Evaluation of a simulation teaching programme for medical students: Does effective learning occur despite resource constraints?

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Background

- Increasing use of simulation in the delivery of undergraduate medical education
  - Technical and non-technical skills
  - Application of knowledge without patient harm

- Implementation limited by resource constraints
  - Time, personnel, access to appropriate space and/or equipment

Our context

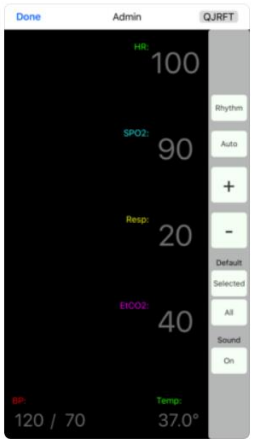
- 5th and 6th year medical students undertaking their paediatric attachments at Waikato Hospital

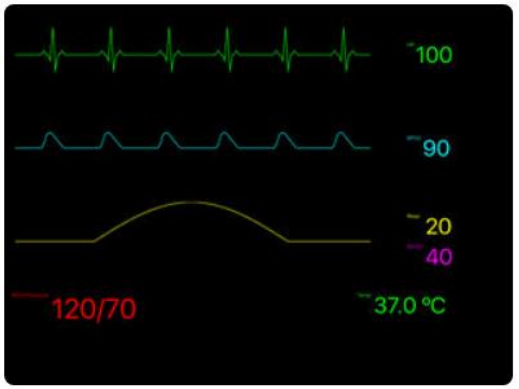
- Limited opportunities to:
  - Actively participate in management of acutely unwell children
  - Explicitly practice and receive feedback on communication tools such as ISBARR* and closed loop communication

**Identify, Situation, Background, Assessment, Recommendation, Read back*

Our approach

- Registrar led simulation programme
- Four common presentations
  - Bronchiolitis
  - Gastroenteritis
  - Asthma
  - Sepsis
- Equipment:
  - Basic infant/child manikin
  - Identical forms and equipment to ward
  - SimpleSim application
- Participants in teams of 2 or 3
- Facilitator guided debriefing post simulation





Our approach

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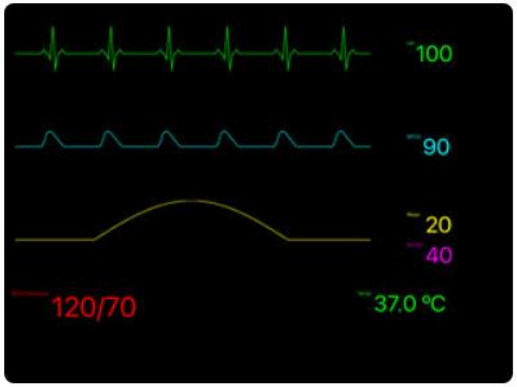
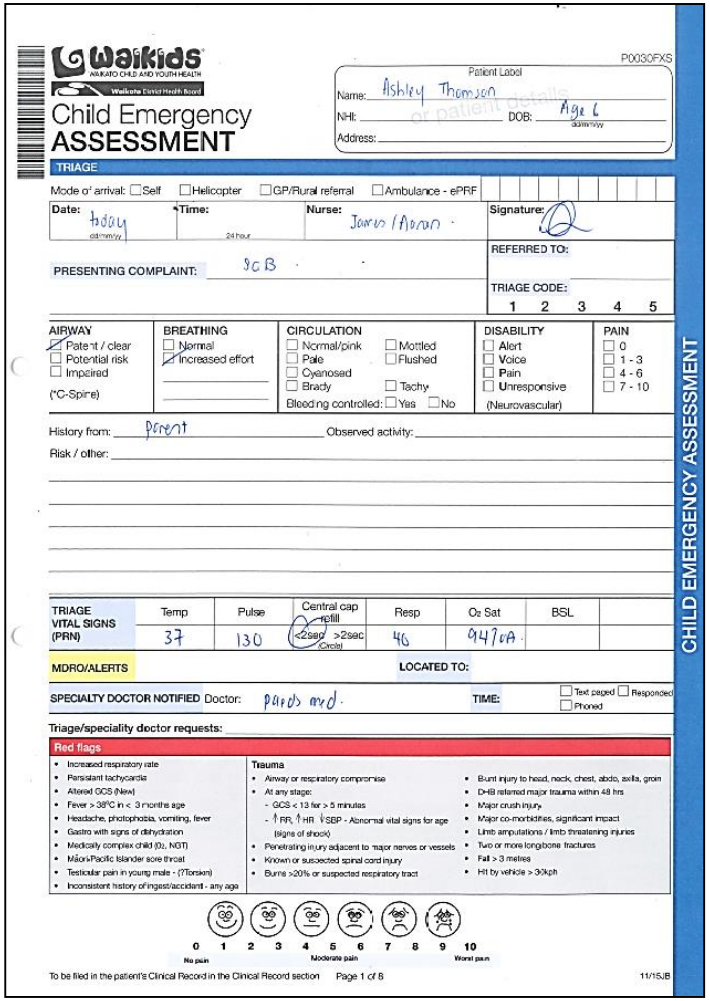




