Managing Children's Anxiety before surgery and procedures: the whys, the now, the future

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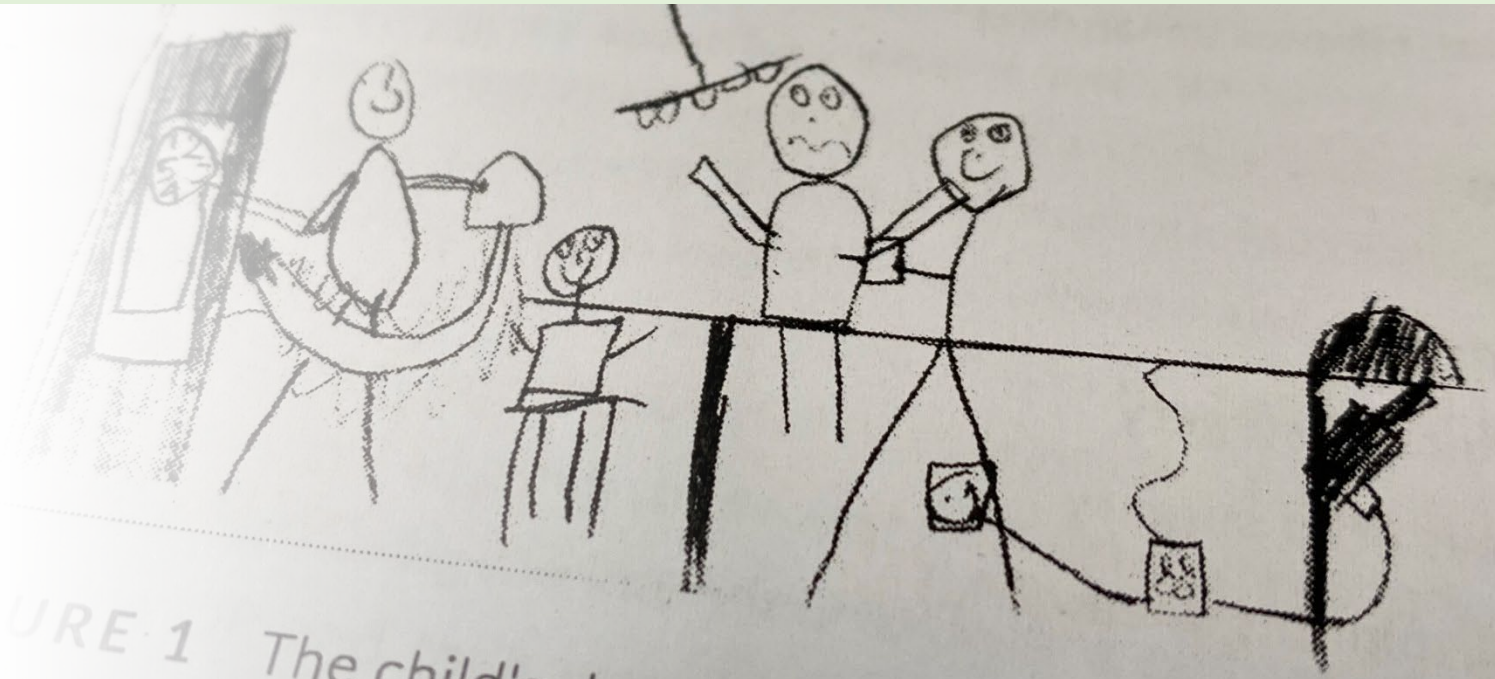
Hong Kong Children's Hospital

- Up to 75% of the children reported to have significant perioperative anxiety
- Tension, Irritability, Increased autonomic nervous system activity



URE 1 The child's drawing of his/her facial expression
s the child's anxiety (9 y old)

Kain et al 1996, 2002, 2004, 2006

Perioperative Anxiety

Fear for anaesthesia

Fear for surgery

Fear of Pain and Discomfort

Fear of separation from parents

Fear of strange hospital environment

Tan L, Meakin GH. BJACEACCP 2010.
Yang Y et al. BMC Pediatr 2022, 22, 92.

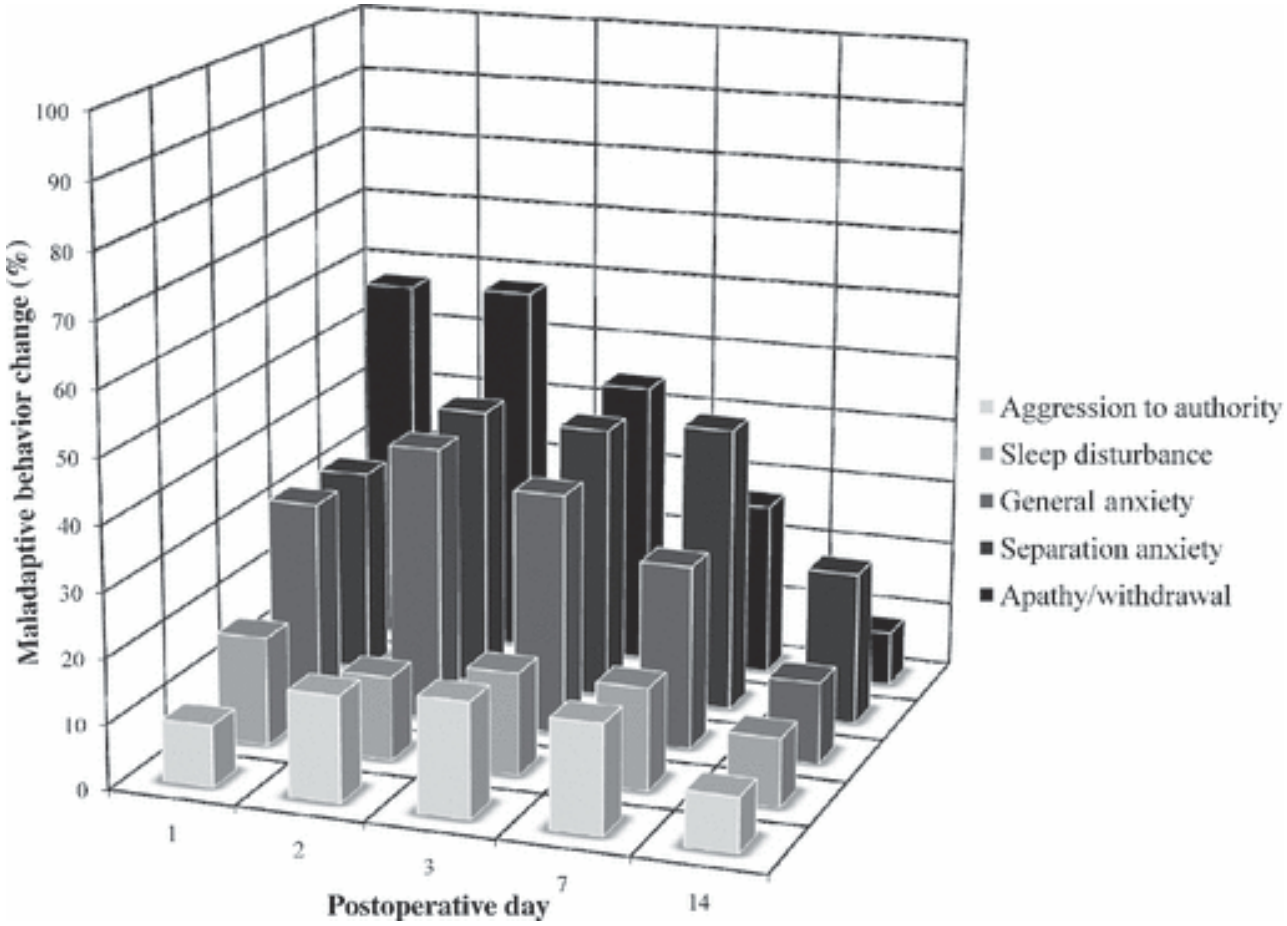
Too much fear can worsen outcome

- Adverse clinical outcomes:
  - ↑ circulating glucocorticoid secretion
  - ↑ postop analgesia requirement,
  - ↑ postop emergence delirium
  - ↑ postoperative behavioural changes
  - Longer and more complicated recovery
  - Negatively affect patient and parental satisfaction
- Impact negatively on the child's responses to future medical care

Kain et al 1996, 2002, 2004, 2006

Postop maladaptive behavioural changes

- Postoperative maladaptive behavioural changes
  - For young children undergoing outpatient surgery
  - General anxiety, nightmares, nighttime crying, enuresis, separation anxiety, temper tantrums
  - Postop
    - 2 weeks – 54%
    - 6 months – near 20%
    - 1 year- 6%



