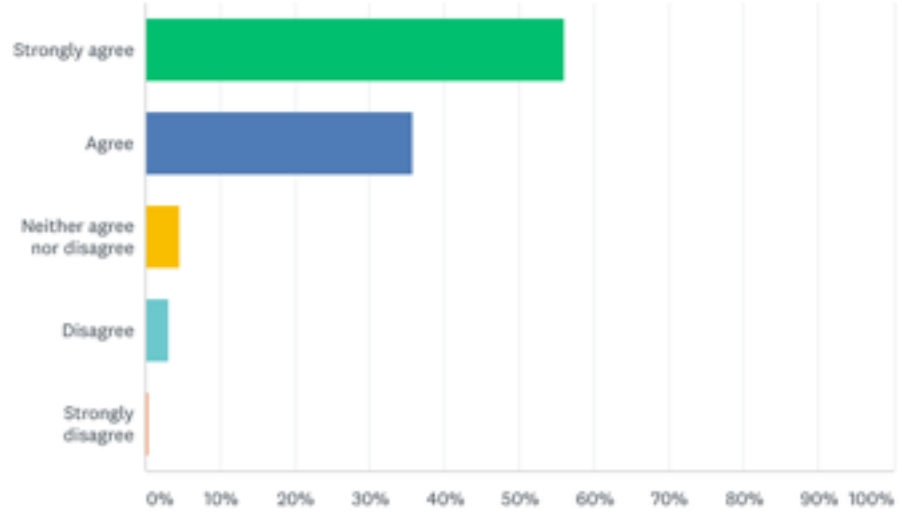

The MedSafe online module was engaging

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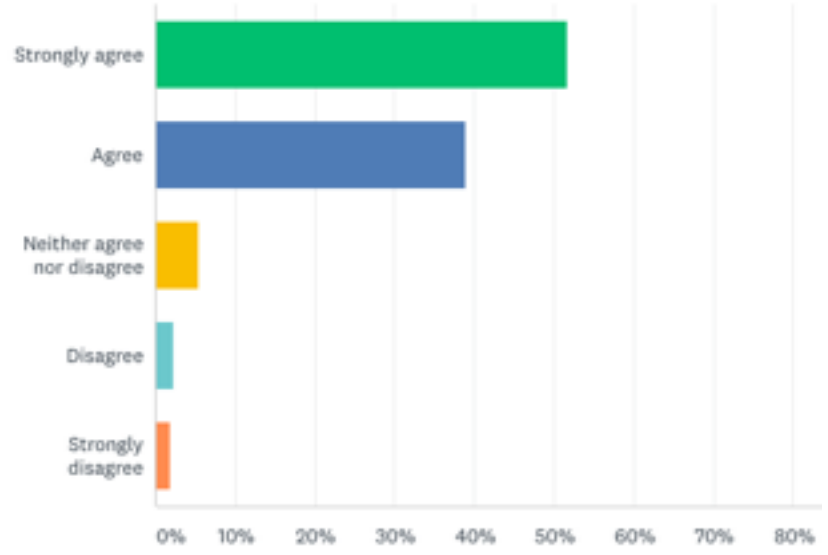

