Transforming medical student learning and transition to clinical years with an innovative curriculum, narrative learning tools and role-playing activities related to Emergency Medicine.

OVERVIEW OF CONTRIBUTION AND CONTEXT: At medical school, I remember struggling to memorise lists of facts to regurgitate for exams. I struggled because of the didactic and unengaging way these facts were often taught, and I am not alone. Many medical students become frustrated trying to memorise facts, especially when they cannot see their direct clinical relevance (Biggs, 1999). The human brain is wired to remember things through association (Brown, 2014), which is why storytelling is a key memory tool for transferring knowledge in many indigenous cultures (Lawrence, 2016). Indeed, Aboriginal and Torres Strait Islander (Indigenous) culture uses songlines, stories, and physical landscapes as visual aids to convey vast amounts of knowledge to future generations (Kelly, 2016). I have Samoan ethnicity and was brought up in Papua New Guinea, with close connections to rural and indigenous communities. My connection to indigenous cultures and my appreciation of the 'power of narrative' influences my teaching philosophy and approach. The James Cook University (JCU) Bachelor of Medicine and Bachelor of Surgery (MBBS) program is a six-year course comprising three years of largely classroom-based subjects, followed by three years of mostly clinical, workplace-based learning within the health care system. The program specialises in training doctors with a passion for Aboriginal and Torres Strait Islander health as well as vulnerable populations in remote and rural settings. In fact, 59.3% of JCU medical students in 2021 were from regional and remote areas, which is triple the national average of 20.3% of students in other universities around Australia (Universities Australia, 2020). Also, 4% of JCU medical students in 2021 were of Aboriginal and Torres Strait Islander origin compared to 1.8% of students in other Australian universities (AIHW, 2016).

In September 2017, I began my first tertiary teaching position as the lecturer and subject coordinator of JCU's Emergency Medicine subject. This subject is in the third year of the MBBS program, has approximately 200 students and ends with a short clinical placement in an emergency department. In order to motivate and inspire my students to learn, I set out to create an innovative learning experience anchored in my belief in the power of storytelling to convey knowledge. Since these changes were implemented in 2017, the pass rate for JCU medical students from diverse backgrounds, including Indigenous students, has increased by nearly 20% over the last 5 years, from 65.7% in 2017 to 82.5% in 2021.

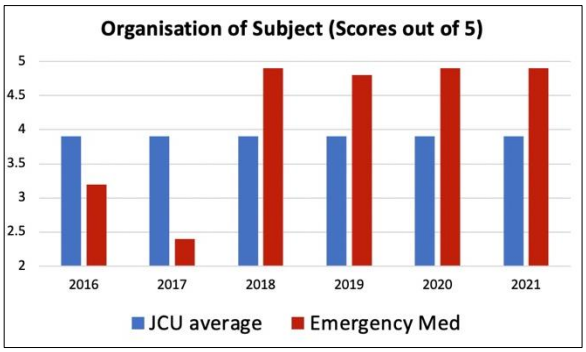
SC1: APPROACHES TO TEACHING AND THE SUPPORT OF LEARNING THAT INFLUENCE, MOTIVATE AND INSPIRE STUDENTS TO LEARN

SYSTEMS TO SYMPTOMS TO STORYTELLING: For a medical student, and myself as an emergency doctor, it can be challenging to memorise all the key treatments of a life-threatening allergic reaction. So I tell the students a story. I show them a photo of 3-year-old 'Andy'. I help them visualise Andy eating satay noodles for the first time at a restaurant and help them actually see the fear in his mother's eyes when he suddenly starts gasping for air with a widespread body rash. I let the students hold an 'EpiPen' injection device that can deliver the lifesaving adrenaline that Andy needs. I also offer the students an acronym memory aid that I use myself to remember the 5 key treatments for life-threatening allergy (anaphylaxis) - "SOFAH" - which stands for steroids, oxygen, fluids, adrenaline, and histamine blockers.

When I began as a lecturer in 2017, I had three connected teaching approaches that I wanted to introduce to the medical students. Firstly, I devised a learning experience that was structured around patients' symptoms, not their anatomical organ systems. Secondly, I created a new resource called the **Emergency Physician's Important Cases (EPIC)** cards that tell stories of 86 different patients based on each symptom. Finally, I emphasised the importance and nuances of the patient-doctor interaction by using weekly role-playing to explore each symptom and its corresponding EPIC card cases.

