

Project Title

Reducing Pre-operative Anxiety Amongst Children Coming For Elective General Surgery

Project Lead and Members

Project lead: Melody Long

Project members:

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- Chan Hean Peng
- Mohamed Abubacker Ahamed Faiz Ali
- Junaidah Bte Abu Bakar
- M. Rengasamy Kavitha
- Merrylyn Tay Hsiu Ann
- Dr Amutha

Organisation(s) Involved

National University Hospital

Project Period

Start date: Feb 2019

Completed date: Aug 2019

Aims

- To achieve an Induction Compliance Checklist (ICC)+ score of ≤ 4 amongst children aged 2 to 12 coming for elective general paediatric surgeries in NUH from 58% to 80% in 6 months
- To reduce the proportion of patients with positive scores on items 7, 8, and 9* from 46% to 0

Background

Children coming for elective surgery tend to be anxious and may have fears about the procedure. They may require restraints by the parent/ operating room staff, while the anaesthetist forcibly applies a mask on them for the inhalational induction. Although not ideal, most anaesthetists would still anaesthetize the child at the parents' insistence because numerous childcare and work arrangements have been made for the operation to be performed on that particular day. Research has shown that children who are highly anxious pre-operatively tend to have higher postoperative pain, delayed hospital discharge, and higher incidence of emergence delirium, sleep disturbances, and other maladaptive behavioral changes that last up to a few weeks following surgery.

Methods

Measurement of peri-operative anxiety was done through the Induction Compliance Checklist (ICC). This survey comprises 10 behaviours that may be present at induction. A score of 0 indicates a perfect induction while 10 is the least ideal. Baseline data was collected for a month prior to the start of this project. Every eligible child was graded on the ICC by the Anaesthesia medical officer/ resident. To solve the perioperative anxiety issue, we broached it from multiple angles: surgical, nursing, anaesthesia and patient education. Surgeons were tasked with using a "red flags" table during the clinic consultation to help identify children with behaviours that may pose difficulties at anaesthesia induction. The anaesthesia team can then identify these children and plan for anaesthesia appropriately. Premedication workflow was also refined to facilitate the safe administration of oral midazolam to calm anxious children. Nurses and anaesthetists were given a lecture by the child life therapist on how to handle children with special needs. In addition, a formal referral system was put in place for the anaesthesia team/ surgical team to refer children to the child life therapist for pre-operative intervention to reduce anxiety. Children (with special needs) that have been referred to the Anaesthesia Outpatient Consultation Clinic (AOCC) will also undergo a standardised screening and preparation package consisting of a questionnaire

understanding the child's behavior, sample social stories the parents can use, and a role play box where the children can experience the pre-induction process. The role play box consists of a plastic intravenous canula, face mask, patient's cap and gown, SpO2 sticker probe. A pamphlet containing information specific for general anaesthesia in children was also created for educating the parents. This information can also be found on the NUH Anaesthesia website; along with helpful links for parents to get more information.

Results

Baseline data shows that 54% of children aged 2 to 12 coming for elective surgery score ≤ 4 on the induction compliance checklist. After our interventions, this figure has improved to an average of 87%. Proportion of children who scored for items 7,8,9 on the induction compliance checklist reduced from 46% to 19%.

Lessons Learnt

1. Importance of multi-disciplinary team cooperation– we had multiple stakeholders such as nursing, child life therapist, doctors from other specialties who were enthusiastic in lending support for implementing the measures. The champions from each of the disciplines helped drive the initiatives in their respective arenas. This allowed us to have a 360 approach to the problem and implement meaningful solutions.
2. Clear goals were set and bite sized tasks identified for each discipline to carry out effectively. A clear leader in each discipline was also appointed to oversee the initiative.
3. Parental education plays a big role in preparing the child for surgery and hence the ability to reduce perioperative anxiety.

Conclusion

Continued efforts are required to see further improvement in reducing peri-operative anxiety amongst children coming for elective surgery. There is potential for further

expansion of this project to have the GA pamphlet translated to Mandarin, and involvement of more surgical disciplines.

