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Magical distraction for induction of paediatric anaesthesia

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Edited by Dr Sharon Tivey

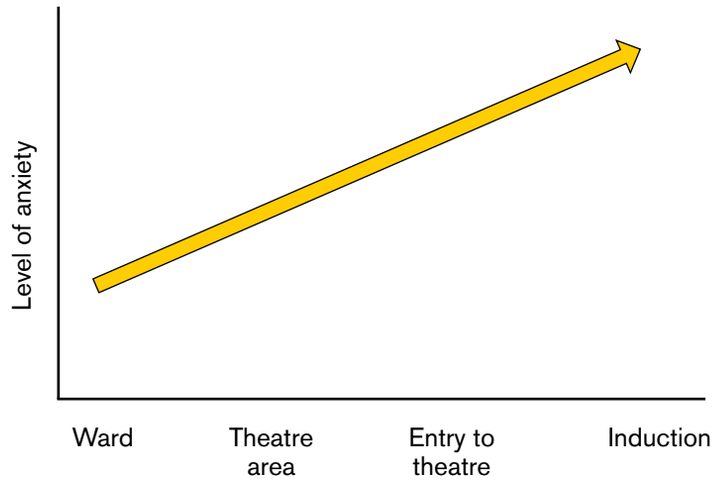
INTRODUCTION

Between 40 and 60% of children are anxious before anaesthesia and surgery, resulting in some becoming uncooperative at induction but also having effects persisting after anaesthesia. Anxiety can be reduced with a combination of education, behavioural and pharmacological techniques. Research shows the child's experience of anxiety is greatly affected by the anaesthetist's choice of words and behaviour. Distraction is a very important behavioural technique the anaesthetist can use at the time of induction to reduce a child's anxiety by keeping their focus away from the procedure. Current research focuses on virtual reality as a form of distraction, although this may involve complex and expensive systems. After a brief overview, this article will give a practical approach to managing induction by taking advantage of the powerful distraction from three simple magic tricks suitable for children aged four years and older. Magical distraction is so strong, that children can be thrilled and laughing as they fall asleep, perhaps reducing the likelihood of emergence delirium. It also distracts and relaxes the parent at the time of induction. After using this technique over the past twenty years and for thousands of children, the author has lost count of the number of frightened children assisted, and of the grateful words and notes of thanks.

ANXIETY AT INDUCTION OF ANAESTHESIA

A child's anxiety increases as they progress towards surgery, with induction of anaesthesia being the most stressful part of hospital admission[1] (Figure 1). Signs of anxiety include crying, screaming, becoming quiet and withdrawn, expressing fear or sadness or lack of cooperation. These signs of anxiety are very common: One sign is present in 42% of 2 to 10-year-olds, and three or more signs detected in 17% at induction.[2] Anxiety is more common in children aged one to five years, those who have a shy, inhibited, or anxious temperament, have had a difficult or 'stormy' induction before, or have very anxious parents.[3]

Figure 1. A child's anxiety increases during their journey towards theatre and induction, although there is variation between children depending on their temperament, past experiences, and other factors. Based on Chorney and Kain.[2]



CONSEQUENCES OF ANXIETY AT INDUCTION

Anxiety can reduce cooperation at induction, with up to 25% of young children who have not received a sedative premedication requiring restraint at this time[1]. However, the effects of this anxiety persist beyond induction. Children who have a difficult induction that necessitates restraint are more likely to be agitated when awakening, have increased pain and behavioural changes after surgery, and may become more anxious about future anaesthetics (Figure 2).

Behavioural changes include clinginess and separation anxiety, sleep disturbances and night terrors, food refusal, temper tantrums, and enuresis. Up to 60% of children have behavioural changes on the first postoperative day.[1,4,5] They commonly persist for three days after discharge, but sometimes for a few weeks or even months (Figure 3). Of the children who have emergence delirium, one in four have an increased incidence of behavioural changes one week postoperatively.[6]

Figure 2. Preoperative anxiety may affect emergence from anaesthesia and cause dysfunctional behaviour in the postoperative period. This experience may then increase the child's anxiety at the next anaesthetic.