1. Reconceptualising curriculum from systems to symptoms: Prior to 2017, the Emergency Medicine Subject at JCU was structured around an 'organ system' based curriculum focussing each week on a single disease or 'organ' such as the lung, brain, or heart. Although the organ system-based approach to Emergency Medicine is convenient and mirrors the teaching approach used for basic science subjects (Dubin, 2016), it bears little resemblance to real-life patient presentation. Patients present with a symptom such as "chest pain" which can be caused by any one of multiple body organs or diseases. Furthermore, medical textbooks are often disease-oriented, rather than symptom-oriented, making it difficult for the student to appreciate the real challenges that exist in clinical practice when trying to distinguish between two diseases in their early stages (Silverston, 2012). Students transitioning to their clinical years need to be able to connect a patient's symptoms with a potential diagnosis, beyond the confines of a purely organ system based approach.

In Emergency Medicine, if someone is very sick, we use an approach called the ABCDE approach (Thim, 2010). This structure prioritises treatment of the **A**irway first, then **B**reathing, then **C**irculation (heart) and continues with more treatments in order of urgency. In keeping with the ABCDE approach, my new curriculum was written with airway diagnoses being studied first, followed by shortness of breath diagnoses, and chest pain diagnoses. Students have appreciated my changes to the curriculum: *"I definitely approve of the arrangement of the subject into symptoms rather than systems. I feel like this worked very well"* (Formal Student Feedback, 2018). Within one year of my new curriculum being introduced, student satisfaction scores regarding the organisation of the subject more than doubled from 2.4 to 4.9 out of 5 and have consistently stayed above 4.8 in the four years since.



2. Narrative EPIC Cards—from symptoms to storytelling: Many medical students use study aids such as flashcards and mind maps to help in their study (Sleight 2006), and once the curriculum was changed in 2017 to focus on symptoms, I created a new resource in 2018 that converted each symptom into a selection of memorable case stories: the EPIC cards. Storytelling, as is used in these case cards, has been employed in tertiary settings and has been shown to positively influence student retention of information (Oaks, 1996). The EPIC cards consist of 86 individual case characters based on specific symptoms. Each case is presented on a single A6 card with a colour portrait photo and sometimes a quirky patient name relating to the diagnosis. The cards have four quadrants, which include patient history details, examination findings, investigation results, and key management principles. These cards have become the backbone of all the lectures, small group discussions, and assessments in the Emergency Medicine subject. I provide the cards to all students as a free downloadable PDF, as an optional physical printed deck of cards, and as a free iOS app called "EPIC cards."

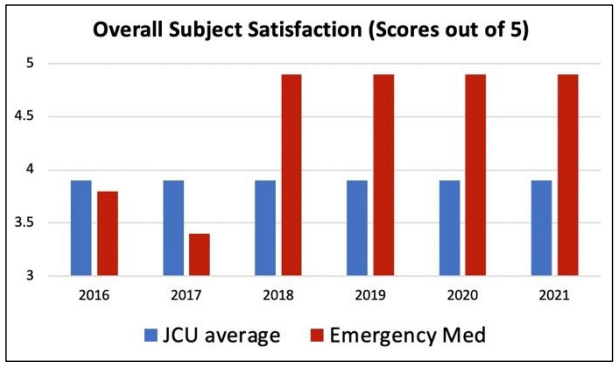
Sample of an EPIC card: front and back.