Project Category

Care Redesign, Clinical Improvement

Keywords

Care Redesign, Clinical Improvement, Quality Improvement Tools, Affinity Diagram, Cause and Effect Diagram, Pareto Chart, Cost Savings, Compliance, Paediatrics, Anaesthesiology, Nursing, Surgery, National University Hospital, Induction Compliance Checklist, Perioperative, Pre-Operative Anxiety, Induction Compliance Checklist, Parental Education

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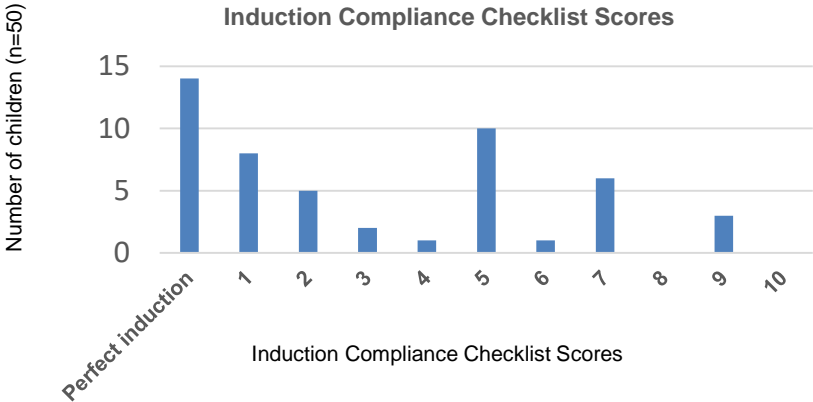
A: Define the Problem

- Children coming for elective surgery tend to be anxious and fearful which may manifest as resistance at entering the operating theatre or during induction.
- Although not ideal, most anaesthetists would still anaesthetize the child at the parents' insistence because numerous childcare and work arrangements have been made for the operation to be performed on that particular day.
- Research has shown that children who are highly anxious pre-operatively tend to have higher postop pain, delayed hospital discharge, higher incidence of emergence delirium, sleep disturbances and other maladaptive behavioural changes that last up to a few weeks following surgery.
- Every month, an average of 85 elective surgeries are performed under GA in children aged 2 to 12 across different disciplines including general paediatric surgery, ENT, dental, eye, orthopaedics and plastic surgery.
- The Induction Compliance Checklist is an observational scale comprising 10 items used to describe compliance of a child during induction of anaesthesia, score of > or =4 indicates poor compliance.

Each description from 1 to 10 score 1 point each when present. Perfect induction scores 0. The best possible score is 0, and the worst possible score is 10.

SN	DESCRIPTION	PRESENT?
	Perfect induction (Does not exhibit negative behaviours, fear or anxiety)	
1	Crying, tears in eyes	
2	Turns head away from mask	
3	Verbal refusal, says "no"	
4	Verbalisation indicating fear or worry, "where's mummy?" or "will it hurt?"	
5	Pushes mask away with hands, pushes nurses/ anaesthetist with hands/feet	
6	Covers mouth/ nose with hands/ arms or buries face	
7	Hysterical crying, may scream	
8	Kicks/flails legs/arms, arches back, and/or general struggling	
9	Requires physical restraint	
10	Complete passivity, either rigid or limp	
Total score		/10

- Baseline ICC scores of **50 children** collected between mid-Feb to and mid-March:

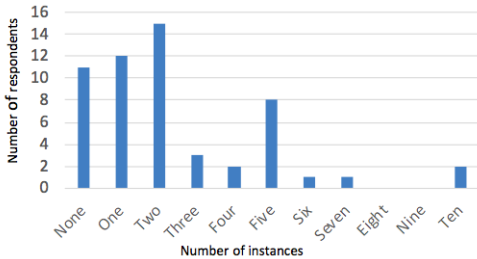


- Concept of "Brutane" describes forcibly holding a child down for an inhalational induction when he/she is struggling or crying hysterically is characterized by items 7, 8 and 9 on the ICC.
- 46% of the children scored at least 1 point for items #7, #8 and/or #9 on the ICC.
- Results from departmental survey on "Brutane"

In my practice, I have encountered instances where I have needed to forcefully restraint and apply a mask on a struggling/ combative child to induce anaesthesia



On average, how many of such instances have I encountered in the last 3 months?



