2.8 Practical use of total intravenous anaesthesia and target-controlled infusions

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Why do this quality improvement project?

The Royal College of Anaesthetists and Association of Anaesthetists Fifth National Audit Project (NAP5) found that failure to deliver the intended dose of a drug was one of the major contributory factors behind accidental awareness under general anaesthesia during total intravenous anaesthesia (TIVA). Meticulous attention to practical aspects of TIVA practice is essential to avoid over- and underdosing of drugs and attendant complications.[1,2]

Background

TIVA was used for 6.6% of cases nationally according to the NAP5 activity survey in 2014.[1] While the current prevalence of TIVA in the UK is not known, it is likely to have risen following increasing awareness of the environmental impact of volatile anaesthetic agents and the possible effect of TIVA in reducing cancer reoccurrence.[3,4]

Best practice

Joint guidelines from the Association of Anaesthetists and the Society for Intravenous Anaesthesia for the safe practice of TIVA were published in 2018.[2]

Standard	Suggested data to collect
A target-controlled infusion (TCI) pump should be used for maintenance during TIVA.	■ Documentation of use of TCI on anaesthetic charts for TIVA cases. ■ Number of TCI pumps available and incident reports of times when pumps unavailable.
A standardised concentration of propofol and dilution of remifentanil should be used for all TIVA cases.	■ Stock check of available propofol concentrations and/or review of concentrations of drugs on anaesthetic charts for TIVA cases.
Specific designed infusion sets should be used to deliver TIVA.	■ Survey of anaesthetists/operating department practitioners regarding which infusion sets should be used for TIVA. ■ Incident reports of times when sets unavailable.
TCI pumps should be programmed after the syringe containing the drug has been inserted to avoid 'wrong drug wrong pump' error.	■ Review of incident reports for the frequency of 'wrong drug wrong pump' error.
The patient's intravenous access (peripheral cannula or central venous catheter) should be visible wherever practical.	■ Review of anaesthetic charts for documentation of IV access visibility and/or survey of anaesthetists to measure the frequency of, and barriers to, IV access visibility.
Processed EEG (pEEG) monitoring should be used whenever neuromuscular blocking drugs (NMBD) are used during TIVA.	■ Review of anaesthetic charts for documentation of use of a processed electroencephalogram (pEEG).
The same standards of practice and monitoring is maintained when TIVA is used outside of the operating theatre.	■ Use of TCI pumps and pEEG monitoring documented on anaesthetic charts and transfer documentation.

Quality improvement methodology

Checklist

Is there a departmental checklist to promote safe TIVA/TCI practice? An example checklist is:[5]

- Dedicated TCI pumps, programmed with correct:
  - drugs
  - dilution
  - demographics
  - models.
- Is TCI infusion set and intravenous access:
  - designed for the task
  - patent and flushed
  - secure
  - visible
  - to be resited after induction?
- Are neuromuscular blocking drugs to be used?
  - Attach pEEG to the patient.

Department

- Is there a departmental lead for TIVA/TCI anaesthesia?
- Is there clearly defined accessible local policy regarding which TCI pumps, models, drug dilutions, infusion sets and pEEG device are to be used during TIVA/TCI?
- Is there cooperation with the surgical team and theatre staff to promote the visibility of intravenous access?
- What is the continuing training for use of TIVA?

Mapping

ACSA standards: 1.1.1.4, 1.1.2.1, 1.3.1.3, 1.3.1.5, 2.1.1.1, 2.2.1.1, 2.3.1.1, 4.1.2.1, 4.2.1.1

Curriculum competences: CI_BK_30, PC_BK_52, PR_BK_22;23;24;28, CS_IK_04, EN_IK_02, NA_IK_04;05, PC_IK_20, POM_IS_22, PR_IS_01;03, CD_HK_11, CK_HS_05, POM_HS_11

CPD matrix code: 1I03, 3A06

GPAS 2020: 2.18, 2.32, 2.39

References

1. Pandit J, Cook T. Accidental Awareness during General Anaesthesia in the United Kingdom and Ireland: Report and findings. NAP5, 5th National Audit Project of The Royal College of Anaesthetists and the Association of Anaesthetists of Great Britain and Ireland. London: RCoA; 2014 (https://www.nationalauditprojects.org.uk/NAP5report?newsid=1187#pt).
2. Nimmo AF et al Guidelines for the safe practice of total intravenous anaesthesia (TIVA). Anaesthesia 2019;74:211–224.
3. Wigmore TJ et al. Long-term survival for patients undergoing volatile versus iv anesthesia for cancer surgery: a retrospective analysis. Anesthesiology 2016;124:69–79.
4. Campbell M, Pierce JMT. Atmospheric science, anaesthesia, and the environment. Contin Educ Anaesth CritCare Pain 2015;15:173–179.
5. Williams SC, Mulvey DA. Stop before you TIVA/TCI (SB4Y TIVA/TCI): three steps to safer practice. A proposal for trial of a safety checklist and national audit. Poster presented at the Society of Intravenous Anaesthesia Annual Scientific Meeting, 22 and 23 November 2018, Manchester, UK.