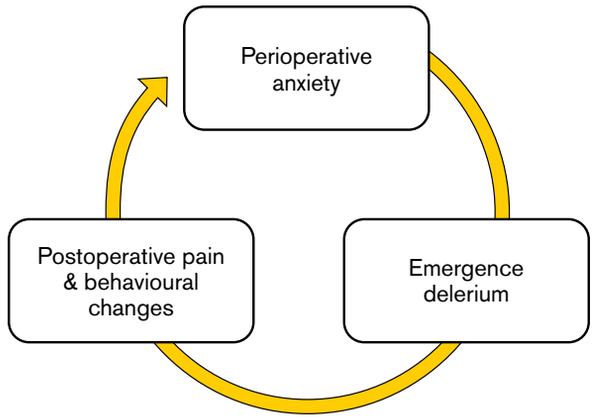
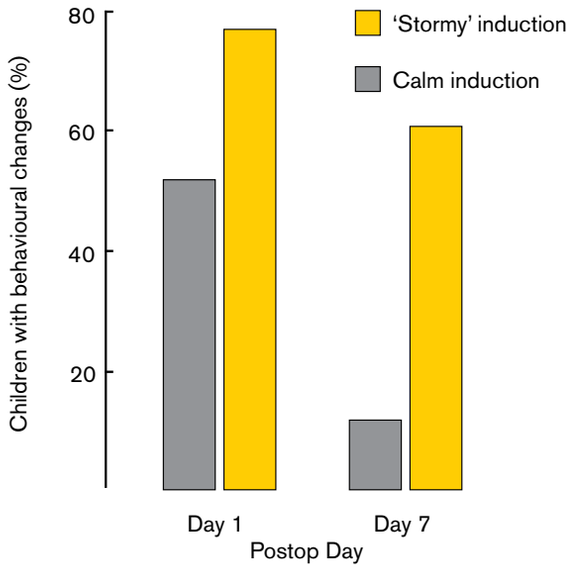


Figure 3. A difficult or 'stormy' induction is associated with an increased incidence of behavioural changes after anaesthesia. Based on Kain et al.[1]



REDUCTION OF ANXIETY AT INDUCTION

Reducing a child's anxiety leading up to and including induction reduces pain and behavioural disturbances in PACU and later. A small group of children will be calm and cooperative at induction no matter what strategies the anaesthetist employs. There is also a small group of children who will likely be unhappy and uncooperative no matter what the anaesthetist does. In the middle is a large group whose anxiety can be managed, and their cooperation maintained. The aim in this group is to maintain a low level of anxiety and prevent tipping into a frightened and uncooperative state. It is important to prevent tipping, because once this has happened it can be very difficult to reduce the child's anxiety and regain their cooperation. The techniques to reduce a child's anxiety at the time of surgery include those educating and preparing the child and parent before admission, pharmacological premedication, and behavioural techniques in hospital.

Education techniques

Preparation programs are optimal if they teach the child coping skills to deal with their anxiety. This requires significant resources, and these programs are not commonly used.[7] The use of individualised video and virtual reality technology may make these programs common again. For the time being, information brochures and websites are the commonest form of education, though they are the least effective. The preoperative phone call to the carer and assessment of the child remains the commonest individualised education and preparation.

The preoperative period is also the time to introduce to the child any distraction technique planned, such as a video or a story. Finally, assessing the child before theatre also gives time for pharmacological premedication, when required.