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B: Goal

- To achieve an Induction Compliance Checklist score of ≤ 4 amongst children aged 2 to 12 coming for elective general paediatric surgeries in NUH from **58% to 80%** in 6 months
- To reduce the proportion of patients with positive scores on items 7, 8 and 9 from **46% to 0**



C: Problem Analysis

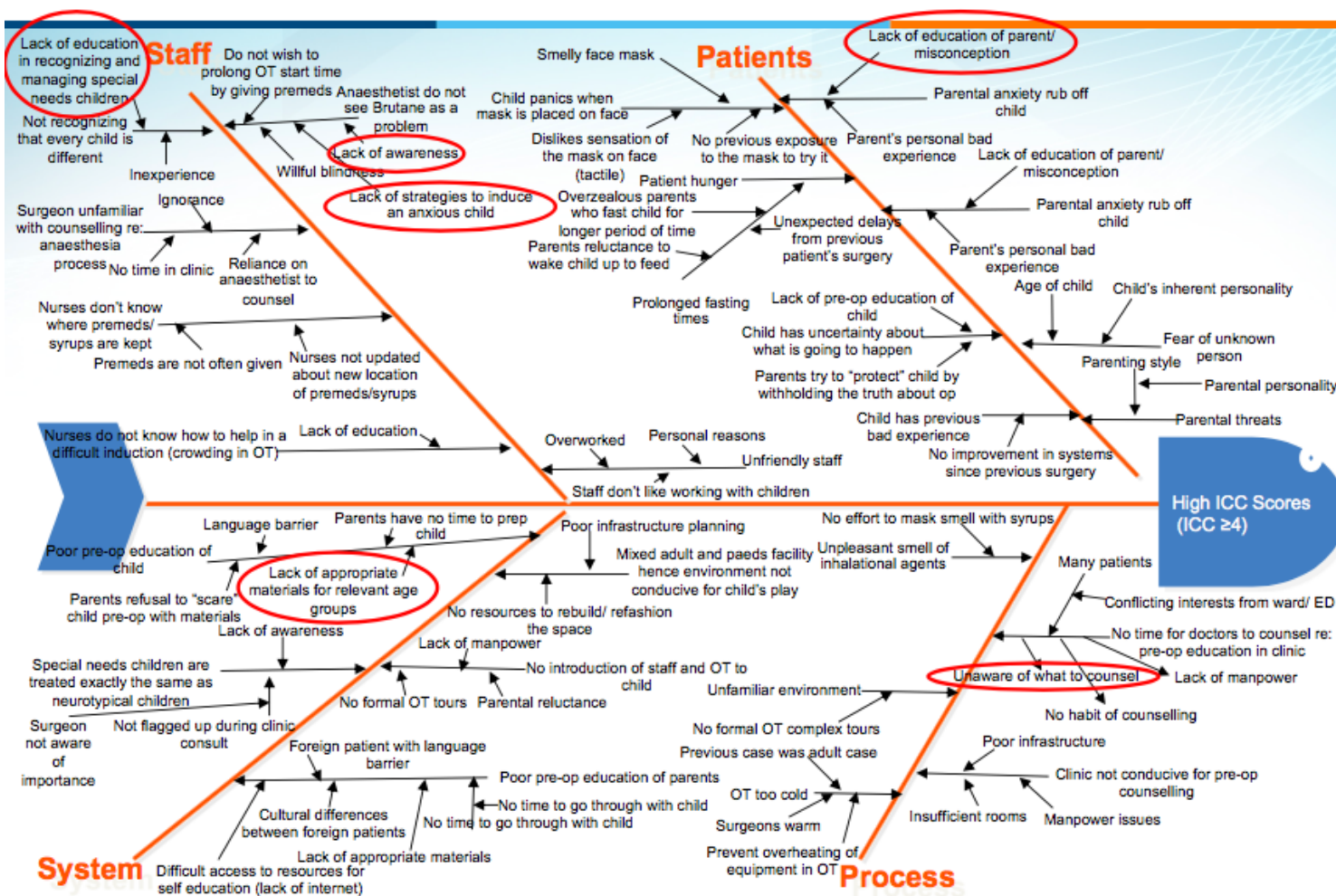
Patient Factors	Staff Factors	System Factors	Process
Parental anxiety effect on the child	Not recognizing that every child is different	No introduction of staff and the OT environment to the parent/ child	Unpleasant smell of inhalational agents eg: Sevoflurane, Desflurane
Threats from parents about them being "naughty" hence needing the surgery	Surgeons don't know how to counsel parents and child re: induction/ anaesthesia processes	Special needs children are treated/ handled in the same manner as neuro-typical children	Difficulty in getting the appropriate pre-medications for the children; hence reluctance in giving pre-meds to reduce time wastage in waiting for the medications to be retrieved
Child panics when the mask is being placed on their faces especially if child has claustrophobia	AU Nurses may not know where the mixing agents/ syrups for oral pre-medications are kept	Poor pre-op education and preparation of the child	Stranger anxiety when the child sees many OT staff crowding around him in the reception/ OT
Child has fear of unknown people eg: OT staff	OT and AU Nurses are not sure of how to help in a difficult induction process leading to "crowding" around the patient	Poor pre-op education and preparation of the parent	Clinic not conducive for pre-op counselling due to lack of space
Child has uncertainty about what is going to happen next	Anaesthetists do not see "Brutane" as a problem	Mixed adult and paediatric service hospital hence the physical set up and environment may not be conducive for induction of a child	Time constraints for doctors to counsel re: pre-op education in clinic
Previous traumatic/ bad experience with the induction process	Anaesthetists are not aware of other strategies to induce an anxious child		Child and parent unfamiliar with the new OT environment
Hunger from prolonged fasting	Unfriendly staff: including nurses, doctors, patient service associates		