The MedSafe modules encouraged me to think critically

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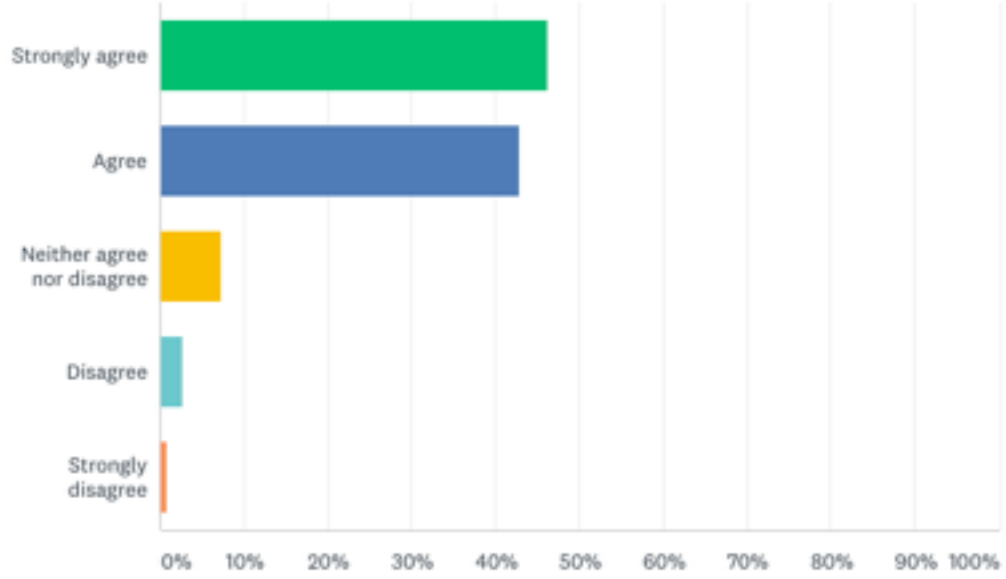

My understanding about medication calculation has improved throug using the MedSafe module

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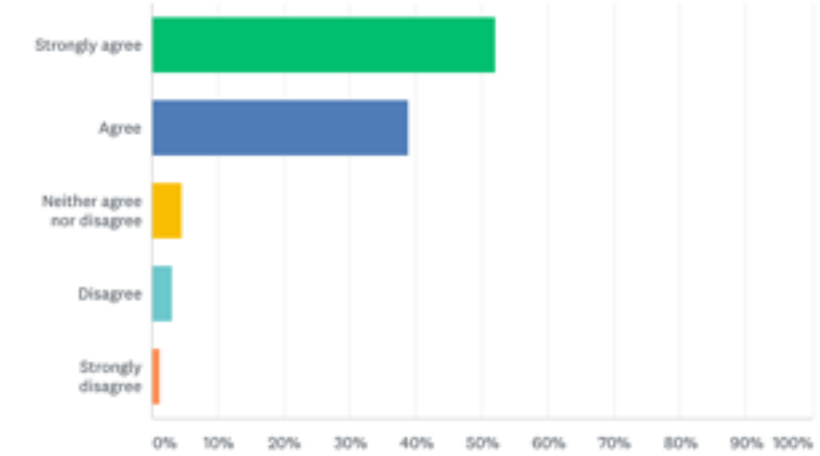

My understanding about medication administration has improved through engaging with the MedSafe module

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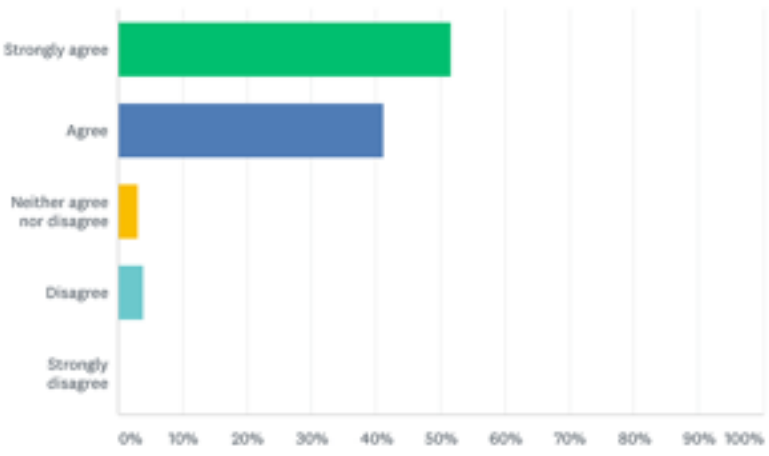

The online module was authentic and 'real world'