Pharmacological techniques

Premedication effectively reduces preoperative anxiety. Its use should be targeted however to allow for risk factors such as the child's age, the duration of surgery and the potential for delayed recovery. When pharmacological premedication is needed, the commonest agents are clonidine 60 minutes before induction or midazolam 30 minutes before induction. Comparisons of the two premedications in preschool age children give diverging results when the effect on anxiolysis is the primary study outcome. A recent study of children between the ages of 2-6 years old showed midazolam gave better anxiolysis and less sedation than clonidine or dexmedetomidine.[8] Midazolam may sometimes cause dysphoria and amnesia after waking though, which should be taken into consideration. However, midazolam does not have to be rigidly dosed at 0.5mg/kg. The dose can be between 0.25 and 0.5mg/kg, administered 30 minutes before induction.[9] It seems plausible that titrating the dose according to the age of the child and their level of anxiety would reduce the likelihood of postoperative dysphoria.

Behavioural techniques

Parental presence at induction is a standard role in caring for children. Even though it does not reduce the child's anxiety at the time of induction, it avoids separation from their carer and increases parental satisfaction. It is part of modern 'family-centred' care.

The anaesthetist can use positive reinforcement and distraction to reduce the child's anxiety at induction. The behaviour of the anaesthetist – what they say and do – can worsen or lessen the child's anxiety.[10,11] Distraction, humour, and talking about something other than the procedure help the child cope with their situation and reduces their anxiety. On the other hand, reassuring, apologising, empathising, criticising, or allowing the child too much control over the procedure focuses them internally, and on their situation, increasing their anxiety and possibly making them inaccessible due to fear (Table 1a and 1b).

Table 1a. Staff and anaesthetist behaviours that reduce a child's anxiety at induction. Distraction shifts attention away from the induction and reduces anxiety. Based on Martin et al.[9]

Anaesthetist behaviours that reduce the child's anxiety	
Staff behaviour	**Example**
Non-procedural, distracting talk	Magic Talking about toys, pets, favourite movies Story telling
Humour	Jokes Funny story
Clear choices that do not allow avoidance of procedure	"Do you want me to hold the mask or your dad (or insert name of parent or carer) to hold it?" "Strawberry or chocolate mask?" "Walk or ride on the trolley?" "Do you want to climb onto the bed or mum to lift you?"
Medical play and describing visible equipment in no threatening terms	Astronaut space mask Green balloon bag
One adult talking	Only one person distracting the child
Firm warm confidence	Speaking with calm clear voice with sense of leadership
Good word choice	Metal tube, plastic straw, perfume smell. Focusing on what child can do rather than not do

Table 1b. Staff and anaesthetist behaviours that increase a child's anxiety at induction. Reassuring, empathic statements focus the child on their feelings of distress and increase anxiety. Based on Martin et al.[10]

Anaesthetist behaviours that increase the child's anxiety	
Staff behaviour	**Example**
Reassurance, empathy, and apologising	"You'll be OK", "Don't worry", "I know it's hard", "I'm sorry"
Excessive technical or medical talk	Too much information about the procedure or equipment, especially immediately before theatre
Suggesting control when the child actually has none	"Can I put the mask on now?" "Are you ready to come to theatre now?" "Do you want to climb up on the bed?"
Multiple adults talking	Child not focused on interacting with one person
Allowing child to delay	"Just a minute", or "Wait, I just want to…"
Poor word choice	Needle, sting, hurt, smelly. Focusing on what child can't do

The words chosen by the anaesthetist also affect the child's behaviour. Framing discomfort using playful, imaginative, or abstract language is helpful – "sparkles" up the arm rather than "this may sting a little", or "a beautiful perfume" rather than "this gas might smell". Speaking in a slow rhythmic manner can be somewhat hypnotic and help hold a child's attention. The choice of words and phrases used at this time are important and have been well discussed by Allan Cyna and his group in Adelaide.[12] Finally, the anaesthetist's posture, facial expression and where they stand relative to the child may also affect the child's anxiety.