Affinity Diagram

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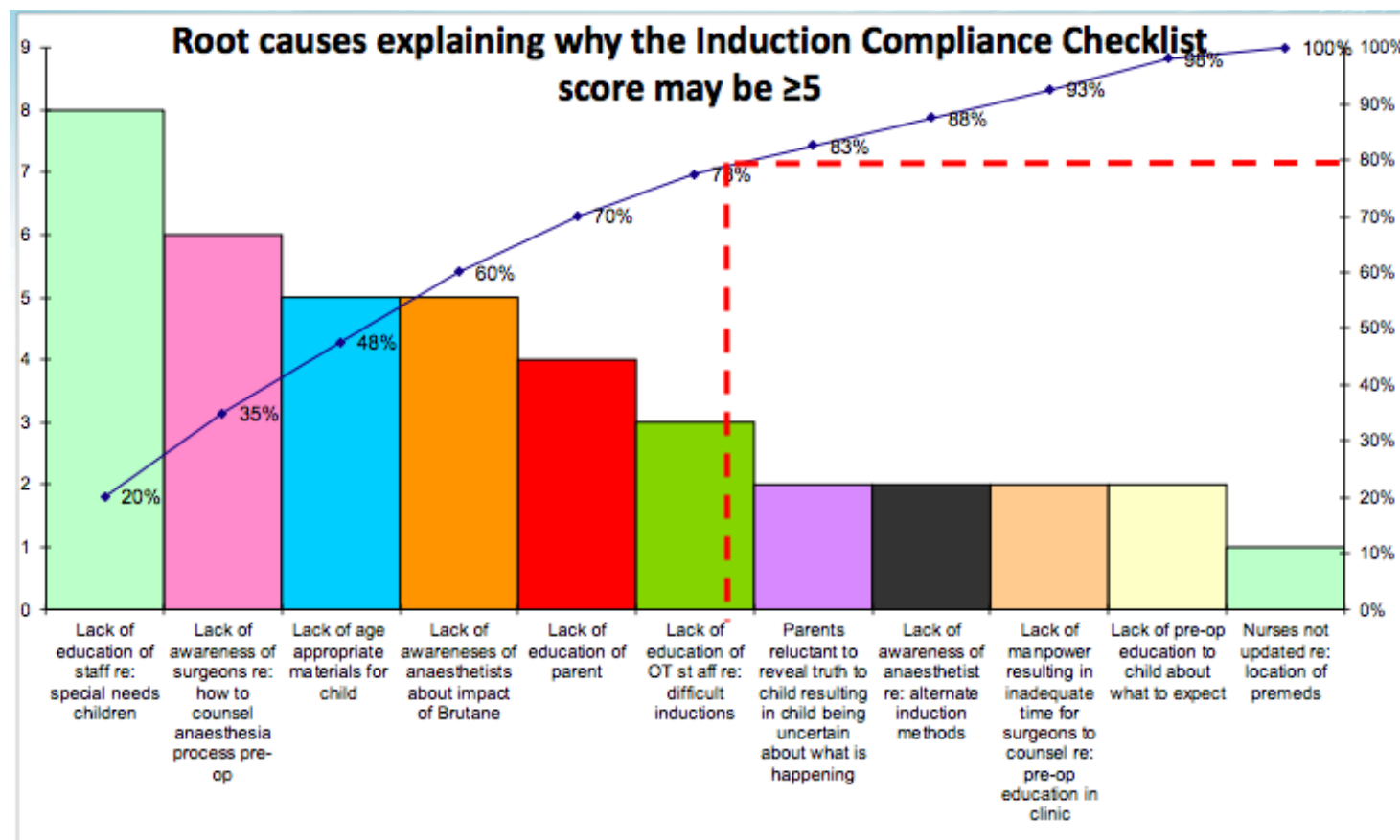


Cause and effect diagram

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C: Problem Analysis



Pareto Chart

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D: Interventions & Action Plan

Problem	Intervention	Date of Implementation
Lack of awareness of surgeons on how to counsel pre-op	Standardised 5 questions (Red Flags Table) for surgeons to observe in a child's behavior and flag up during the clinic visit to facilitate better anaesthetic planning (i.e. premed plans). This table will be available on the desktop of computers in the surgical clinics to be pasted into CDOCs and filled up by the surgeons during consultations.	March 2019
Lack of education of staff re: special needs children	Nursing: 1) In-service to teach the nurses on Dos and Don'ts when handling a special needs child 2) Refining the pre-med ordering and administrating process Anaesthesia: 1) Morning meeting to educate the department on downsides of Brutane by Child life specialist, Ms Suraya 2) Standardised questionnaire, set of instructions and sample social story for working with parents of special needs children when they come to the AOCC with a formalized referral to the Child Life Specialist if indicated	Nursing: 1) In-service for nurses: 8 May (MCOT), 28 May (MOT) 2) Premed protocol: 6 May 2019 Anaesthesia: Anaesthesia dept teaching on 11 June 2019 AOCC protocol: 13 May 2019
Lack of age appropriate materials for children	Role Play Box to be incorporated into the surgeon's clinic and Playscape (Child Life Specialist's workspace) with instruction card on how to use the contents - Box will include a mask, SpO2 probe, gown, cap, IV cannula - Child life specialist will see the elective pre-op children on Thursday afternoons at the Playscape (children and parents can Walk In)	End May 2019

Lack of parental education

Educational pamphlet containing info about the anaesthetic process, simple FAQs and website links to resources that parents can work with their children to prepare them for GA to be created and given out to parents with the financial counselling folder.