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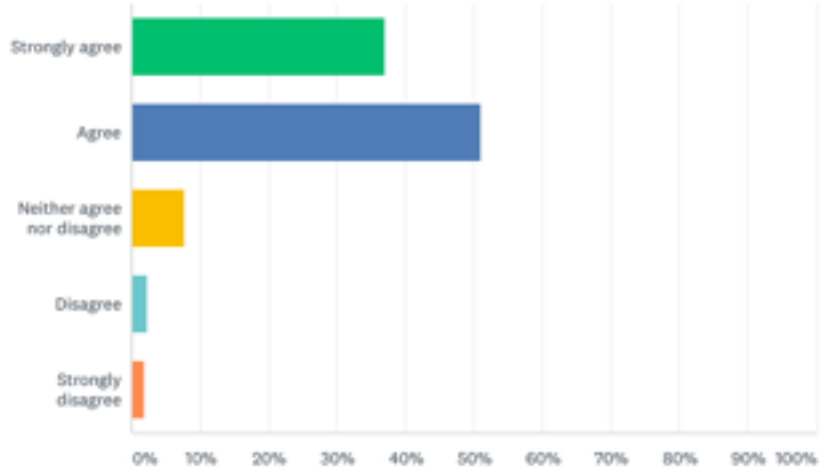

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I was able to create my own learning pathway using the different sections and activities in the module

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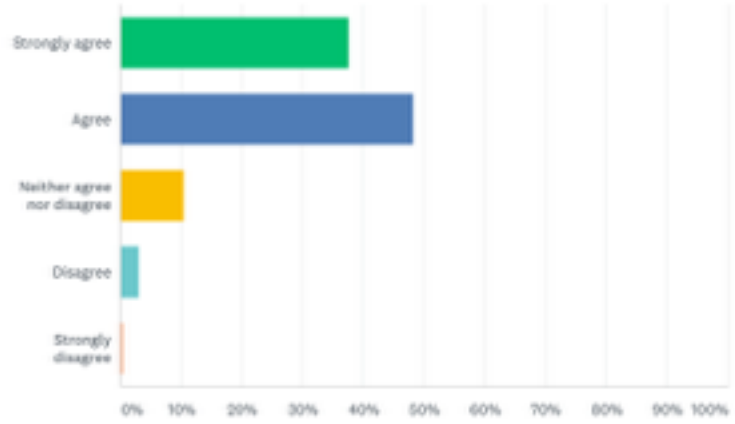

This module suited my learning style

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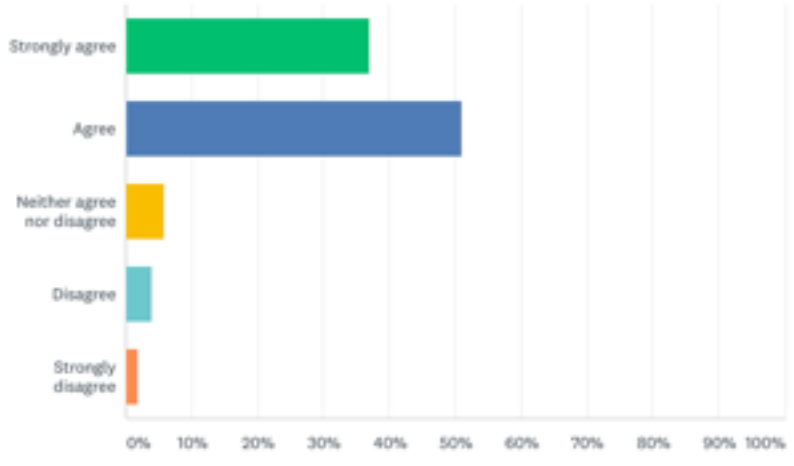

I feel more prepared for workplace experience through engaging in the MedSafe module