The EPIC cards app was released on 28 July 2022 and was downloaded by 117 students in its first week. Most students use the app on their iPhones, with the average active user having used the app 3.35 times in the previous 11 days. In fact, 45% of students who downloaded the app in August 2022 were actively using the app a week later. For third-year students, the EPIC cards have become a tangible library of case experiences and have given them a glimpse of what type of patients they are likely to see in their Emergency Medicine placement and clinical rotations: *"The content we were taught in EM came in very handy with the placement, often when taking a history it would be as if it came straight from an EPIC card. During this placement, I felt I could relate a lot more of our class experiences with real-world applications compared to prior years."* (Formal Student Feedback, 2020). Given that peer-assisted learning (PAL) is a well-accepted educational method within health education, involving a process of socialisation among students (Burgess, 2020), I created an extension of the EPIC cards to help students learn from and with each other in a more informal context. I created a tabletop game called "EPIC jigsaw" that involves up to 10 cases with the same initial symptom. Each of the case cards is cut into its four separate quadrants, which then requires small groups of students to consult together and match each quadrant with its corresponding diagnosis. This weekly task of "EPIC jigsaw" helps replicate real-life situations where multiple patients present with the same initial symptom, and only through analysis of their history, examination features and investigations can a doctor differentiate between cases. Students have found these activities highly useful: *"Case based learning and the EPIC cards were utilised excellently and really made the subject engaging and assisted my understanding of weekly content"* (Formal Student Feedback, 2020).

Students playing 'EPIC jigsaw'

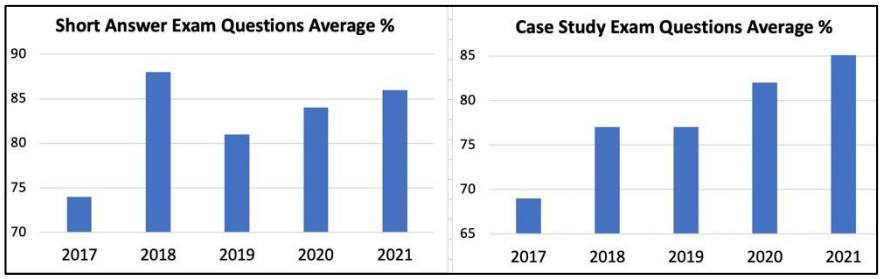
3. Role-playing: Role-play is widely used as an educational method for learning about communication in medical education (Nestel, 2007), and in the Emergency Medicine subject, role-playing became a means of bringing the EPIC cases to life and having students really engage with each case character. In 2018, I began to get volunteers to come to the front of the class and role-play being a patient using one of the EPIC cards. I would role-play the doctor and would actively verbalise my clinical thought processes of why particular history or examination findings were significant for each diagnosis. Then, during the following three-hour guided workshop sessions, I would switch: this time students were the doctor and myself or a tutor would be the patient, again based on one of the case-narrative EPIC cards. Students have appreciated this innovative approach: *"I enjoyed the role-play and EPIC cards which added a different way of learning that was conducive to my [learning] style"* (Formal Student Feedback, 2018).

Other interactive tasks included a "Stroke Charades Game" where students were tasked to exhibit limb weakness patterns and other students had to guess which cerebral brain vessel was occluded. I also initiated a "Toxidrome Fashion Parade" where students dressed up in different hats, sunglasses and shoes to represent different toxicological syndromes from drug overdoses.



My changes to the curriculum, including the incorporation of role-playing and EPIC cards, resulted in overall subject satisfaction scores increasing from 3.4 to 4.9 out of 5 within one year of implementation, with scores staying consistently above 4.8 ever since.

IMPACT: Improvements in pass rates can be a measure of the quality of teaching and learning of a program (Smith, 2008). Since I commenced in 2017, the proportion of students who passed the Emergency Medicine subject has increased from 95.4% in 2016 to 97.5% in 2021. However, more significantly, there has been a nearly 20% increase in the pass rate for Indigenous, regional and remote students and students from diverse backgrounds doing the emergency medicine subject from 65.7% in 2017 to 82.5% in 2021. Over the last 5 years there has been consistent improvements in exam results across multiple examination types. For example, prior to the new curriculum, the average exam mark for the Case Study Examination in 2017 was 69%. This increased by 17% over the next 5 years with an average student mark of 86% in 2021.