July 2019

Red Flags Table for surgeons to include into CDOCs entries

SN	Description	Present?
1	Refusing to separate from parent and will cry/ fuss if asked to	
2	Has been roaming/ running around the room throughout the consultation. Child has not been able to sit on the chair/ on parent's lap despite being asked to do so by parent repeatedly during clinic consult session	
3	History from parents/caregiver regarding behavioural problems eg: cannot sit still in class, inappropriate screaming/shouting, repetitive behaviour, currently being seen by a doctor for developmental/behavioural problems	
4	Inability to maintain eye contact/wave hello or goodbye with the physician despite prompts from the parents/ caregivers	
5	Known history of special needs: autism spectrum disorder, ADHD	

To consider speaking to Anaesthetist/ refer Child Life Specialist if ≥2 factors present

Role Play Box for Children



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Educational Trifold Pamphlet for Parents – Outside

COMMONLY ENCOUNTERED QUESTIONS

What are the side effects of GA?

Common, temporary side effects	Uncommon complications
<ul style="list-style-type: none"> Headache, dizziness, drowsiness Nausea, vomiting Sore throat Emergence delirium: a restless and irritable recovery process during which your child may roll about, cry or seem inconsolable 	<ul style="list-style-type: none"> Damage to teeth, dental prosthetics, lip or tongue Damage to vocal cords or larynx Allergy reactions Injury to nerve/ pressure areas/ pressure sores
Extremely rare and serious complications <ul style="list-style-type: none"> Severe allergic reaction Very high temperatures (malignant hyperthermia) Aspiration resulting in lung complications 	

Why does my child need to fast before surgery?

Fasting ensures that your child's stomach is empty before anaesthesia. This reduces the risk of aspiration (stomach contents entering the lung) which can lead to serious breathing complications.

Can my child still receive a GA if he has fever/ cough/runny nose/sore throat/phlegm (i.e. an upper respiratory tract infection (URTI))?

Elective, non-urgent surgeries should be avoided until two weeks after complete recovery from a URTI. A child's breathing tract becomes more sensitive when he/she has an URTI, causing an increased risk of developing breathing complications peri-operatively.


Are there any long-term effects of GA on my child's IQ/brain development?

Recent human studies^{1,2,3} have suggested that a single, relatively short exposure to general anaesthetic and sedation drugs in infants and toddlers is unlikely to have negative effects on behaviour or learning.

1 - Pediatric Anaesthesia and Neurodevelopment Assessment (PRNDA) Trial
2 - General Anaesthesia compared to Spinal Anaesthesia (GAS) Study
3 - FDA safety announcement, Dec 2016


USEFUL RESOURCES

For more information about Anaesthesia or resources to prepare your child, please visit <https://www.nuh.com.sg/anaesthesia> or scan the following QR code:



For enquiries regarding surgery, please call the respective Surgical Clinics.


For enquiries regarding Anaesthesia, please contact the Anaesthesia Outpatient Consultation Clinic at (65) 6772 6268 or appointment_aocc@nuhs.edu.sg.



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This information provided in this publication is meant purely for educational purposes and should not be used as a substitute for medical diagnosis or treatment. You should seek the advice of your doctor or a qualified healthcare provider before starting any treatment or if you have any questions related to your health, physical fitness or medical conditions.

Information is correct at time of printing (May 2018) and subject to revision without prior notice.



GENERAL ANAESTHESIA IN CHILDREN

General anaesthesia is a combination of medications that puts a patient in a sleep-like state before a surgery or other medical procedures.

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Educational Trifold Pamphlet for Parents - Inside

WHAT TO EXPECT ON THE DAY OF SURGERY

Pre-Op Preparation

- You can prepare your child by:
 - Explaining that the surgery will help them get better
 - Encouraging them to talk about the operation and ask questions. Books, games and stories are useful.
 - Telling them about timing: when the operation is scheduled, how long they will be in hospital for
- You should receive instructions from the hospital about when your child should stop eating or drinking. As a guide:
 - 6 hours before - your child can have a light meal or glass of milk. Bottle-fed babies may have formula feed.
 - 4 hours before - babies can have breast milk
 - 2 hours before - children can drink water

On The Day Of Admission

- After registration, a nurse will bring you to the ward to prepare you and your child for the operation. Some numbing cream is applied over the veins on the back of your child's hands so that it will not hurt when the plastic tube (intravenous cannula) is inserted into the vein later.
- The anaesthetist will review your child to check that he/she is prepared for the operation and discuss with you the options for anaesthesia and pain relief. One of the options for pain relief is to do nerve blocks, which are done once your child is asleep. Nerve blocks provide pain relief during and after the operation and reduce the amount of strong pain killers (opioids) which are not tolerated so well in children.