Waikids
WAIKATO CHILD AND YOUTH HEALTH
Waikato District Health Board

P0030FXS

Patient Label
Name: Ashley Thomson
NHI: DOB: Age 6
Address:

Child Emergency
ASSESSMENT

TRIAGE

Mode of arrival: ☐ Self ☐ Helicopter ☐ GP/Rural referral ☐ Ambulance - ePRF

Date: today (dd/mm/yy) Time: (24 hour) Nurse: Jones / Moran Signature:

REFERRED TO:

PRESENTING COMPLAINT: 9c B

TRIAGE CODE: 1 2 3 4 5

AIRWAY	BREATHING	CIRCULATION	DISABILITY	PAIN
☑ Patent / clear ☐ Potential risk ☐ Impaired (*C-Spine)	☐ Normal ☑ Increased effort	☐ Normal/pink ☐ Mottled ☐ Pale ☐ Flushed ☐ Cyanosed ☐ Brady ☐ Tachy Bleeding controlled: ☐ Yes ☐ No	☐ Alert ☐ Voice ☐ Pain ☐ Unresponsive (Neurovascular)	☐ 0 ☐ 1 - 3 ☐ 4 - 6 ☐ 7 - 10

History from: parent Observed activity:

Risk / other:

TRIAGE VITAL SIGNS (PRN)	Temp	Pulse	Central cap refill (Circle)	Resp	O2 Sat	BSL
	37	130	<2sec / >2sec	46	94% RA	

MDRO/ALERTS LOCATED TO:

SPECIALTY DOCTOR NOTIFIED Doctor: paeds reg. TIME: ☐ Text paged ☐ Responded ☐ Phoned

Triage/speciality doctor requests:

Red flags

- Increased respiratory rate
- Persistant tachycardia
- Altered GCS (New)
- Fever > 38°C in < 3 months age
- Headache, photophobia, vomiting, fever
- Gastro with signs of dehydration
- Medically complex child (G, NGT)
- Māori/Pacific Islander sore throat
- Testicular pain in young male - (?Torsion)
- Inconsistent history of ingest/accident - any age

Trauma

- Airway or respiratory compromise
- At any stage:
  - GCS < 13 for > 5 minutes
  - ↑RR, ↑HR ↓SBP - Abnormal vital signs for age (signs of shock)
- Penetrating injury adjacent to major nerves or vessels
- Known or suspected spinal cord injury
- Burns >20% or suspected respiratory tract
- Blunt injury to head, neck, chest, abdo, axilla, groin
- DHB referred major trauma within 48 hrs
- Major crush injury
- Major co-morbidities, significant impact
- Limb amputations / limb threatening injuries
- Two or more long bone fractures
- Fall > 3 metres
- Hit by vehicle > 30kph

0 1 2 3 4 5 6 7 8 9 10
No pain Moderate pain Worst pain

To be filed in the patient's Clinical Record in the Clinical Record section Page 1 of 8 11/15JB

CHILD EMERGENCY ASSESSMENT

Learning objectives

- Put the ABCDE approach into practice
- Practice effective communication
- Identify and manage seriously unwell children with common paediatric conditions

Aim

To evaluate the utility of our 5th and 6th year medical student simulation programme

Research questions

1) What do our students learn from the workshop?