Kain et al, 1996
Fortier et al, Ped Anesth 2010

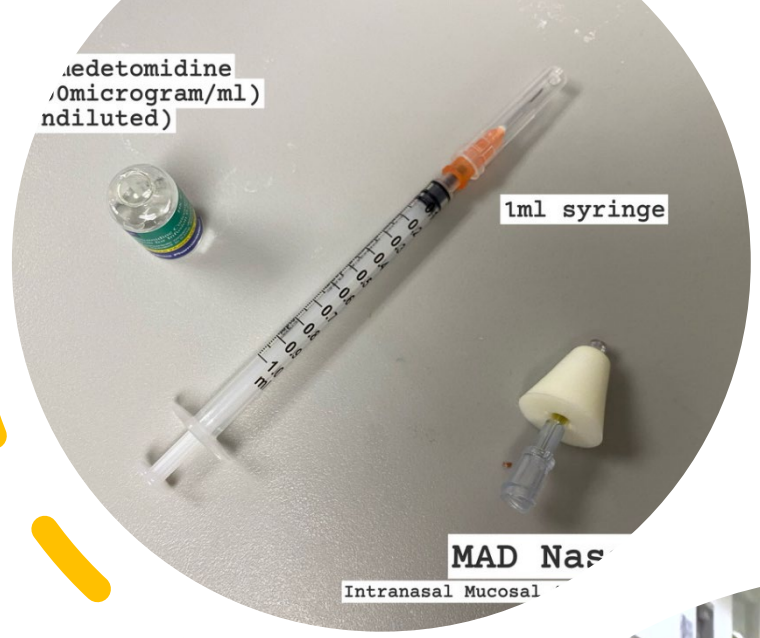
Predictors of postoperative behavioural changes

- Young age 1-4 years
  - Separation anxiety, social inexperience, limited ability to communicate, limited ability to relieve anxiety through play
- Child's temperament: shy, inhibited
- Increased anxiety of both child and parent in holding area and at anaesthesia induction
- Previous negative medical experiences

Management of Perioperative Anxiety

- Pharmacologic
  - Sedatives
  - Topical anaesthetics
- Non-pharmacologic

1. Environmental
2. Educational
3. Social, communicative and behavioural
4. Psychological



Sedatives may not be the answer to everything

- Time for drug to work
- Monitoring after premedications
- Selection of appropriate agents:
  - midazolam vs ketamine vs dexmedetomidine vs others
- Paradoxical agitations
- OT delays
- Delayed emergence and discharge for ultra short cases
- Contraindications: unfasted, difficult airway, critically unwell etc

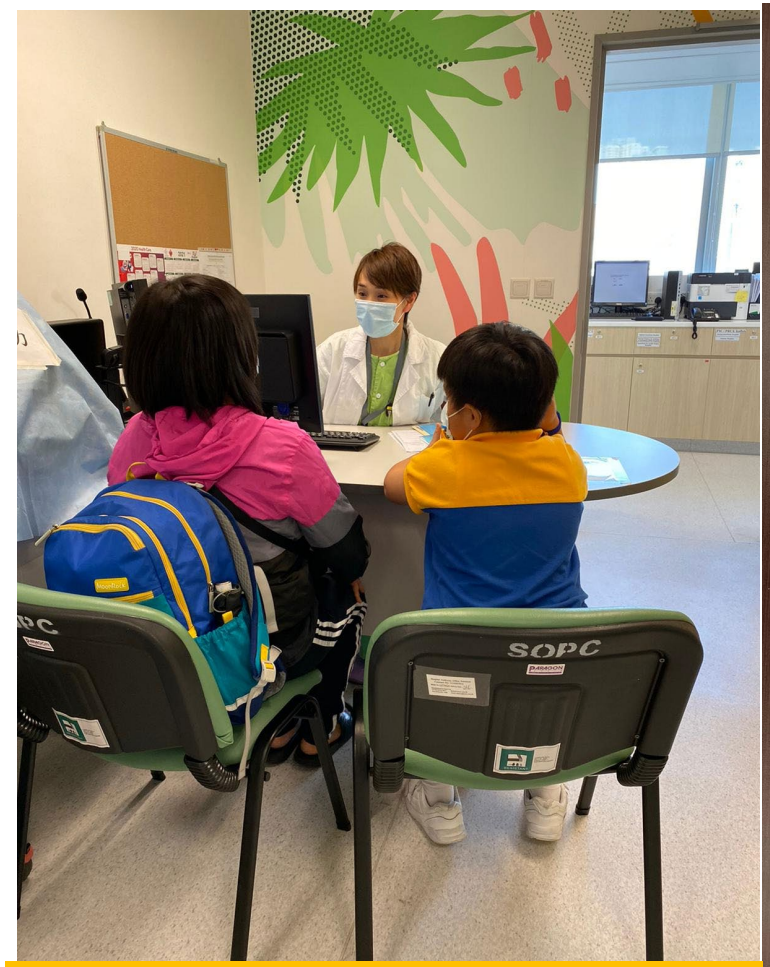
Kelly L, Coper M. Paediatric anaesthesia: challenge with induction, Nov 2017. WFSA tutorial

Environmental strategies

- Scented masks
- Toy Cars
- Music
-Lighting

Management of Perioperative Anxiety

Education to children and parents



Pre-anaesthetic/Pre-sedation Clinic
Education by Anaesthesiologists and OT nurses

Leaflets

Video Education

Management of Perioperative Anxiety

Parental presence for Induction of Anaesthesia (PPIA)

- Delays in OT schedules
- Crowded operating rooms
- Complicated induction
- Parental anxiety
- Disruptive behaviour
- Multiple studies showed parental presence DOES NOT result in decreased anxiety on children during induction process

- Reduce anxiety of separation
- Reduce need for sedatives
- Increased child compliance
- Increased parental satisfaction
- Calm parents benefit anxious children during anaesthesia induction

To date, all studies concluded that the presence of a parent during induction does not have an impact on the issue of postoperative behavioural changes

Health care provider

Coping-promoting	Distress-promoting
Distraction	Reassurance
Nonprocedural talk	Apology
Humour	Empathy
Medical reinterpretation of equipment/procedures that were in child's immediate environment	Criticism
	Giving a child too much control over a procedure

Management of Perioperative Anxiety

Psychological Strategies

- Distraction stimuli
- Smartphone/tablets
- Virtual reality
- Guided imagery
- Medical reinterpretation

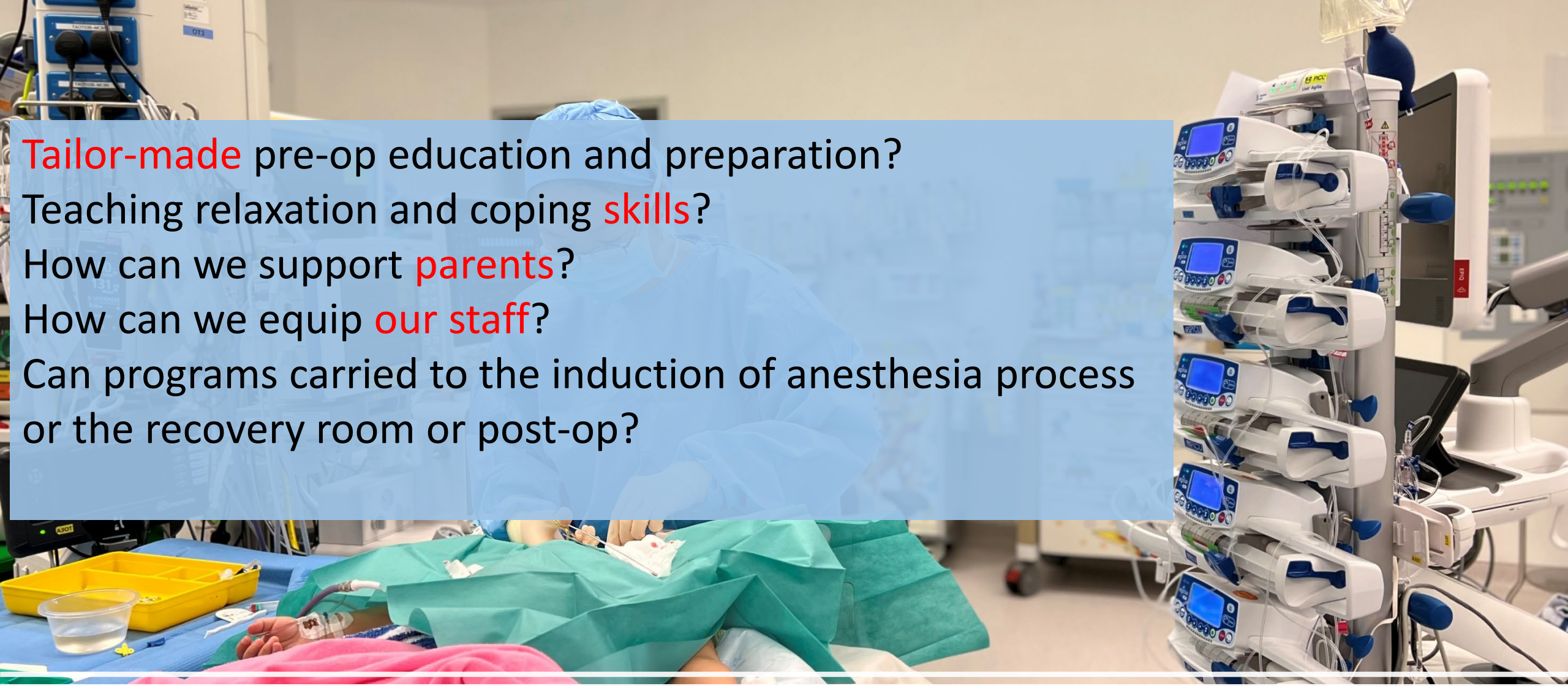
Child-centred interventions and approaches