- Please check with our anaesthetists if you have any questions about anaesthesia or pain relief.

- Children are often anxious and the anaesthetist may give some sedative/calming medicine. This is usually taken with some juice or syrup but may also be given via other ways, such as in the nose or into an IV drip.

- We encourage one parent to accompany your child into the operating theatre (OT) to comfort and help distract him/her until he/she is asleep. However, this is not necessary if your child is below six months old or if he/she has been heavily sedated beforehand.

- Your child may be able to ride a bike into the OT and can bring a toy or device to watch a video or play a game on, to comfort him/her while he/she falls asleep.

The Anaesthetic Process

- Your child can go to sleep either lying on the operating table or sitting on your lap on a chair.
- Anaesthesia is induced either by placing the IV plug in the back of the hand (where the numbing cream was) and injecting the anaesthetic medicine or by breathing anaesthetic gas through a mask held over the mouth and nose. The anaesthetist will offer the most appropriate method based on the circumstances.

- It is common for children to get slightly disorientated and appear to struggle when going to sleep but this is normal and the child will usually not remember this.

- You will have to leave the OT once your child is asleep. The anaesthetist will then insert the breathing tube, other IV lines and perform the nerve blocks as planned.

After Surgery

- After surgery, your child will wake up in the recovery area (PACU) and the nurse will call you so that you can be with your child.

- The doctors and nurses in PACU will be able to manage any post-surgery issues such as pain relief, nausea and vomiting. Children can cry because of pain, which we can treat, but sometimes, it may be because they are confused (a side effect of the anaesthesia) and just need comforting.

- Once your child is stable, he/she will be moved to the ward. If your child is planned for discharge the same day, he/she will still need to be observed in the ward for three to four hours to make sure he/she is well before discharge.



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Nursing In-Service Questionnaire

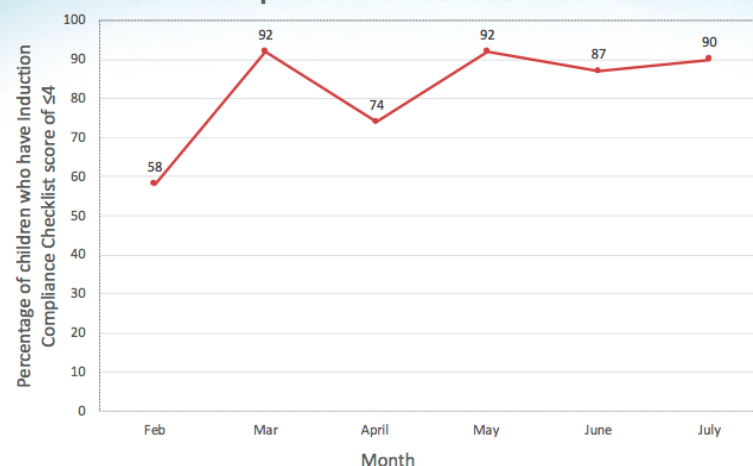
1	The In-service session was useful.	Yes	No
	If not, please share with us why.		
2	The speaker was effective in teaching and presenting the information.	Yes	No
	If not, how can we improve the presentation and information?		
	Are there other topics you hoped the Child Life Specialist had covered? If so, please share with us.		
3	After the in-service, I understand more about the behaviour of anxious/ special needs children.	Yes	No
4	After the in-service, I am more confident in handling anxious children/ children with special needs.	Yes	No
	If not, can you share with us why?		
5	The duration of the in-service session was appropriate.	Yes	No
	If not, please let us know how long should the session be:		
6	The timing of the in-service was convenient for me to attend.	Yes	No
	If not, please let us know what will be a more appropriate timing?		
7	I would like to have another in-service session in the future on a similar topic.	Yes	No
8	I will recommend my colleagues/ friends to come for another in-service/teaching session on a similar topic in the future.	Yes	No
9	Do you have any other feedback/ suggestions for us to improve this teaching?		