Distraction is a very important technique in reducing the child's anxiety. The aim is to get the child's attention and keep their focus away from the procedure. Distraction can be achieved many ways, and although some children will be relaxed with simple non-procedural talk about school or toys, other children are more anxious and benefit from stronger distraction. Various techniques have been studied and assessed in a Cochrane review.[13] Current research tends to focus on electronic devices such as videos, handheld games, and virtual reality headsets.[14] Some of these techniques are complex, expensive, or cumbersome. Furthermore, it seems the child is better distracted if they are actively participating with the technique. One comparison showed actively playing a video game distracted the child and reduced anxiety, but just watching a video did not.[15] The novelty of the device is also important. Passively attempting distraction by just showing a video on a phone might not have enough impact.[16]

Strong, effective distraction starts early, is continuous, and increases as induction progresses, (Table 2) with a goal of preventing the child 'tipping' to an uncooperative state. A distraction is made powerful by its novelty and by building a sense of anticipation so the child is looking forward, or even excited, to find out what will happen. For a story, this might mean beginning it in the preoperative area. For a video or game, it might mean starting to watch it or choosing aspects of the game in the preoperative area. The distraction is maximised if the child's interest is held while they enter theatre, rather than their focus shifting to looking around and becoming worried.

Simple magic tricks are a powerful distraction because they are novel, colourful, and partly performed by the child. Unlike videos, children don't often see or experience them. Magical distraction has the practical benefits of being cheap, mobile, reliable, and easily accessed in theatre. Although some tricks need some skill, this form of distraction removes the need for the anaesthetist to make up stories, sing, remember jokes, or think of topics for conversation.

Table 2. The effectiveness of any distraction used by the anaesthetist can be maximised.

Effective distraction
Is interesting and new to the child
Gets child's attention as soon as they enter theatre
Begins with a sense of anticipation to build excitement
Increases as induction approaches and anxiety increases
Is continuous with no pauses or gaps that might lose child's attention
Has the strongest distraction saved for the time of mask acceptance or cannula insertion when anxiety is maximal

MAGICAL DISTRACTION

The author was fortunate to have learnt magical distraction from Professor Chris Abajian in Vermont, about 20 years ago.[17] Since then, he has employed three simple tricks at induction of children aged four years and older.

These simple tricks are easily carried, perhaps in a pocket, and are easy to clean and reuse. The overarching story presented to the child is that they will be able to colour-in with their finger by magic, immediately building a sense of anticipation (or disbelief) for them to look forward to. The three tricks used by this author are the zig zag pencil, a simple sponge ball trick, and a magic colouring book. They are used in this order, as they become more impressive and more distracting, flowing nicely to the start of induction. They are also effective tricks because the child is actively involved in doing them, rather than just watching. The details of the three tricks are in the Appendix, but an overview of what they are and how they help the child is given below.

Zig zag pencil in the waiting area

The idea of the child being able to colour-in by magic with their finger is discussed at the preoperative assessment. The zig zag pencil is used to reinforce the idea of magic, and to give some proof that the child really will have magical powers. This trick requires zero skill and takes 30 to 60 seconds, during which a pencil appears to be chopped into three pieces, then magically re-joined.

Sponge balls in the preoperative area

The second trick uses sponge balls and is performed immediately before the child is taken to theatre, so its distraction power is maximal. It is an impressive trick that first makes one ball become two, and then two become three, all in the child's hand. The child is then left holding the three balls and is challenged to turn them into four. The child becomes distracted right up to entering theatre, excited at the thought of learning how to make four balls. This trick is sophisticated enough to distract some anxious teenagers, as they can become very nervous at the time of induction even though they usually maintain their cooperation.

Magic colouring book in theatre

As the child enters theatre, their attention is immediately grabbed by the anaesthetist holding up the colouring book to show them. This maintains their focus, as they look at it and not around the theatre environment. Now is also the time to make the fourth ball appear. Either as the trolley is brought into the induction room, or positioned beside the operating table, or as the child walks up to the table to climb onto it. The fourth ball appearing is a 'wow' moment for the child (and parent) and makes them happy to climb onto the operating table or be in the induction room.

Maintaining the flow and without pauses, the colouring trick is begun. The magic colouring book first has outlines, then becomes coloured, then becomes blank, then the outlines reappear.