2) What do students find useful from the workshop?

3) What are suggestions for improving the workshop?

Method

- Anonymised feedback forms completed by all students at the end of each workshop

- Student perceptions:
  - Likert scales
    - Usefulness of the workshop
    - Appropriateness of level of difficulty of scenarios in relation to their level of experience
  - Free-text qualitative responses
    - Learning points encountered
    - What students found useful
    - Suggestions for improvement

Data analysis

- Likert scales
  - Descriptive statistics

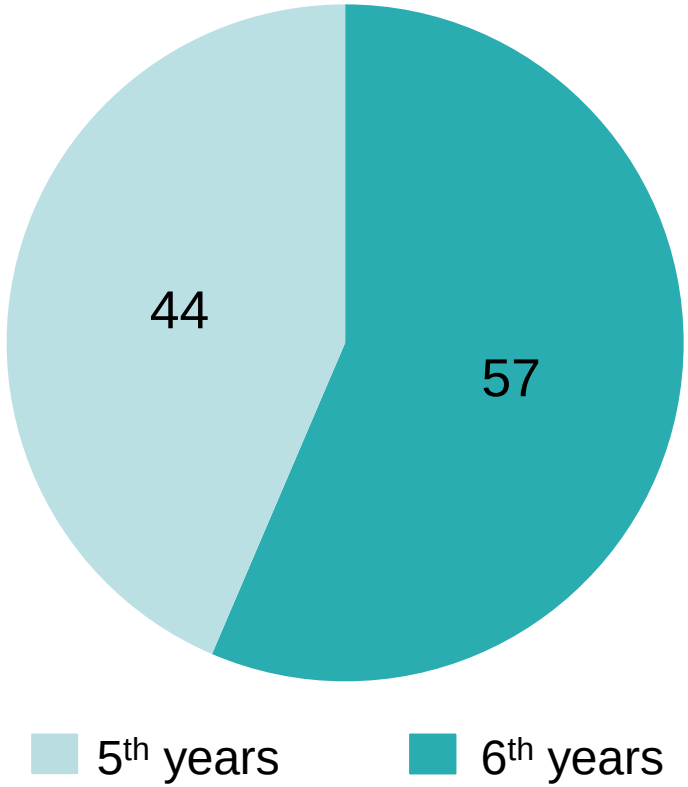
- Free text qualitative data
  - Inductive, thematic content analysis
  - Data coded and analysed using nVivo software