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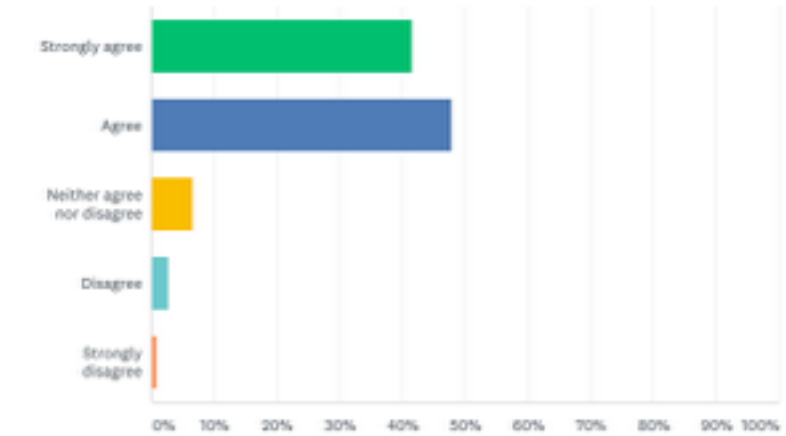

I feel more confident about medication administration and administration

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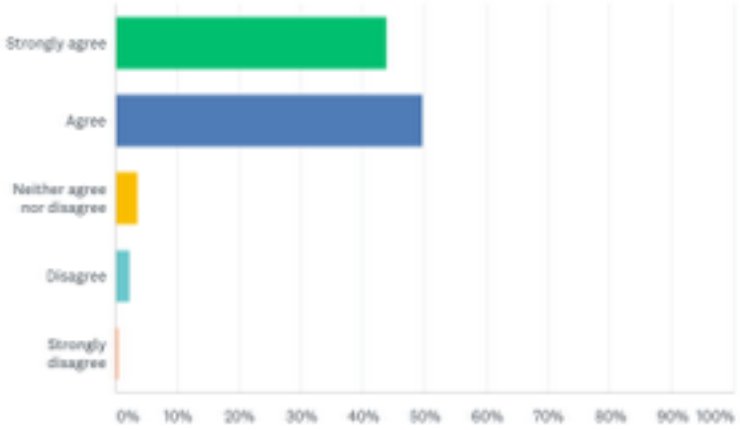

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Results - summary

- Over 93% of respondents Agreed or strongly agreed that The MedSafe online module helped improve understanding of both numeracy in general, medication calculation and of medication administration.
- More than 90% of respondents agreed or strongly agreed that the modules were engaging, accurately measured what they were learning, and 88.56 found the module to be authentic and real world. More than 88% of respondents agreed or strongly agreed that the modules; stimulated critical thinking; stimulated their interest in medication administration; were easy to navigate and easy to use; suited their learning style and enabled them to create an individual learner centred pathway using the activities and sections in the programme.
- Crucially – respondents strongly agreed (41.29%) or agreed (49.75%) that they felt more prepared for workplace experience through engaging in the MedSafe module and over 94% of respondents felt more confident about medication administration.
- These quantitative data were borne out by the free text comments with a number of comments suggesting that this programme should be available to all students in BN programmes from first year (12 comments).