What happens after the magic?

The child is impressed and excited. They did magically colour-in like you said they would. Now they are much more likely to comply with the next stage of induction. They are even perhaps looking forward to what happens next and if there is another trick. The magical distraction is best maintained when flowing into an inhalational induction. It is also helpful with an intravenous induction, but it is more difficult for the anaesthetist to maintain distraction while concentrating on the IV insertion. There are many ways to proceed from here, and each anaesthetist will have their preferred approach.

To maintain the flow of the induction, this author introduces the mask by touching it on the child's hand where they can see and feel it, then places the mask onto the bridge of the nose. The lower portion of the mask is kept off the mouth at first, so the child doesn't feel a change in their breathing while getting used to the mask in their personal space.

The mask is lowered on to the mouth as the rebreathing bag is held up and the child challenged to blow it up in five breaths. There could be lots of different stories or words that are used at this point, but here is one of them: After the bag has been blown up by the child, relate a simple story about their magic powers making the balloon get bigger and smaller. Touching the bag on their hand adds another sensory input and is a new distraction to the child. As the sevoflurane is introduced, the child is asked to hold the parent's hand because they might get dizzy, like being on a merry-go-round. This focuses the child on the touch of the hand rather than the smell of the gas. If the mother is present, it's nice to say the smell might be like a perfume mum wears when she goes out, which often gets a laugh from the mother and perhaps relaxes the child further. The anaesthetist holds the child's other hand, and it is gently rotated around and around, like a merry-go-round. Thus, the anaesthetist has control of that hand, the parent has the other hand, and the child is distracted in a new way.

This author prefers to give nitrous oxide in oxygen for about 20 seconds before sevoflurane is begun, and until the sevoflurane has begun to have an effect. There is no need to incrementally increase sevoflurane as opposed to beginning at 8 per cent, especially if the circle circuit is being used.[18]

SUMMARY

Distraction is the most important and effective way of reducing a child's anxiety at the time of induction. Distraction using three simple magic tricks has been presented. This is a powerful form of distraction since children don't usually see or experience magic close up. The zig zag pencil, sponge balls, and magic colouring book require little skill or effort, but will distract patients, who will be much more likely to remain cooperative

at induction. Magical distraction is so powerful, children can be thrilled and laughing as they fall asleep, which would be expected to reduce the likelihood of emergence delirium. The tricks also distract and relax the parent, are enjoyed by staff, and will have children asking if they can please have the 'magic doctor' next time they have an anaesthetic.