- Improve children’s ability
  - to access, understand and evaluate health information and services
- Empowering children
  - to become more engaged in shaping and making decisions and choices about their healthcare

Age-specific strategies

	0-12 mo	1-2 years	2-5 years	7- 12 years	Adolescence
	• Readily accept parental surrogates	• Separation anxiety • Less likely to understand proceedings	• Concerns about bodily mutilation	• More explanation and participation • Need for control	• Concerned about pain, awareness and lost of control
• Strategies	• Soothing voices • Gentle rocking • Being held	• Appropriate distractions	• Require reassurance • Simple explanations effective • Play therapy useful	• Appropriate distractions	• Coping strategies • Sense of control
• Parental presence	• +/-	• Helpful	• Helpful	• +/-	• +/-
• Premed	• Seldom	• +/-	• +/-	• PRN	

Kelly L, Cooper M. ATOTW 367 – Paediatric Anaesthesia: Challenges with induction
Tan L, Meakin GH. Continuing Education in Anaesthesia, Critical Care & Pain j Volume 10 Number 2 2010



Tailor-made pre-op education and preparation?
Teaching relaxation and coping skills?
How can we support parents?
How can we equip our staff?
Can programs carried to the induction of anesthesia process or the recovery room or post-op?

How can we do better?

Collaboration with Child Life Specialists

- Prepare children and family members for medical procedures
- Tailored therapeutic play and age-appropriate preparation
- Variable distraction techniques in the operating room depending on age
- Promote effective and healthy coping and adjustment
  - for present and future healthcare experiences
- Reduce needle-related pain and distress in children pain experiences

Received: 24 July 2019 | Revised: 3 December 2019 | Accepted: 18 December 2019

DOI: 10.1111/pan.13802

RESEARCH REPORT

Pediatric Anesthesia WILEY

Reducing preoperative anxiety with Child Life preparation prior to intravenous induction of anesthesia: A randomized controlled trial

Nicholas West[1] | Nancy Christopher[1] | Kirsten Stratton[2] | Matthias Görges[1,3] | Zoë Brown[1,3,4]

BC Children's Hospital

59 Children aged 3-10 for elective day surgery lasting <= 2 hours

Child Life Group (on OT day) ~ 20 minutes

- Role play: using dolls and medical equipment
- Books/storyboards: showing pictures of Anaesthetic Care Unit and operating room routines
- Coping and relaxation skills: including deep diaphragmatic breathing and guided imagery
- Age appropriate explanation of what to expect throughout the day in OR

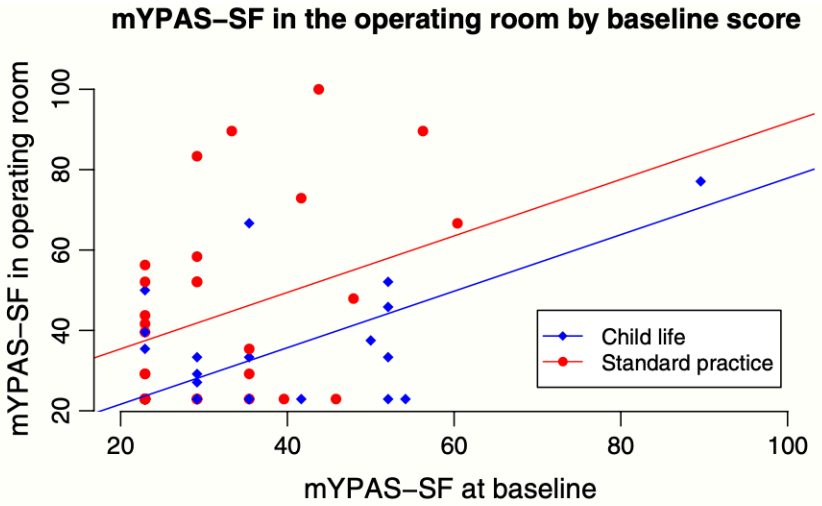


FIGURE 3 Change in modified Yale Preoperative Anxiety Scale—Short Form (mYPAS-SF) between baseline score in ACU and postintervention score in the operating room. The operating room myPAS-SF score is plotted against the baseline mYPAS-SF score for the Child Life group (blue diamonds) vs standard practice group (red dots). Red and blue lines indicate score change predicted by the analysis of covariance (ANCOVA) model

Operating room anxiety (mYPAS-SF)

- **Control 16/31 (52%)** VS **Child Life Preparation 6/28 (21%)**

Family-centered Preparation for Surgery Improves Perioperative Outcomes in Children: A Randomized Controlled Trial FREE

Zeev N. Kain, M.D., M.B.A.; Alison A. Caldwell-Andrews, Ph.D.; Linda C. Mayes, M.D.; Megan E. Weinberg, M.A.; Shu-Ming Wang, M.D.; Jill E. MacLaren, Ph.D.; Ronald L. Blount, Ph.D.

Anesthesiology January 2007, Vol. 106, 65–74.

https://doi.org/10.1097/00000542-200701000-00013

- 408 children randomized to 4 groups
  - Standard of care
  - Parental presence during induction of anaesthesia
  - Family-centred behavioural preparation (ADVANCE)
  - Oral midazolam

- ADVANCE program
  - Anxiety reduction
  - Distraction on day of surgery
  - Video modeling and education before the day of surgery
  - Adding parents to the child's surgical experience and promoting family centred care
  - No excessive reassurance
  - Coaching of parents by researchers
  - Exposure/Shaping of the child via induction mask practice