Results

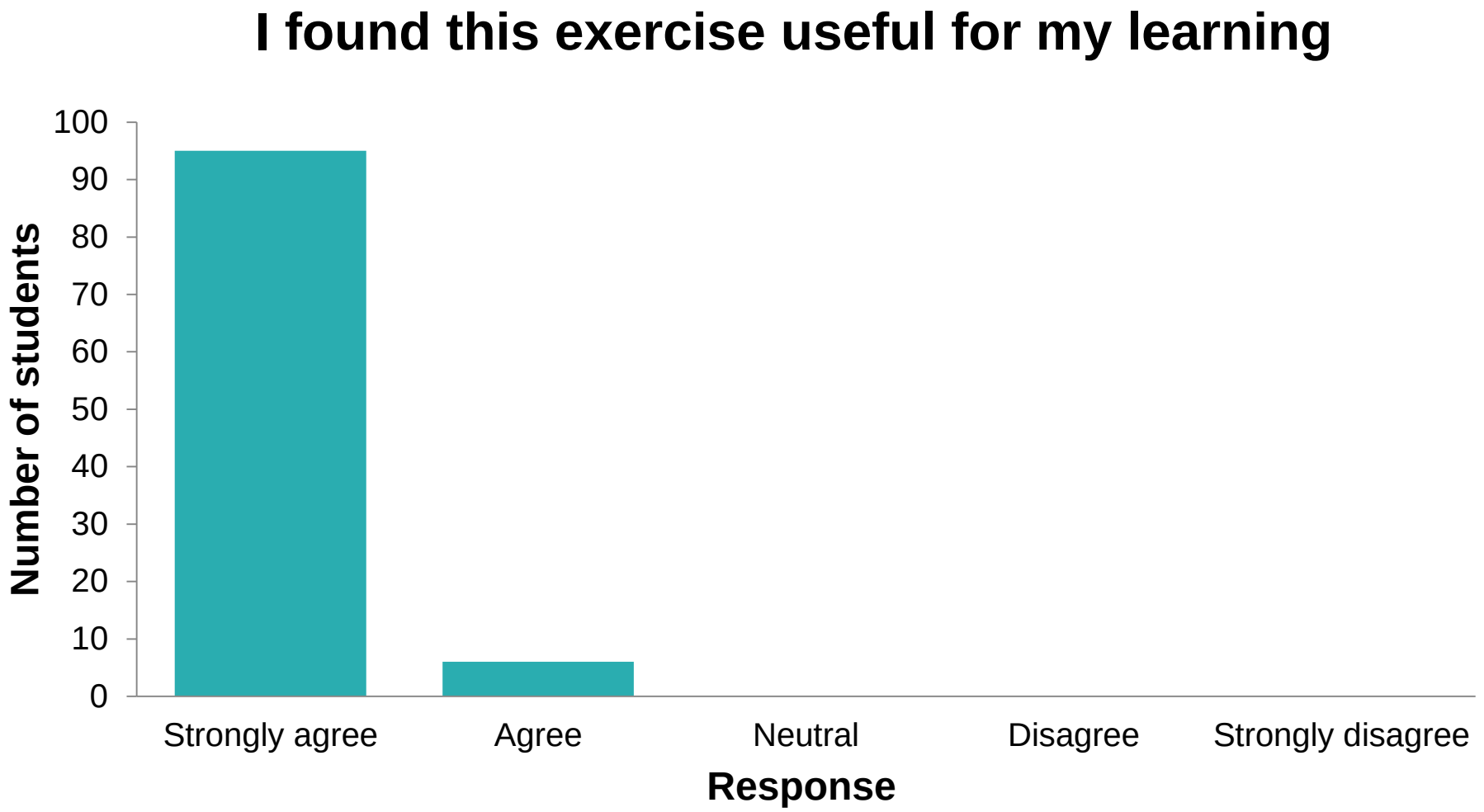
- 1st June 2017 to 31st December 2018

- 101 students
  - 100% response rate

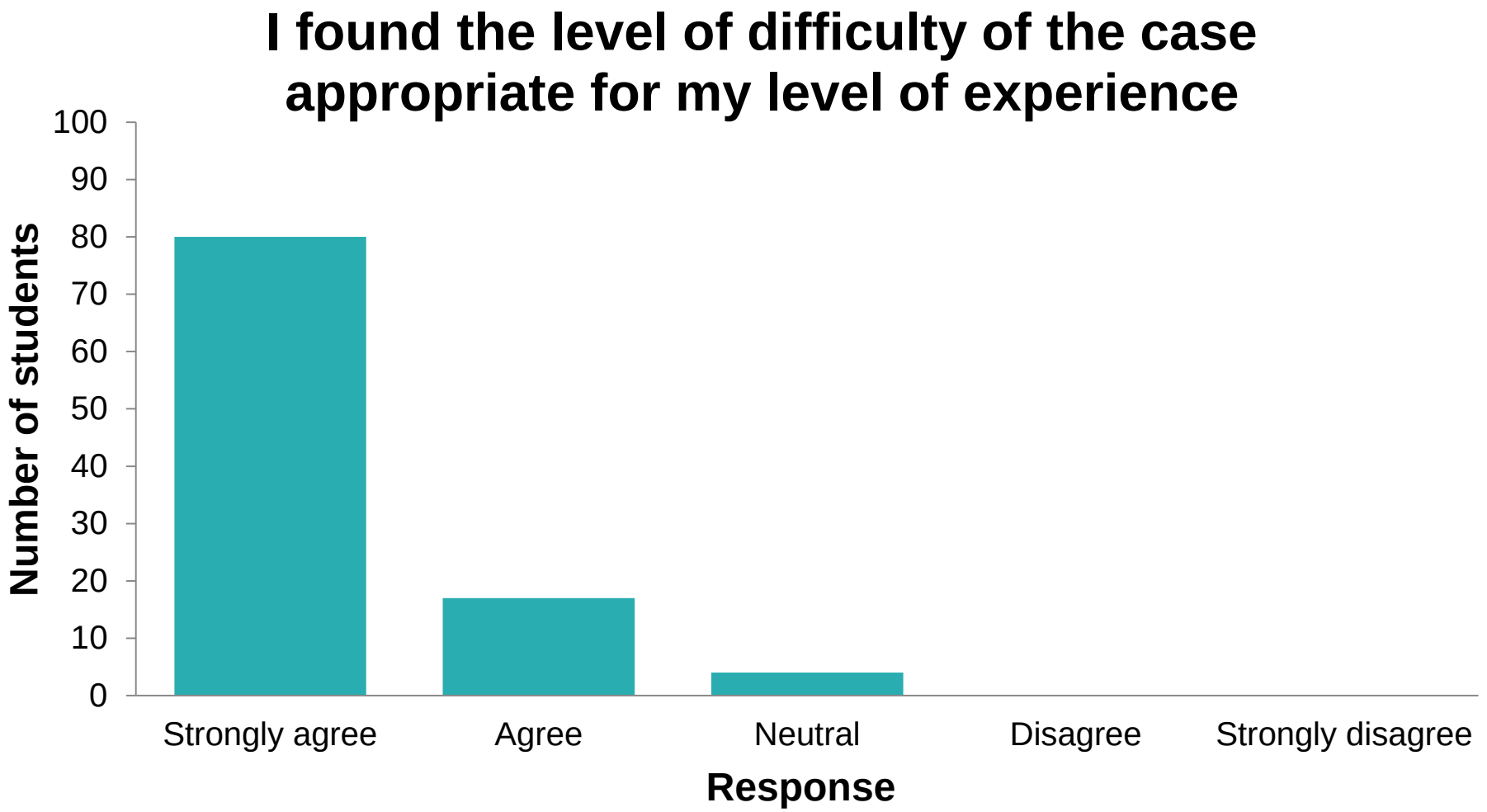
Distribution of medical students



Results: Likert scales



Results: Likert scales



Results: Free-text

Question 1:

What are our students learning from this workshop?

Results: Learning points

Theme 1: Importance of utilising a structure to manage acutely unwell patients	
- ABCDE for initial assessment and re-assessment	"Importance of using an ABCDE structure in panic situations and re-assessment for response/clinical changes." "ABCDE and importance of addressing each individually. Don't miss anything and don't forget interventions at each stage." "Go back to ABCDE when unsure what is going on."

Results: Learning points

Theme 2: Importance of effective communication skills in an acute setting	
- Communication with parents, colleagues - Use of “time-out” and microsummaries - Asking for help	“Ways to communicate under pressure – closed communication loops and regular recaps to establish status quo and planning next steps.” “Slow down, take a breath. Use team time-outs.” “When to call for help and how to present information. ISBARR. You need to be clear and concise with what you want/requesting over the phone.”

Results: Learning points

Theme 3: Appreciation of human factors in a clinical context	
- Team work and prioritisation skills - Recognising limitations - Assertiveness skills	"The leader doesn't have to dictate everything, active followers follow in the background." "How to prioritise tasks, allocate roles and splitting so that things are efficiently done." "Understanding limits. Don't be afraid to escalate and call for senior help and clarify plan if I'm unsure."

Results: Learning points

Theme 4: Application of knowledge and utilisation of resources when managing an unwell child	
- Identification of an unwell child - Management of common conditions - Utilisation of guidelines - Prescribing skills	"Distinguishing life threatening or acute asthma. Life threatening asthma protocol." "Following and finding protocols." "Practicalities of emergency management. How to give resus fluids. Paediatric dosing."