REFERENCES

1. Kain Z, Mayes L, Caramico L, Hofstadter M. Distress during induction of anesthesia and postoperative behavioral outcomes. Anesth Analg 1999;88:1042–7.
2. Chorney JM, Kain ZN. Behavioral analysis of children's response to induction of anesthesia. Anesth Analg 2009;109:1434-40.
3. Kain ZN, Caldwell-Andrews AA. Preoperative psychological preparation of the child for surgery: An update. Anesthesiol Clin N Am 2005;23:597-614
4. Kotiniemi LH, Ryhanen PT, Moilanen IK. Behavioural changes in children following day-case surgery: a 4-week follow-up of 551 children. Anaesthesia 1997;52:970–6.
5. Aono J, Mamiya K, Manahe M. Preoperative anxiety is associated with a high incidence of problematic behavior on emergence after halothane anesthesia in boys. Acta Anaesthesiol Scand 1999;43:542-4.
6. Kim J, Byun SH, Kim JW, Kim J, Kim YJ, Choi N et al. Behavioral changes after hospital discharge in preschool children experiencing emergence delirium after general anesthesia: A prospective observational study. Ped Anesth 2021;31:1056-64.
7. Kain ZN, Caramico LA, Mayes LC, Genevro JL, Bornstein MH, Hofstadter MB. Preoperative preparation programs in children: a comparative examination. Anesth Analg. 1998;87:1249-5.
8. Bromfalk A, Myrberg T, Wallden J, Engstrom A, Hultin M. Preoperative anxiety in preschool children: A randomized clinical trial comparing midazolam, clonidine and dexmedetomidine. Ped Anesth 2021;31:1225-33.
9. Cote CJ, Cohen IT, Suresh S, Rabb M, Rose JB , Weldon C et al. A comparison of three doses of commercially prepared oral midazolam syrup in children. Anesth Analg 2002;94:37-43.
10. Martin S et al. Changing healthcare providers' behavior during pediatric inductions with an empirically based intervention. Anesthesiol 2011;115:18-27
11. Litman RS. Allaying anxiety in children: When a funny thing happened on the way to OR. Anesthesiol 2011;115:4-5.
12. Laing R, Cyna A. Hypnosis and communication in paediatric peri-operative care. In: Riley R (Ed) Australasian Anesthesia. Melbourne: Aust NZ College Anesthetists, 2017. pp 273-9.
13. Manyande A, Cyna AM, Yip P, Chooi C, Middleton P. Non-pharmacological interventions for assisting the induction of anaesthesia in children. Cochrane Database Syst Rev. 2015 Jul; 2015(7): CD006447.
14. Rodriguez S, Caruso TJ. What every anesthesiologist should know about virtual reality. Ped Anesth 2022;32:1276-7.
15. Sakizci Uyar B, Polat R, Bolat M, Donmez A. Which is good for pre-operative anxiety? Midazolam, video games or teaching with cartoons. EJA 2021;38:744-50.
16. Rodriguez S, Caruso TJ, Tsui B. Bedside entertainment and relaxation theatre: size and novelty does matter when using video distraction for perioperative pediatric anxiety. Ped Anesth 2017;27:668-9.
17. Abajian JC. Magical Distractions. Presented at the Society for Pediatric Anesthesia Annual Scientific Meeting, Chicago, October 2006. Available at http://www2.pedsanesthesia.org/meetings/2006annual/syllabus/MagicalDistractions-Abajian.pdf (Accessed Aug 2023)
18. Lerman JL. Induction of anesthesia with sevoflurane in children: Curiosities and controversies. Ped Anesth 2022;32:1100-3.

APPENDIX

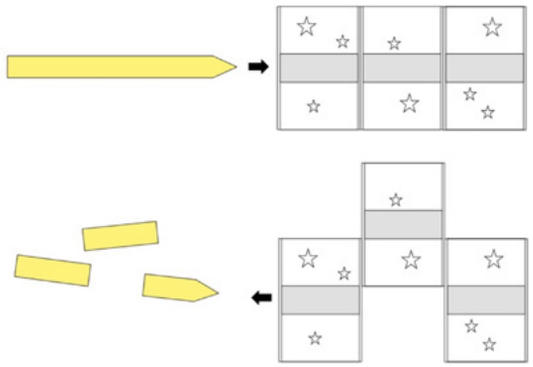
This section describes the three distraction tricks in detail. All three are available online from magic shops.

The zig zag pencil

A pencil is cut into three pieces, then 'glued' back together (Figure 1). The instructions supplied with the pencil are easy to follow, and the device can be easily cleaned between uses. The child can be involved with the trick rather than just watching, asking them to put the pieces back into the device and push it shut.

Video at https://www.youtube.com/watch?v=H5GFCGwUuTQ (accessed August 2023)

Figure 1. The zig zag pencil, which magically cuts and re-joins a pencil.