Child's State Anxiety

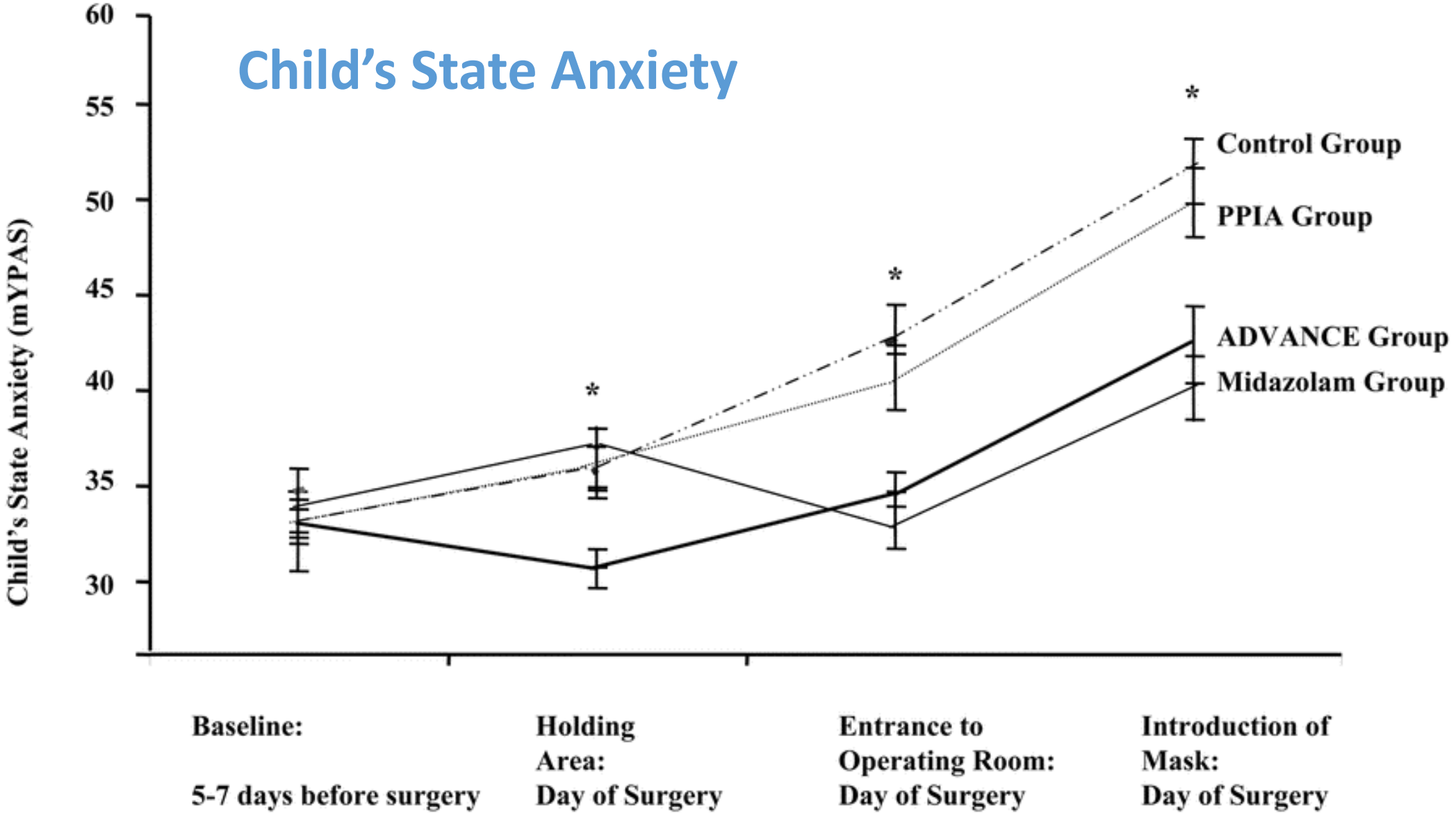


Table 2. Perioperative Outcomes

	Study Group					
	Control (n = 99)	Parental Presence (n = 94)	ADVANCE (n = 96)	Midazolam (n = 98)	*P* Value	Effect Size (95% CI)‖
Children's Anxiety (mYPAS)						
Holding area	36 ± 16	35 ± 16	31 ± 12*	37 ± 17	0.001	0.54 (0.78–0.30)
Introduction of mask at induction	52 ± 26	50 ± 26	43 ± 23†	40 ± 24	0.018	0.33 (0.58–0.08)
Postanesthesia care unit						
Fentanyl consumption, μg/kg	1.37 ± 2	0.81 ± 1	0.41 ± 1‡	1.23 ± 2	0.016	0.54 (0.75–0.24)
Time until discharge, min	120 ± 48	122 ± 44	108 ± 46§	129 ± 44	0.040	0.34 (0.60–0.09)

Table 3. Emergence Delirium, %

	Emergence Status*		
	1	2	3†
Control group	35.4	40.4	24.2
Parental presence group	57.1	27.4	15.5
ADVANCE group	50.0	39.6	10.4
Midazolam group	42.5	36.8	20.7

* $P = 0.038$. † Denotes marked emergence symptoms = patient is thrashing and crying and may need restraint as he or she emerges from anesthesia after surgery.

Superior outcomes in
- Analgesic consumption
- Time until discharge
- Emergence delirium

Reducing Anesthesia and Health Care Cost Through Utilization of Child Life Specialists in Pediatric Radiation Oncology

Michael T. Scott, MD, MBA • Kimberly E. Todd, CCLS • Heather Oakley, LCSW • ... Stuart Klein, MBA • Nancy P. Mendenhall, MD • Daniel J. Indelicato, MD • Show all authors

- 2006-2014, Retrospective cohort 425 patrients (Age 2-12)
- Average 6 week course of pediatric anesthesia for radiation therapy costs USD$50,000 to payer
- Average annual cost to employ one CCLS is also $50,000
- Pre-Child life era: 33/53 (62.3%) aged 5-8 require daily anesthesia
- Post-Child life era: 124/304 (40.8%) require daily anesthesia (28.8% aged 5-8 years old)

- >16% absolute reduction in anesthesia use after employment of CCLS
- Predicted annualized health care system cost savings (when treating 100 children aged 3-12/year) > USD$775,000

Scott MT et al. International Journal of Radiation Oncology. Vol 96, Issue 2, P 401-405 Oct 2016

HKCH Case sharing 1:

Overcoming anxiety of anaesthesia induction

HKCH Case sharing 2:
High risk patient for procedural sedation

- 4 years old
- Mucopolysaccharoidosis type 4 (Morquio A Syndrome)
- Currently on Enzyme replacement therapy (Elosulfatase alfa)

- Noted brisk reflexes and ankle clonus
- no numbness or incontinence noted.

MRI Spine (Plain) - REPORT

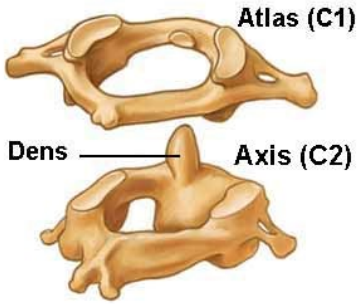
- Diffuse spinal stenosis at C2-C5
- Flattening of cord at C2
- Subtle increase in cord signal at C2 level, suggesting myelomalacia

Metabolic Team and Orthopaedic Surgeons then requested :

MRI brainstem + craniocervical junction ***(flexion + extension view)***
Scheduled appointment 3 months later

Common Clinical Features in MPS

More skeletal manifestations for MPS IV



Difficult intubation 28-44%

68%: >25% Tracheal narrowing
29%: >75% Tracheal narrowing

Short neck (with or without cervical instability)

Hypertrophic tonsils and adenoids

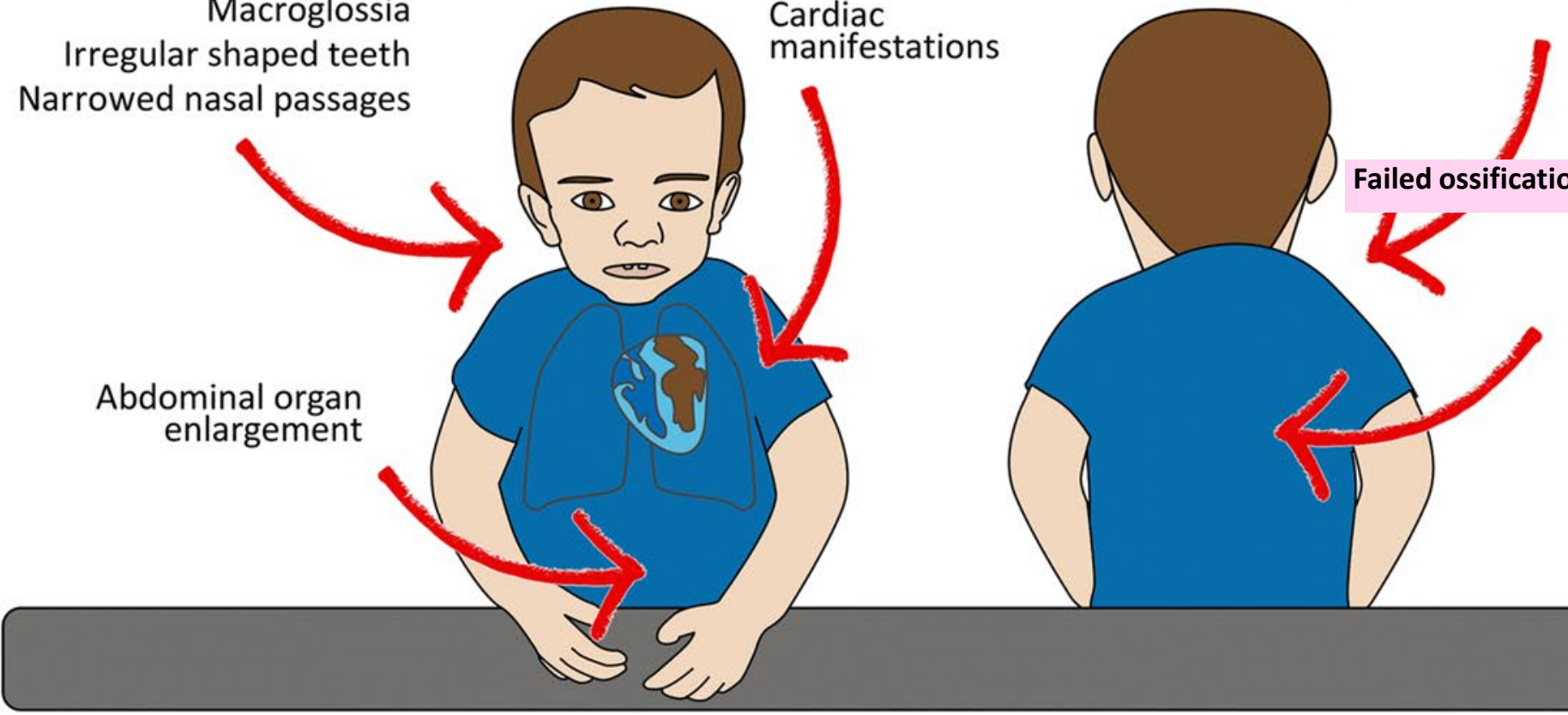
Tracheal distortion

Tracheomalacia

Thickened and copious secretions

Prominent mandibula
Immobile jaw
Macroglossia
Irregular shaped teeth
Narrowed nasal passages

Cardiac manifestations



Abdominal organ enlargement

Failed ossification of the dens and dens hypoplasia (90%)

Spinal cord compression/ stenosis (51%)

Kyphoscoliosis

Abnormalities in the shape and structure of the ribs

Resctrictive pulmonary disease

Redundant respiratory epithelium

Airway edema due to recurrent infections or reactive airway disease.