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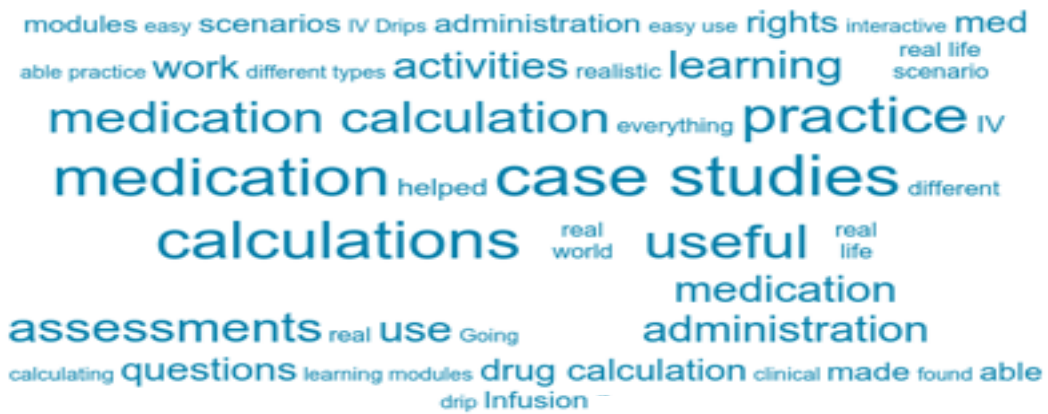
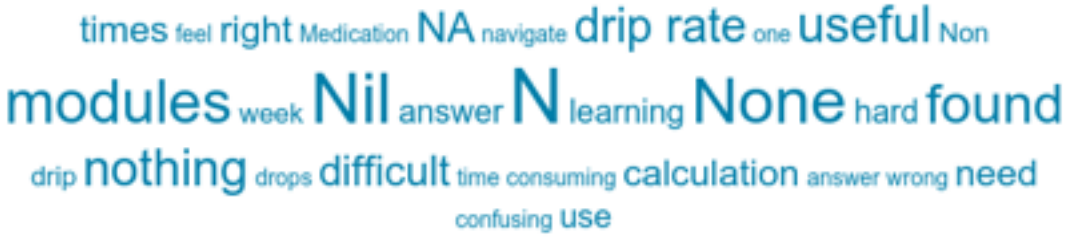
Free Text Word Clouds

Q23 Which was the most useful element or activity of your MedSafe module experience



Q24 Which was the least useful element or activity of your MedSafe module experience



Q25 Any additional comments?

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Discussion

- The case for a consistent whole of curriculum approach to medication calculation and administration is strong given the data pertaining to medication error.
- The Med+Safe® programme provides for a student centred, scaffolded, whole of curriculum approach to this topic.
- The cost of the licence for each student enrolled in the BN to have access to the programme for their entire degree compared very favourably with current costs of teaching medication calculation and administration and offers a student centred consistent learning programme.

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- Embedding and integrating numeracy skills for healthcare throughout the curriculum is consistent with a number of recommendations for best practice in this area of learning (Coben et al 2008, van de Mortel et al 2010, van de Mortel et al 2014).
- This embedded programme provides a whole of curriculum approach to the acquisition of applied numeracy skills that is student centred, allowing the individual student to follow a guided, scaffolded learning pathway.
- Student centred learning environments have been shown to allow the student to develop higher order thinking skills and deep - more permanent - learning (Guneyli and Zeki 2014).
- The Med+Safe® environment provides an authentic learning environment where simulated clinical scenarios and cases encourage deep approaches to learning as students are able to easily see the link between the learning, assessments and professional practice.

What now?

- The Med+Safe® login is available to students from the first session of their first year and access continues for their entire degree.
- Students are provided with an overview of the whole of curriculum approach and scaffolding to applied numeracy across the three years.
- One subject each session (a total of six subjects over three years) contains a focus (or knot) on the Med+Safe® programme with guided weekly activities appropriate to the session and year where the subject sits within the curriculum and an exam assessment set within the Med +Safe® programme.
- Students are able to choose to follow the guided activities each session on a week by week basis and approach the tutors for support where required but it is expected that students will use the learning resources within the programme, thus teaching will be consistent.
- Importantly, students are able to access the learning resources, case studies, calculation learning and practice, medication administration learning and practice as much as they wish. For some students this will allow them to practice and repeat learning about complex concepts for other students this will allow them to stretch and challenge themselves.

- Medication calculation and administration is now embedded in the BN curriculum in a way that aligns with the underpinning constructivist foundation.
- A constructivist approach to learning uses intentional spiralling of increasingly complex learning activities, where students repeatedly revisit previously learnt material with increasing degrees of complexity.
- Within a spiral curriculum experience, practice and knowledge are presented to students with increased complexity in each re-visitation. Students elaborate on previous topics while building increasing competency of expected learning outcomes (Ross, Noone, Luce & Sideras 2009).

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