BJA

British Journal of Anaesthesia, ■ (■): 1–7 (2018)

doi: 10.1016/j.bja.2018.02.067
Advance Access Publication Date: xxx
Clinical Investigation

CLINICAL INVESTIGATION

The effectiveness of transport in a children's ride-on car for reducing preoperative anxiety in preschool children: a randomised controlled prospective trial

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Abstract

Background: This study was designed to determine whether transport of a paediatric inpatient in a children's ride-on car has an effect on perioperative levels of anxiety compared with transport on a hospital gurney with or without oral midazolam premedication.

Methods: In this prospective study, 108 children aged 2–5 yr with congenital heart disease and undergoing first surgical correction were randomly allocated to one of three groups: Group C (transport in a children's ride-on car), Group G (transport on a gurney without premedication), or Group M (transport on a gurney and received premedication of oral midazolam 0.5 mg kg^{-1}). The modified Yale Preoperative Anxiety Scale-Short Form and parent-recorded anxiety VAS were applied to evaluate anxiety in the following time points: pre-anaesthesia visit (the day before surgery), upon getting in the ride-on car or on the gurney in the ward, upon arriving in the preoperative holding area, at the moment of leaving from the holding area to the operating room (OR) (coincided with separation from parents), at the time after entering the OR, and at the time just before anaesthesia induction.

Results: Children in Group C exhibited significantly lower levels of anxiety from the time they got into the ride-on car until the time they entered the OR, compared with the other two groups ($P<0.001$). The subjects in Group C had similarly low anxiety levels to those in the Group M at the time before induction ($P=0.914$).

Conclusions: Transport in ride-on cars can relieve preoperative anxiety in preschool children undergoing surgery to a comparable degree as midazolam.

Clinical trial registration: ChiCTR-IOR-17012791.

Keywords: anxiety; child; hospitalised; preschool; preoperative period

Editorial decision: February 13, 2018; **Accepted:** February 13, 2018

Editor's key points

- Anxiety is common among children about to undergo anaesthesia and surgery.
- Children being transported to the operating theatres are often made to lie on a transport gurney.
- The authors compared the anxiolytic effect of allowing children to use a ride-on toy car during transfer to that of oral midazolam.
- Anxiety scores were reduced by riding on the toy car compared with those in children transferred on a gurney; the anxiolytic effect of the car ride was comparable to that of oral midazolam premedication.

Significant anxiety was reported in up to 60% of all young children undergoing anaesthesia and surgery.[1] Preoperative anxiety has been associated with short- and long-term traumatic consequences, including risks of emergence delirium and maladaptive postoperative behaviours such as separation anxiety disorders and eating disorders.[2–4] Several previous studies indicated that preschool children were associated with increased risk for development of pre-surgical anxiety.[5] In addition, unfamiliar environments and people, and negative anticipation of surgical procedure further distress young children.[6]

Three categories of interventions have been classified to reduce preoperative anxiety: sedatives premedication, parental presence during induction of anaesthesia, and hospital-based preoperative preparation programs. Midazolam premedication is regarded as a reliable strategy in reducing preoperative anxiety, but it may be associated with a number of untoward consequences, such as paradoxical reaction, delayed patient discharge in ultrashort procedures, and some operational drawbacks.[7] Parental presence with the child until the completion of anaesthesia inhalation induction is well popular in Great Britain and the USA and it increases the parents' satisfaction and the child's cooperation. But clinically, it is less practical in overpopulated Asian countries. And some researches showed that merely parental presence is not reliable for reducing preoperative anxiety.[8,9] There are a variety of hospital-based preoperative preparation programs applicable to paediatric patients for relieving their anxieties, such as clown doctors, video games,[10–15] ADVANCE (Anxiety-reduction, Distraction, Video modeling and education, Adding parents, No excessive reassurance, Coaching, and Exposure/shaping; see Kain and colleagues[16] for a description of the intervention) program, comic information leaflet, etc.[16,17]

In China, the model of same-day surgery is in a fledging stage and most surgical patients still need to be admitted to hospital 1 or 2 days before the day of surgery. On the day of surgery, children would be transported from the ward to the holding area on a hospital gurney 30 min before anaesthesia induction. More often, both parents and children have shown significant anxiety when patients are placed on the gurney. Some children even refused to lie down on it. Recently, in our hospital, a children's ride-on car (Fig. 1) was tried for transport and attracted public attention. This non-motorised ride-on toy car would let children enjoy a 'driving mood' on the way from the ward to the operating room (OR). In some preschoolers, enjoying riding in this type of car is part of their daily routine. Thus, the ride-on cars could open a new alternative avenue for alleviating preoperative anxiety in children.

Few investigations have been done to study the effect of different transport modes on preoperative anxiety. Therefore, the purpose of this study was to determine whether riding in ride-on cars from the ward to the OR is capable of alleviating preoperative anxiety in preschool children in comparison with midazolam premedication and transport on a hospital gurney.

Methods

This prospective, randomised study was carried out over the period from September to December, 2017. It was approved by the Institutional Review Board of Shanghai Children's Medical Centre (SCMCIRB-K2016041) and was registered at Chinese Clinical Trial Registry (ChiCTR-IOR-17012791). Written informed consent was obtained from the parents or legal guardians of each subject before the day of surgery.

Study population

Children with congenital heart disease, aged between 2 and 5 yr, ASA Physical Status (ASA-PS) score 2 or 3, and undergoing the first surgical correction were recruited in this study. Patients having emergency surgery and those with a neuropsychiatric disease, previous anaesthetic experience, taking psychoactive medications, or with a history of significant hearing or visual impairments and severe sleep apnoea were excluded from participation.

Randomisation and preoperative management

According to a computer-generated randomisation list, patients were assigned in blocks of three with a sealed envelope technique to one of three groups:

- Group C: participants were transported in children's ride-on cars and did not receive premedication.
- Group G: participants were transported on hospital gurneys and did not receive premedication.
- Group M: participants were transported on hospital gurneys and received premedication of oral midazolam (0.5 mg kg^{-1} up to a maximum of 15 mg upon arriving in the preoperative holding area 30 min before surgery).

One of the anaesthesiologists from the research team visited the thoracic cardiovascular ward to conduct preoperative interviews and the baseline anxiety evaluation the day before surgery. Patient characteristics and temperament [emotionality, activity, sociability, and impulsivity (EASI)] of the child were collected from the parents and the medical charts.

All operations were performed in morning sessions. Eutectic mixture of local anaesthetics (EMLA) cream was applied about 1 h before venipuncture. All patients arrived in the preoperative holding area about 30 min before surgery. Children in Group C were transported from the thoracic cardiovascular ward to the OR in a children's ride-on car, while children in Groups G and M were transported on a hospital gurney. Upon arriving in the preoperative holding area, the patients in Group M were administered oral midazolam 0.5 mg kg^{-1} by a nurse. One parent was allowed to accompany the child in the preoperative holding area. When the OR called, the children were taken away from their parents via the standard practice and transported to the OR (Fig. 2). The parents were escorted out of the holding area after separation.

Protocol of anaesthesia induction and tracheal intubation

Once the patient was positioned on the operating table, the monitors of ECG, pulse oximetry, and non-invasive blood