- Total of 71 out of 96 nurses (MCOT and MBOT PACU/AU/Scrub nurses) attended the in-service, which was held in 2 separate sessions
- 100% of participants thought that the session was useful, that the speaker was effective in teaching and presenting the information; felt they understood more about the behavior of anxious/special needs children and that the duration of the session was appropriate.
- 97% felt they were more confident in handling children after the session. Of the 3% who didn't feel the same, one person reflected that the children are sometimes too strong.
- 89% would like another session on a similar topic. Those who disagreed were more likely to be PACU or scrub nurses.
- In all, 97% would recommend their colleagues to come for another teaching session on a similar topic in the future.

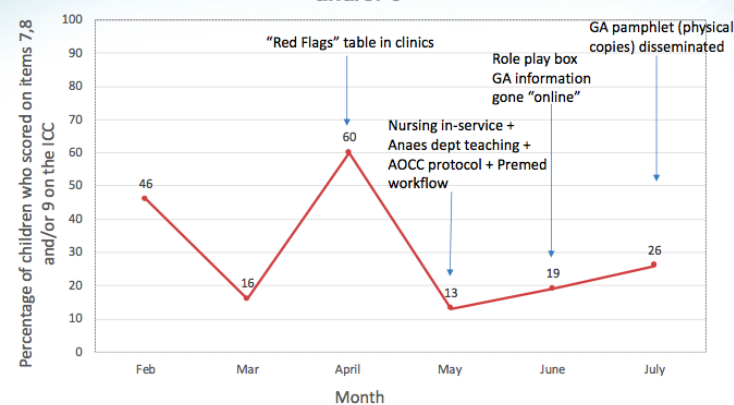


E: Benefits/ Results

Induction Compliance Checklist Scores score of ≤ 4



Proportion of children who scored on items 7,8 and/or 9



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- Possible reasons why the run chart does not show sustained improvement in reduction of scores 7, 8 and 9 might be due to lack of time for the interventions to run
- Bulk of the children under go elective surgeries during the school holidays (June 2019) and these children will be seen in clinic much earlier (Dec 2018 - April 2019) prior to the introduction of our interventions hence the values may not be representative of the results of our interventions

Benefits of Our Interventions

- Staff
 - Higher satisfaction from a smoother induction process
 - Greater empowerment through provision of resources
- Patient/Parents
 - Less anxiety and greater preparedness for surgery
- OT resources
 - More efficient usage of OT time due to less delays from a prolonged induction/pre-medication process

Cost Savings (Per Patient)

- Cost of running MOT for 1 hour = \$508
- Cost of running MCOT for 1 hour = \$469
 - 30 min delay due to pre-med/poor co-operation = **\$254 (MOT), \$234.50 (MCOT)**
- Cost of printing the GA pamphlet = \$0.28 (incl GST) per piece
- Cost of role-play boxes = \$2 (per box)
- Cost of pre-med mixing agent = \$0.30

Net Savings:

- MOT: \$254 - \$0.28 - \$2.00 - \$0.30 = **\$251.42**
- MCOT: \$234.50 - \$0.28 - \$2.00 - \$0.30 = **\$231.92**



F: Strategy for Spreading/Sustaining

- NHS Institute for Innovation and Improvement: sustainability score of 55.2



- Repeat in-service training for nurses being planned
- Red Flags table and GA pamphlet to be routine part of pre-op clinic visits
- GA pamphlets and information for parents made available on the NUH Anaesthesia website and to the clinics of other surgical specialties with Paediatric services
- Introduction of Child Life Specialist services and appropriate referral channels to the other surgical specialties – email notification and face-to-face meeting to introduce other surgical departments to the child life specialist
- Other surgical specialties that have been contacted: Dental, ENT, orthopaedics, plastics