Dysostosis multiplex
widespread skeletal dysplasia and bony deformity

Solanki, G.A., Martin, K.W., Theroux, M.C. *et al. J Inherit Metab Dis* **36,** 339–355 (2013).
Harmatz P, et al. Mol Genet Metab. 2013 May; 109(1):54-61.

Moretto, A., Bosatra, M.G., Marchesini, L. *et al.* Anesthesiological risks in mucopolysaccharidoses. *Ital J Pediatr* **44,** 116 (2018)

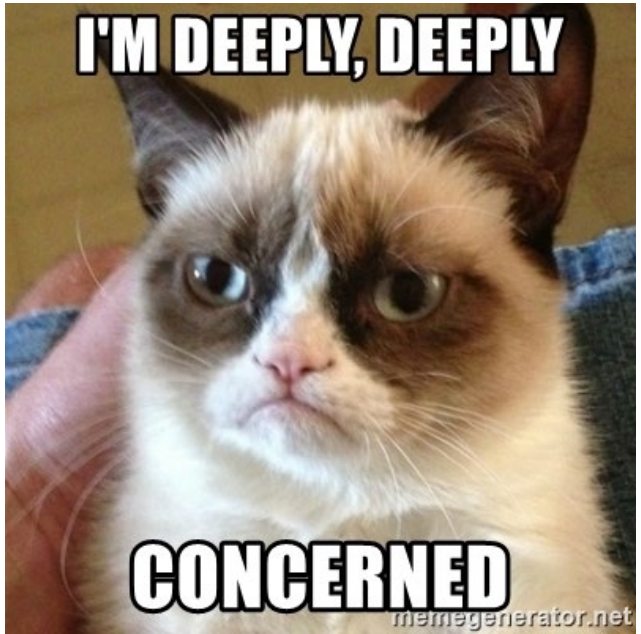
(Berger KI et al, J Inherit Metab Dis 2013;36:201-10)

Tomatsu et al, Case series, Mol Genet Metab 2016;117:150-6)

Anaesthetic Concerns

- MRI: Long duration

- Flexion position:
    - Risk of subluxation, spinal cord instability or compression
    - Neurological status cannot be monitored while sedated/anaesthetized
    - Anterior buckling of posterior tracheal wall may further obstruct airway
- Airway disease: Obstructive/Restrictive
- Comorbidities



Is no-sedation an option for a 4-year-old?

- Collaboration with Radiology and Child life specialists

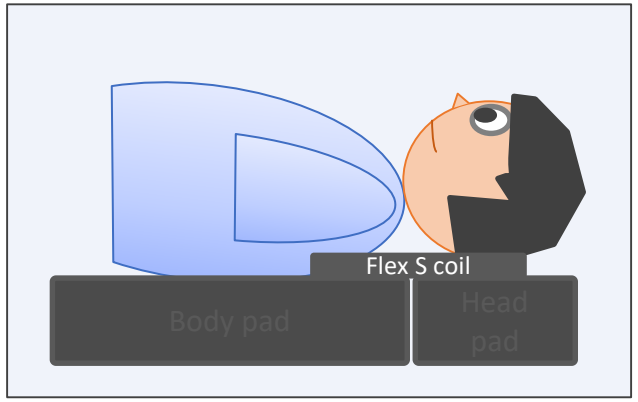
MRI simulator

MRI audiovisual system with MR compatible video goggles & headset


00:05
SÉLECTION SÉQUENCES
1
3
ATELIER ENREGISTREMENT

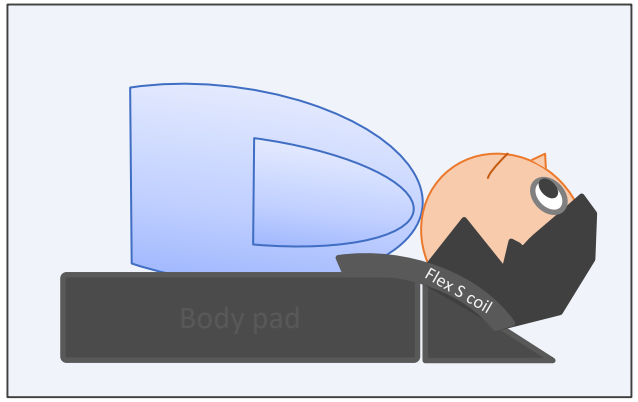
Step 1. Neutral position

Sagittal: T2 tse, T1 tse
Axial: T2 space 2-3mm



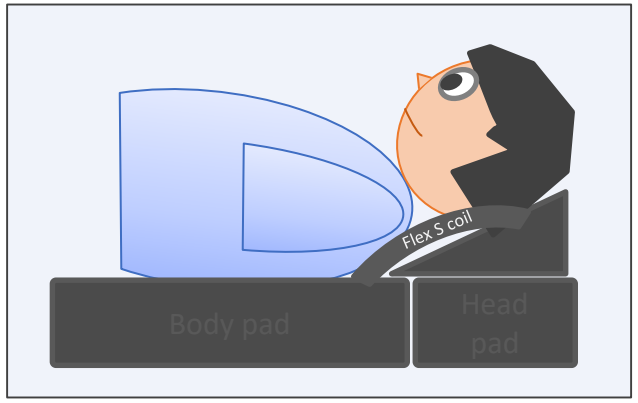
Step 2. Extension position

Sagittal: T2 tse fast/trufi
+/- Axial: T2 trufi



Step 3. Flexion position

Sagittal: T2 tse fast/trufi
+/- Axial: T2 trufi



Radiological modification

Risks of flexion-extension manipulation

1. Cord compression (Check by Radiologist or Orthopaedic Surgeon)
2. Airway compromise (Check by Anesthetist in sedation setting)

- STOP exam if either complication happened ☹
- Head must be stabilized throughout the procedure

Short incremental sequence

- Goal-directed
- Limit to 5 minutes each for flexion and extension

Joint team collaboration

- Physiotherapist and Orthopaedic Surgeon
  - documenting degree of flexion/extension tolerated
- Radiology/Child Life Specialist:
  - Mock scan simulation training

TKOH Experience

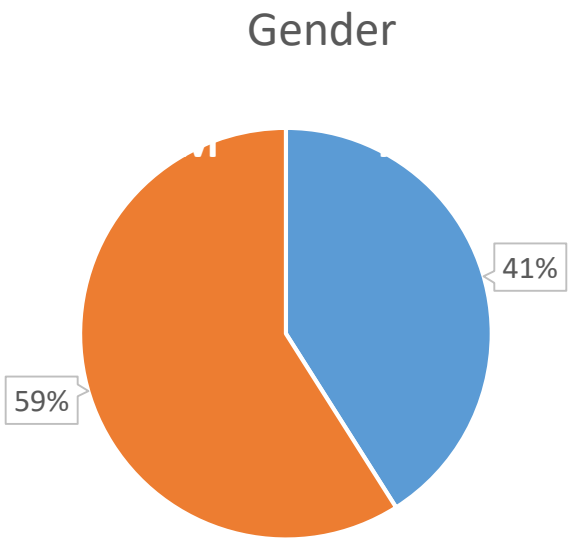
Special thanks to Ms Yung Siu Ling RN and Ms Chiko Chong (Playright) for the TKOH powerpoint slides