Results: Free-text

Question 2:

What do our students find useful from this workshop?

Results: What was useful?

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Theme 1: The learning climate	
Practical, safe, non-intimidating learning environment	"Having the hands on experience under supervision and guidance was a safe way to learn and experience these emergency situations."
Peer participation provided sense of comradery and opportunity to learn vicariously	"It was nice having everyone in the same room as those doing the simulation – sense of not being alone in a stressful situation." "It was really helpful to be an observer too. Observing how my classmates do things and learning from their successes and failures."

Results: What was useful?

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Theme 2: The clinical scenarios	
The designed scenarios were practical and provided a sense of realism	"It felt real. All the equipment was present."
	"Having to make decisions. Thinking on feet. Practicing the level of responsibility/duty expected of us in 1 month's time."
Scenarios fostered autonomy and a sense of responsibility not routinely experienced during their training	"Really good realistic practice to take up the role as a doctor. Was good to be the person in charge of management rather than being a passive bystander."

Results: What was useful?

Theme 3: Applying learned knowledge to a clinical context	
Applying learned knowledge and practicalities of managing of an acutely unwell child	"Doing a scenario is very different from reading about it." "Learning to recognise when the child is sick and when to escalate. Practicing algorithms/ structures. Back to basics ABCDE." "Getting us to perform things we're not yet completely comfortable doing - being able to do practical doctor things e.g. filling out forms, charts etc."

Results: What was useful?

Theme 4: Negotiating complex human factors	
Experience of negotiating complex human factors involved in the management of an unwell child	"Useful to try working in a team setting. How to organise a team. Splitting tasks." "Communication skills. How to present relevant information to the team. Practice calling seniors." "Becoming aware of own weaknesses. Realising what you don't know. Learning to know when to seek help."

Results: What was useful?

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Theme 5: The debriefing process	
Timing and content of the debrief Utilisation of peer feedback	"The immediacy of feedback. Being able to ask questions about real life applications in these scenarios – putting learning points into context." "Highlighting what was done well and not just focusing on negatives. Practical aspects discussed point by point." "Getting feedback from both students and registrars."

Results: Free-text

Question 3:

What are suggestions for improving the workshop?

Suggested improvements

- 51 students had no suggestions for improvements
- Increased frequency of workshops
  - Greater breadth of scenarios
- Equipment failure
  - Back up application (SimMon)

Conclusions

- Simulation is an effective learning tool for undergraduate medical students when:
  - Tailored appropriately to their level of experience
  - Undertaken in a safe learning climate
- Simulation acts to:
  - Encourage application of learned knowledge
  - Facilitate the teaching of both technical and non-technical skills
- Feasible in a resource constrained environment

Strengths and limitations

- Strengths:
  - All students who participated were surveyed
  - Surveys simple, cost effective
  - Responses were anonymised, free text responses

- Limitations:
  - Findings based on student perceptions
  - Single coder during data analysis

Where to from here?

- Ensure sustainability of workshop
  - Addressing ongoing learner needs

- Evaluate utilising a three pronged approach
  - Student, peer and self evaluations
  - Longitudinal follow-up of workshop participants

Where to from here?

- Development of a practical “how-to” guide

Viewpoint | Free Access

Developing an undergraduate paediatric simulation workshop in a resource constrained setting: A practical ‘how to’ guide

Aaron Ooi, James Hambidge, Alexandra Wallace

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  Dr Sukhbir Sandhu
  Dr Carolyn Aird
  Dr Wee San Toh

Thank You

Questions?