It can be daunting for many students to start working within a hospital or clinic and to begin seeing real patients for the very first time (Van Hell, 2011). Many students may feel that they lack the confidence, knowledge, and communication experience to interact effectively in a patient-doctor encounter (Malau-Aduli, 2020). One of the main aims of the Emergency Medicine subject is to help prepare students for their clinical placements in hospitals and the community. Student feedback has consistently stated that my changes to the subject material and delivery have improved their readiness to begin clinical placements: *"The subject was very clinical and relevant and I feel ready to start my emergency placement and 4th year because I have learnt so much about different conditions, their presentations and management"* (Formal Student Feedback, 2018); *"Going through the cases and understanding patient history, examinations and investigations was of great benefit, especially with the transition towards 4th year"* (Formal Student Feedback, 2017). The impact of my changes to the Emergency Medicine subject was felt at least two years later with one Doctor tutor of fifth-year medical students commenting, *"one of the topics I cover in the year 5 General Practice teaching is "dizziness". Often a confusing presentation for students that can take some sorting out. To my surprise I have noted recent groups of students have all been across this topic; when I asked why, the response was 'Zaf taught us'"* (Fifth-year General Practice facilitator, 2019).

RECOGNITION: The transformation of the Emergency Medicine program at JCU and the impact it has had on student learning has been acknowledged within JCU, wider academia, the Emergency Medicine community,

the broader community and public media. In 2021, I was named the overall winner of the **JCU Awards for Outstanding Contributions to Student Learning** across JCU's Australian and Singaporean campuses. I was subsequently invited to present to teaching staff in Singapore about my curriculum and delivery methods for the Emergency Medicine subject. The Dean of the JCU College of Medicine and Dentistry, Prof. Richard Murray, commented on my teaching style during a personalised training course stating, *"as educators, you've left us in no doubt as to your natural talent as a teacher. It's a great example"* (2019). In addition, the Head of the Townsville Clinical School, Prof. Tarun Sen Gupta, emphasised that *"he [Zaf] doesn't just teach the material—it is learned, and retained, and applied where relevant"* (2019). Most significantly at the National level, in 2018, after my very first year of lecturing, I was awarded the national **Australian Medical Students' Association (AMSA) Award for Teaching Excellence**. The AMSA Awards are *"the highest honour bestowed on a teacher by medical students across Australia"* (AMSA President Alex Farrell). AMSA represents 17,000 medical students across Australia and the Award was selected from over 90 nominations of academics across the country and *"represents students' appreciation and recognition of teachers who have made an especially positive impact on their studies"* (AMSA). This prompted former JCU Vice Chancellor, Prof. Sandra Harding, to write to me personally, stating, *"I am always pleased to see our staff recognised for their professional achievements. This [AMSA] award is a great testament to your work in teaching, engaging and inspiring our medical students"* (2018). In 2018, The Australasian College for Emergency Medicine (ACEM) described my new Emergency Medicine module as "completely revolutionising ED teaching" through the creation of *"additional learning aids like flash-cards, YouTube videos, and Kahoot quizzes to aid in their [students'] learning"* (29/11/2018). Among the broader community and public media, the Herald Sun Newspaper acknowledged my *"creative approach to explaining challenging medical concepts"* (05/07/2019). The Townsville Bulletin newspaper commented that it has been *"a year since Dr Smith took to the lecture theatre but it's the newly minted lecturer's expertise in his field that has won over his students"* (05/07/2019). An interview on WIN TV emphasised the successful use of the case narrative cards stating, *"one of his innovations was to use flashcards to make the program more engaging for students"* (24/12/2018).

SUMMARY: I have transformed the Emergency Medicine Subject for third-year medical students at JCU from an organ system-based approach into a symptom-based course, using short case narrative cards, combined with interrelated role plays, and small-group tabletop activities. These changes have positively impacted the student learning experience by changing otherwise challenging clinical conditions into tangible, memorable and engaging case experiences. The subject provides students with a glimpse of what types of future patients they are likely to see in their Emergency Medicine placements, which motivates them to learn and helps them successfully transition to the clinical years and the medical careers that lie ahead of them: *"There is something special about having a young, vibrant doctor teaching us because that's what we ultimately intend to become. It empowers the goals we set before joining med, to model in our minds what we may possibly be in the end of this incredibly bumpy journey where it is quite easy to forget what the end result is, and what we are working to become. Hence seeing Zaf being Zaf is the best aspect of this subject… I will never forget FOCCALS for sepsis, SOFAH for anaphylaxis, or TRIGGER BOOM for asthma, etc. These are for life Zaf, thanks"* (Formal Student feedback 2018).

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