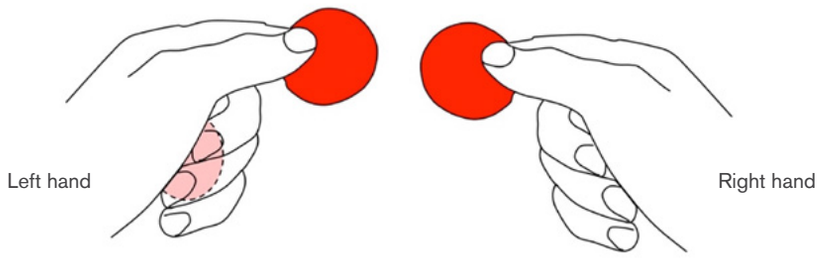
Sponge balls

Sponge balls are soft, compressible red foam balls, 1.5 inches in diameter, that come in packs of four. There are many brands, including 'Magic by Gosh'. They can be cleaned using some types of hand sanitiser.

Children need to be at least four years old to be able to do this trick. The child begins with one red ball, which turns into two, then three. The magic happens in their hand, making it a strong distractor shortly before anaesthesia. The child is left with the three balls and challenged to make four, either just before going to theatre, or while being taken around to theatre. The child is focused on trying to make the fourth ball appear when they enter theatre, taking their attention off the theatre environment. The anaesthetist makes the fourth ball appear in the child's hand upon entry to theatre, amazing the child and helping make them happy to climb onto the operating table, or just being within the induction room.

Step 1. In the right hand, the anaesthetist holds one ball between thumb and index finger and clenches the remaining fingers. In the left hand, a ball is also held between thumb and index finger, but a third ball is hidden in the clenched fist (Figure 2). The anaesthetist secretly gives the child both balls from their left hand, getting the child to clench their fist around the balls so their presence is not revealed. It's easy to hide the other ball in this move so the child thinks they have only been given one ball. Meanwhile, the anaesthetist has a fourth ball hidden in their left scrubs pocket for future use.

Figure 2. The anaesthetist's view of the first step. A ball is between the fingertips of both hands, but another is within the clenched left hand. Both hands need to be clenched to avoid suspicion.



Step 2. This step is the most difficult part. It is usual to feel self conscious when doing it, but the audience is a young child, not a live TV audience! The anaesthetist now has a ball visible in their right hand, and this needs to disappear. This is done by quickly 'palming' the ball into the left hand (Figure 3). The ball in the fingertips of the right hand is poked into the palm of the left hand, and is held there by bringing the thenar and hypothenar eminences together, puckering the palm and gripping the ball. As soon as the ball is within the left hand, the right hand is taken away and clenched in a fist. At the same time, the left hand with the palmed ball is kept facing down to conceal the ball, and placed flat on a surface so it doesn't look like anything is in it. This flat surface can be the bed sheet (Figure 4), or the knee or thigh (if the anaesthetist is crouching), or within the hand clenched around the railing of a patient trolley. Clenching the left hand or looking at it gives away the secret.

At this stage, the child believes they have a ball in their fist and the anaesthetist has a ball in their clenched right fist, when in fact the anaesthetist's ball is in their flat left hand.

Figure 3. The anaesthetist's view of the second step. The ball between the fingertips of the right hand is poked into the palm of the left hand and held there by puckering the hand. The right hand is immediately clenched into a fist while the left hand, with the ball, is lain flat on a surface.

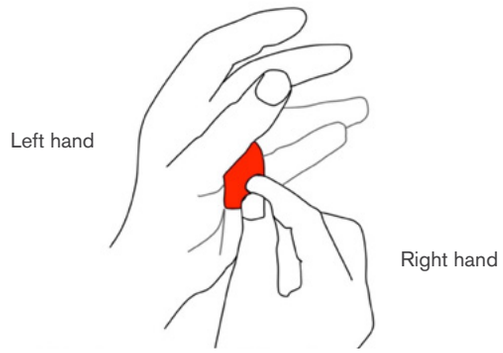
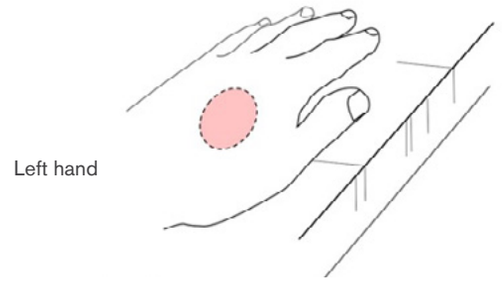


Figure 4. The anaesthetist's view of the third step. The ball is squashed under the hand, held against the bed sheet. This hides it and makes the child think the ball is the anaesthetist's clenched right hand.