Our simulation scenarios

WAIKATO CHILD AND YOUTH HEALTH

Paediatric

Simulation:

An overview

(5th/6th year medical students)

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THE UNIVERSITY OF AUCKLAND NEW ZEALAND

Title: Meningitis and meningococcal septic shock				
Author(s): Aaron Ooi				**Scenario Number:** 4
Patient Information:	**Name:**	Joe Smith	**Age:**	6
	Diagnosis:	Meningitis and meningococcal septic shock	**Weight:**	20kg
	Signs:	Purpuric rash, neck stiffness, photophobia, Brudzinski and Kernigs +ve	**Gender:**	Male
			Allergies:	NKDA

Scenario objectives	• Use an ABCDE approach to managing an unwell child • Apply principles of effective communication, utilising tools such as an ISBARR handover to senior support and closed loop communication • Correctly identify and manage a moderately unwell child with meningitis and septic shock demonstrating an understanding of important factors in assessing severity
Participants	5th/6th Year Medical Students on their paediatric run
Participant brief(s)	
Setting	
Actors/plan	

Test			Ref.Range	Units	Location
Specimen type (BG)		Capillary			Waikato
O2 (inspired)		21	21 - 100	%	Waikato
Temperature (patient)		37.0		Celsius	Waikato
pH		7.22 L	[7.32 - 7.43]		Waikato
pH (temp corrected)		7.22 L	[7.32 - 7.43]		Waikato
pCO2		3.2 L	3.6 - 5.5 (see text)	kPa	Waikato
pCO2 (temp corrected)		3.2 L	3.6 - 5.5	kPa	Waikato

Waikato District Health Board

Orientation to simulation

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Welcome to sim!

Ground rules

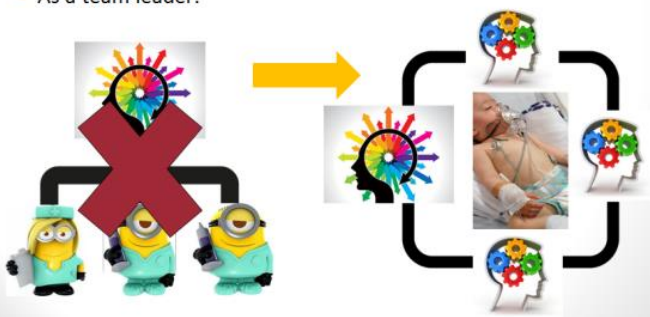
- What happens in sim stays in sim
- None of what happens is an assessment
- Suspend disbelief:
  - Treat everything in sim as real life including the patient, the carer, the nurses etc
  - Do things how you would normally and ask for what you can't see
- Its supposed to be fun! ☺

What to expect: Participants

- You'll be in a team of two
- There will be an introduction to the scenario for you
- We expect you to go through an A-E assessment, managing issues as you find them
- There is always help to be found
  - Ring and ask for what you think you need
- It isn't the diagnosis but the getting there that's important
- You will be working outside of your role to allow the sim to work, this doesn't mean this is expected of you in real life at the moment!

What to expect: Participants

- Tag teaming vs team leading
  - Student vs clinician behaviour
- As a team leader:



References

- Weller JM. Simulation in undergraduate medical education: bridging the gap between theory and practice. Medical education. 2004 Jan 1;38(1):32-8.
- Ker J, Bradley P. Simulation in medical education. In: Swanwick T (editor).Understanding medical education: Evidence, theory and practice. 1st ed. Oxford: Wiley-Blackwell; 2010. p. 164-80
- Sawyer T, Eppich W, Brett-Fleegler M, Grant V, Cheng A. More than one way to debrief: a critical review of healthcare simulation debriefing methods. Simul Healthc. 2016 Jun 1;11:209-17-40.
- Nygaard C, Belluigi DZ. A proposed methodology for contextualised evaluation in higher education. Assessment & Evaluation in Higher Education. 2011 Oct 1;36(6):657-71.
- Watson S. Closing the feedback loop: Ensuring effective action from student feedback. Tertiary Education & Management. 2003 Jan 1;9(2):145-57.
- March HW, Dunkin MJ. Students' evaluations of university teaching: A multidimensional perspective. Higher education: Handbook of theory and research. 1992;8:143-233.
- Shevlin M, Banyard P, Davies M, Griffiths M. The validity of student evaluation of teaching in higher education: love me, love my lectures?. Assessment & Evaluation in Higher Education. 2000 Dec 1;25(4):397-405.
- Bewley WL, O'Neil HF. Evaluation of medical simulations. Military Medicine. 2013 Oct 1;178 (suppl_10):64-75.