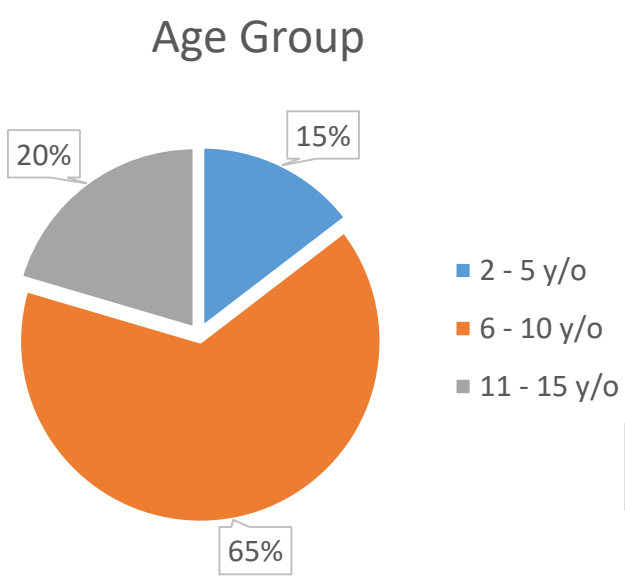
TKOH Experience

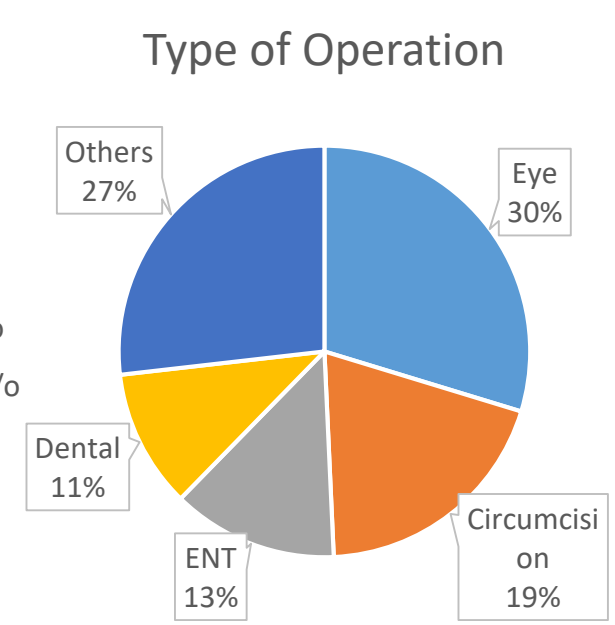
	Before COVID	During COVID
Location	On-site preparation	Home preparation (Zoom)
Time	15-20 minutes	~ 40 minutes
Parents involvement	Limited	More parental participation
Preparation	More interactive play Better observation of emotional needs	Less interactive
OT in-situ support	Can accompany patients to OT Distraction plays a/v	N/A
Communication with OT staff	More direct communication with OT team and anaesthesiologists	N/A