Step 3. After an 'abracadabra', or blowing magic, the anaesthetist and child open their hands. The child is amazed they have two balls and the anaesthetist has none!

Step 4. Next, the third ball will be revealed. This ball is currently in the anaesthetist's left hand. The anaesthetist uses the right hand to take the two balls from the child, then places them into their left hand where the third ball already is, then gives the child all three balls into their clenched fist.

Step 5. After another 'abracadabra' or blowing magic, the child is asked to open their hand, revealing three balls this time. The child is now challenged to turn them into four while the anaesthetist either leaves to ready theatre, or escorts the child around to theatre.

Step 6. Immediately upon entry to the induction room or theatre, the fourth ball is made to appear. The fourth ball from the scrubs pocket is hidden in the anaesthetist's left hand before the child enters the room. Similar to step 5, the three balls are taken from the child, added to the fourth within the left hand, then all four are given to the child.

This might seem a complicated trick to carry out, but after several times it becomes easy and natural. The magical distraction is impressive and powerful for both child and parent, and is a great reward for doing it. It is also a useful distractor for nervous teenagers, who can be challenged to work out how it is done and how to make a fourth ball. A phrase like "You're way too old for this trick, but your mum will like to watch it" also makes it more acceptable to a teenager.

Video of a similar routine https://www.youtube.com/watch?v=iiegjl46pPk (accessed August 2023)

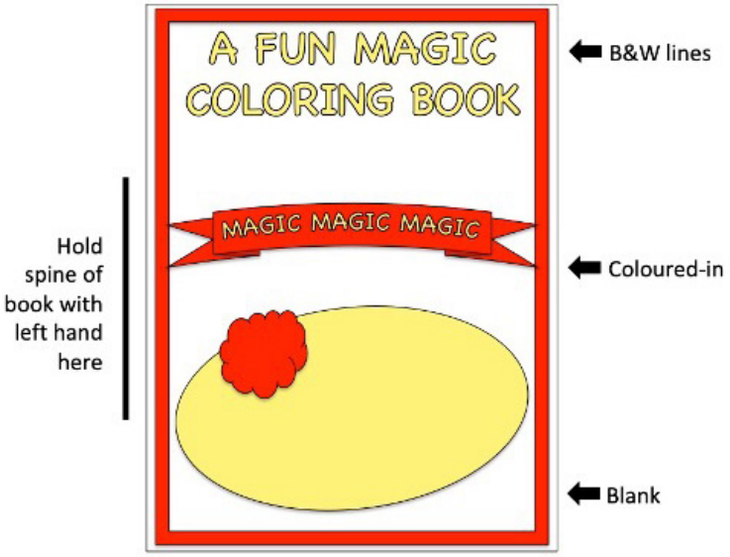
The magic colouring book

This is the final trick that the anaesthetist has been telling the child they will be able to do all along, building anticipation and distraction power. The book pages alternate between simple outlines, coloured-in, or blank, depending on where the right-hand side of the book is held while turning the pages (Figure 5). If the book is protected by a clear plastic book covering, it can be wiped over to clean.

Children aged about three and a half years and older can do this trick. After demonstrating the outline drawings inside, the anaesthetist can ask the child to press some part of the front cover and say 'abracadabra', before making the coloured pages appear. The child can then be asked to turn the pictures back, but the pictures mysteriously become blank. Finally, the child can make the outlines come back as at the beginning.

Video at https://www.penguinmagic.com/p/73 (accessed August 2023).

Figure 5. The magic colouring book.



The spine of the book is held in the left hand, and the pages flipped using the thumb and forefinger of the right hand. The arrows show the effect of flipping the pages with the fingers in the three positions.