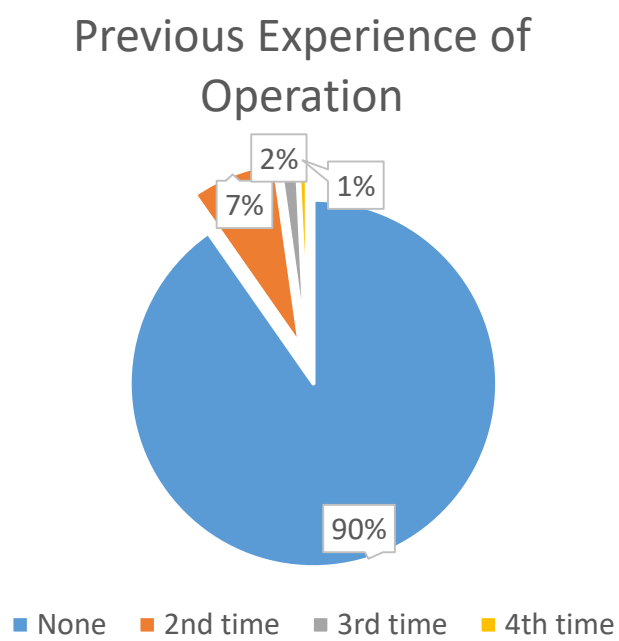
TKOH Questionnaire Results

December 2020-August 2022, n=140



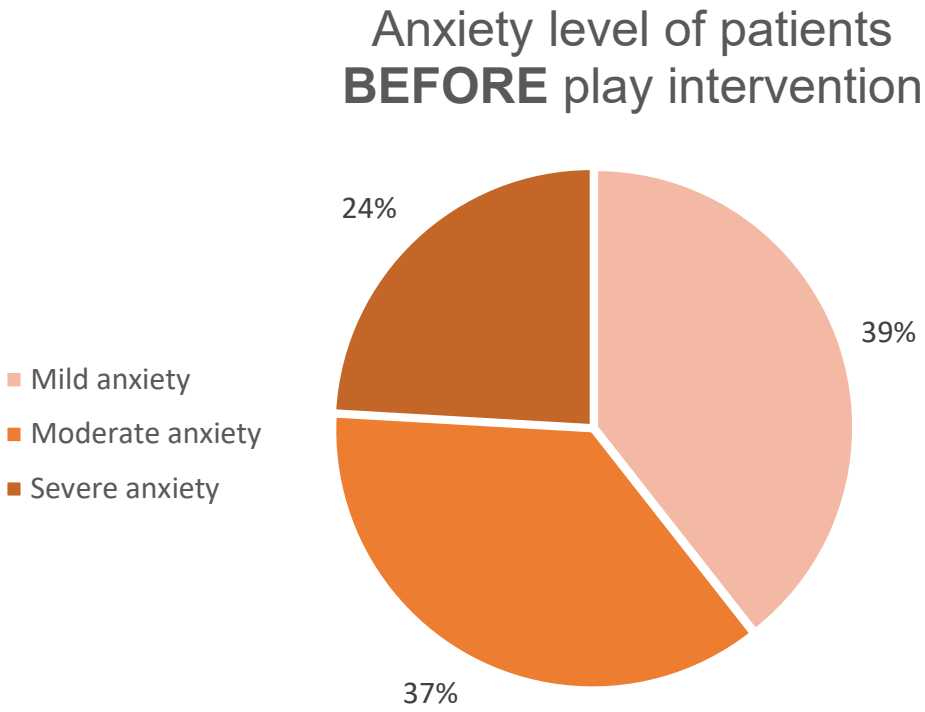


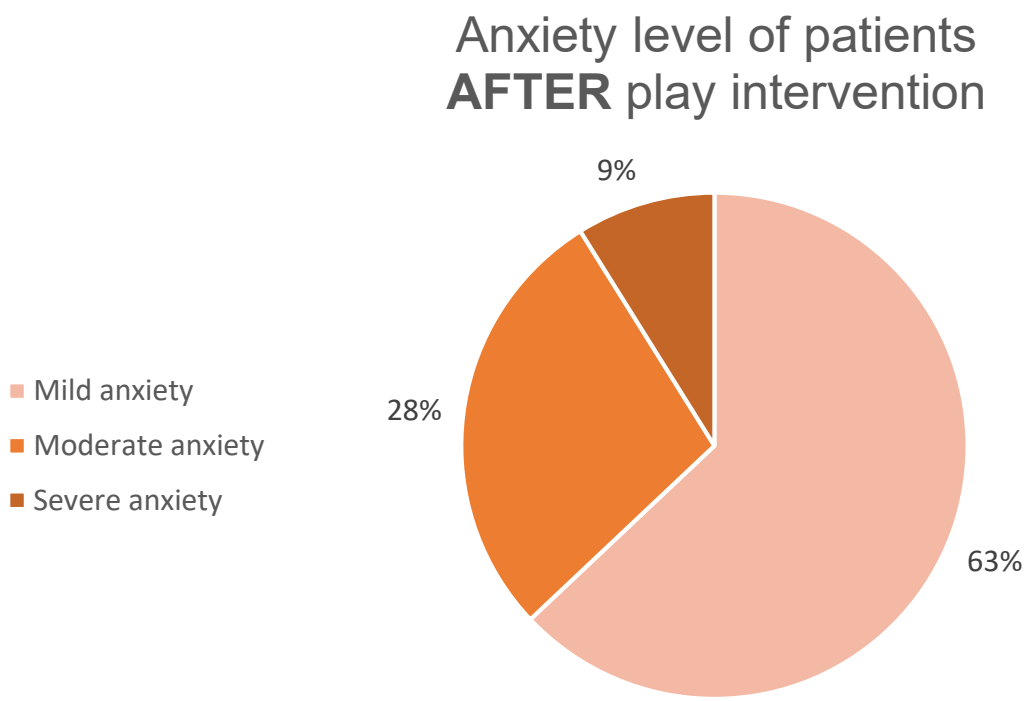




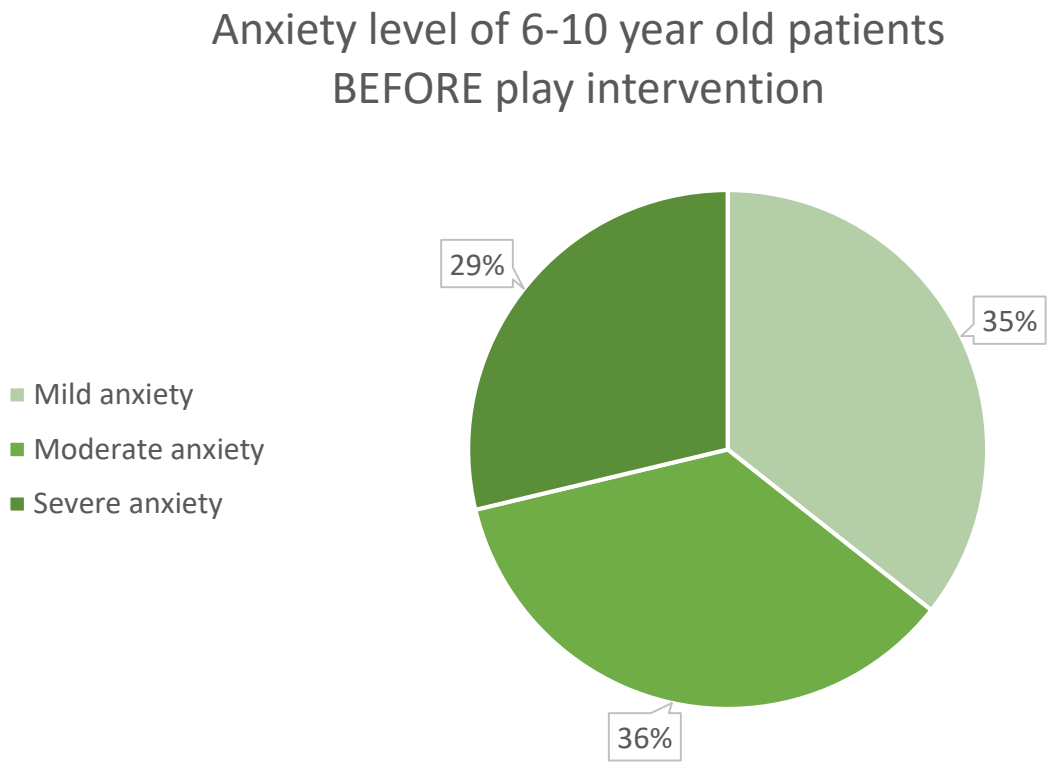
TKOH Questionnaire Results

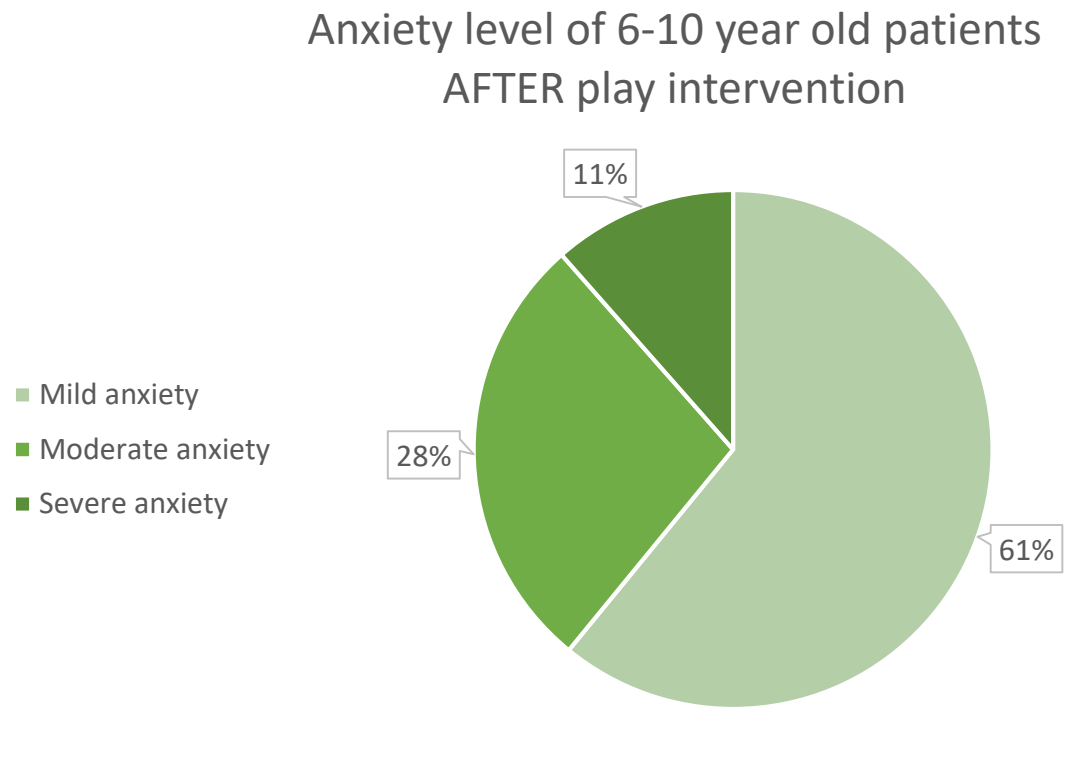
- A total of 140 patients and their parents did the survey during December 2020 to August 2022 in TKOH
  - **Severe anxiety level**: before intervention – 24%
    after intervention – 9%



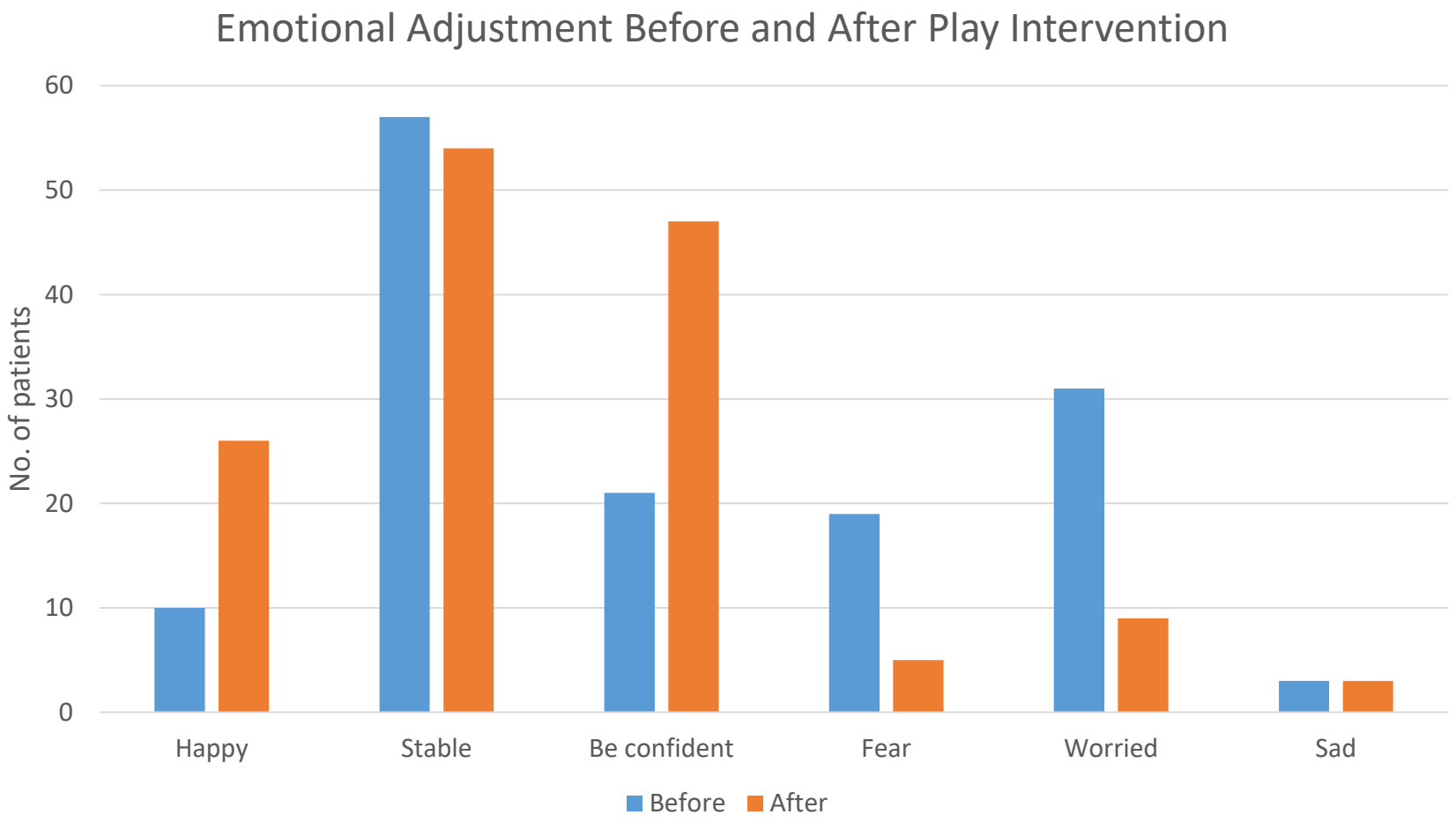


The impact on **6-10 years old** patients is more obvious than toddlers and teenagers:

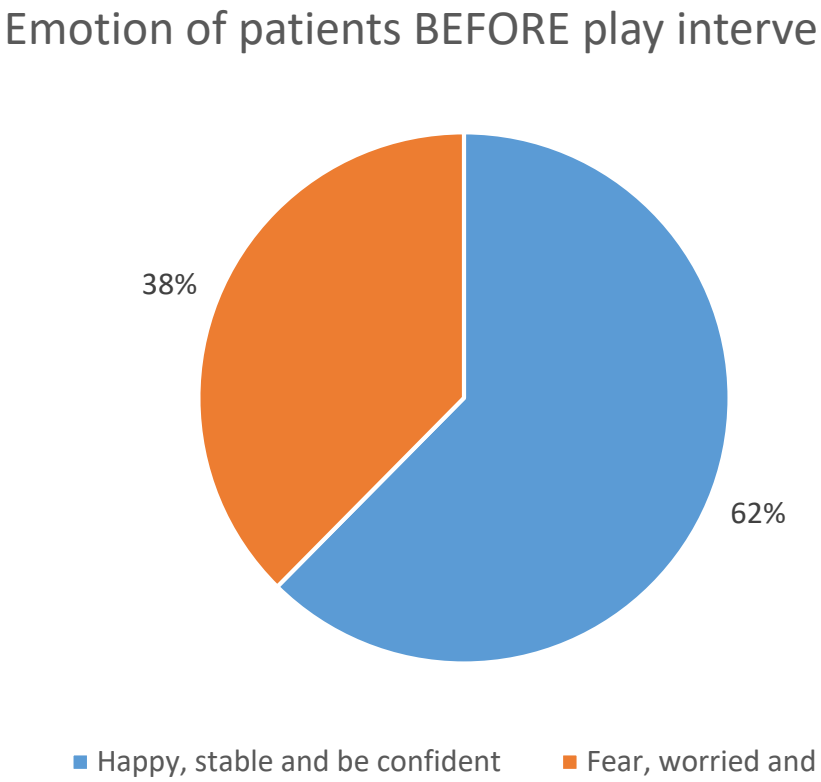


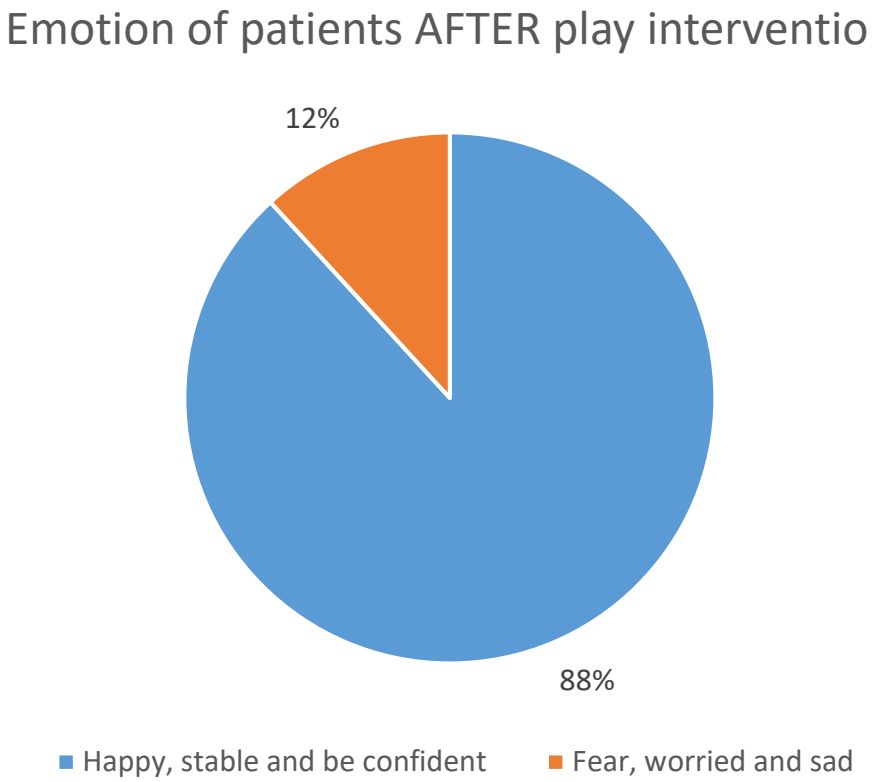


Emotional Adjustment Before and After Play Intervention



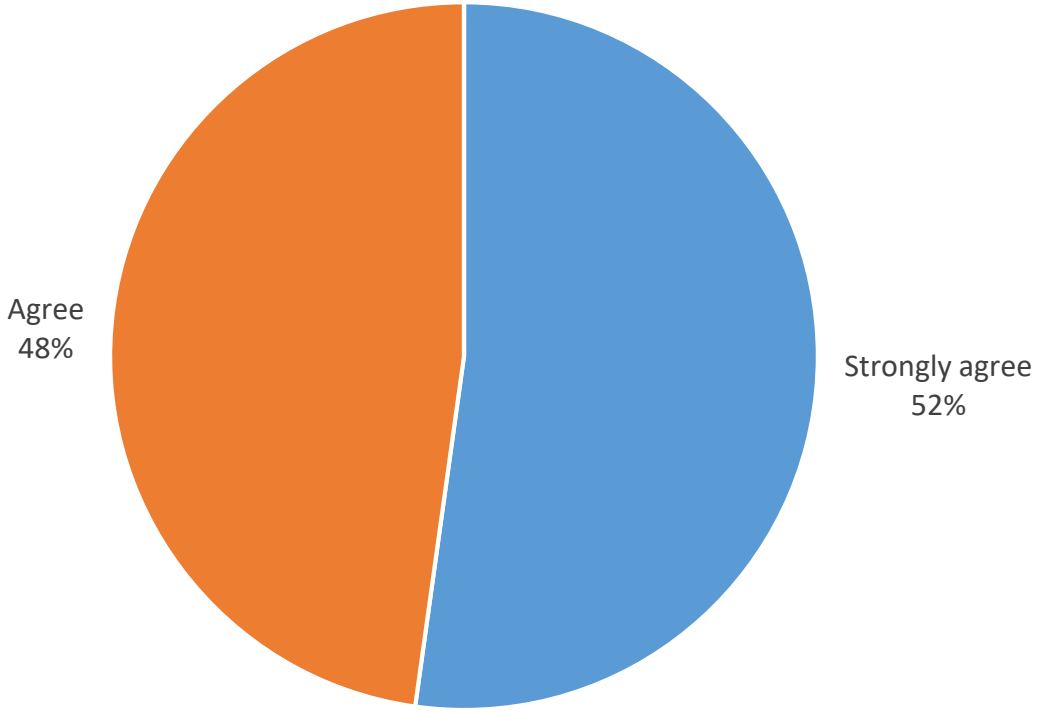
88% of patients felt happy, stable and be confident after play intervention





Parent Feedback

Could the hospital play services help your child understand more about the medical procedures and express their emotions?



Virtual Reality OT Tour for Pre-op education

- Joint study with HKCH, Hong Kong Polytechnic University, City University of Hong Kong and Playright
- Start in 2023
- 7-12 years old, Elective surgery
- 15 minutes VR Operating theatre tour

What we do know

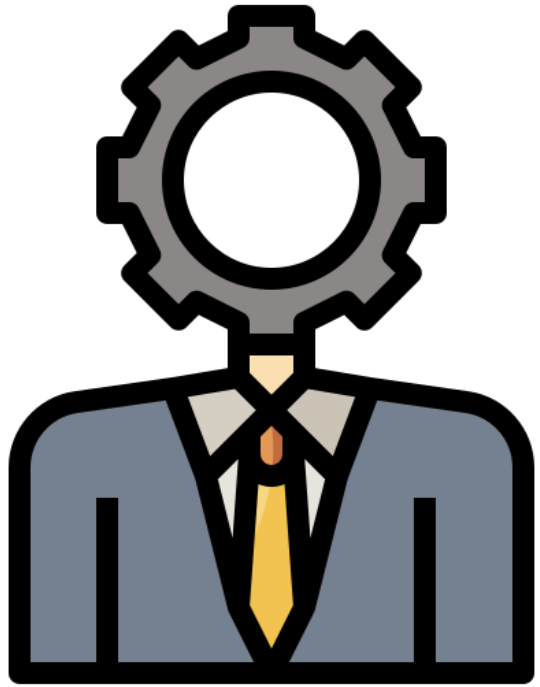
- Anti-anxiety strategies are vital for paediatric patients coming in for procedures/surgeries.
- Child-centred interventions and approaches
- Parents need to be prepared as well
- Saves sedation and anaesthesia requirements
- Reduce unwanted adverse outcomes
- Saves cost

Anaesthesiologists

- Referral to Child life specialists:
  - Identify who
- Collaboration with Child life specialists in wards and OT
- Staff training

Child Life Specialists

- Tailored strategies for patients and parents
- Preop/OT/Postop
- Sedation & procedures
- How?
  - Utilization of ***both*** remote and on-site support?



Administrators

- Enhance and facilitate the communication between anaesthesia/OT teams and child life specialists
- Promote flexibility and allow timely referral to ALL patients in need

thank you!

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