Teaching epidurals without the headaches

Matt Rucklidge
King Edward Memorial Hospital
Perth
• One of the hardest techniques to master
• Variable success
• Associated complications
• No standardised training structure
• No standardised assessment of competency
“(The epidural technique) must be well taught to protect the learner from acquiring bad habits but at the same time patients should be protected from the tyro during his educative process”.
Competence

“The ability of an individual to do a job properly”

- What defines a proper job?
- How is competence acquired?
SUCCESS

HARM
Technical reasons for failure

- Localisation of epidural space
- Incorrect insertion level
- Catheter fixation
- Equipment
- Local anaesthetic dose and volume
- Method of LA delivery

Pharmacological reasons for failure
<table>
<thead>
<tr>
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<th>Failure definition</th>
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**Table 1 Definitions and rates of failed epidural anaesthesia or analgesia.** *Pre-intervention group in an intervention study*

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Inadequate pain relief within 45 minutes

Dural Puncture

Resite or procedure abandoned

Maternal dissatisfaction
Epidural failure rate using a standardised definition

A. Thangamuthu, I.F. Russell, M. Purva
Department of Anaesthesia, Hull Royal Infirmary, Hull and East Yorkshire NHS Trust, Hull, UK

“Failure” in 23%
Auditable Standards

- Pain relief 45 min after insertion ≥ 88%
- Epidural replacement during labour < 15%
- Accidental Dural Puncture rate < 1%
- Satisfaction ≥ 98%
Clinical audit guide for: 
Epidural analgesia during labour

Please check with your local ethics service or governing body about the process requirements for auditing your own practice.

- Pain relief 45 min after insertion ≥ 88%
- Epidural replacement during labour < 15%
- Accidental Dural Puncture rate < 1%
- Satisfaction ≥ 98%
Competence

The ability of an individual to do a job properly

• What defines a proper job?

• How is competence acquired?

Drake EJ. BJA 2015;114: 951-7
Defining competence in obstetric epidural anaesthesia for inexperienced trainees†

E. J. Drake¹,*, J. Coghill¹ and J. R. Sneyd¹,²

“There is currently no universally accepted and comprehensive way to assess competence in a procedural skill.”

• CUSUM graphs generated for over 100 novice trainees over a 15 year period
Cumulative sum analysis (CUSUM)

- Analyses output of a process over multiple repetitions
- May identify small changes in one direction or another
- Binary assessment - e.g. competent / incompetent
- Applied in medical practice - ease of use, objective
Defining competence in obstetric epidural anaesthesia for inexperienced trainees

E. J. Drake¹,*, J. Coghill¹ and J. R. Sneyd¹,²

Failure if:

Midwife assessment of analgesia as anything but ‘good’

Spinal or GA used for operative delivery

Any problems - e.g. dural puncture
Acceptable success rate set at 65%
Defining competence in obstetric epidural anaesthesia for inexperienced trainees
d
E. J. Drake¹,* , J. Coghill¹ and J. R. Sneyd¹,²
Defining competence in obstetric epidural anaesthesia for inexperienced trainees†

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Mean success rate stabilised after first 10
Defining competence in obstetric epidural anaesthesia for inexperienced trainees†

E. J. Drake¹,*, J. Coghill¹ and J. R. Sneyd¹,²

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<th>65% acceptable success rate</th>
<th>80% acceptable success rate</th>
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<td>Mean attempts to reach competency</td>
<td>46</td>
<td>77</td>
</tr>
<tr>
<td>Median attempts to reach competency</td>
<td>39</td>
<td>65</td>
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<tr>
<td>Range</td>
<td>19–114</td>
<td>29–198</td>
</tr>
<tr>
<td>Number of trainees</td>
<td>77/81</td>
<td>46/81</td>
</tr>
<tr>
<td>Competent after obstetric anaesthetic training block</td>
<td></td>
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<td>Number of trainees (%)</td>
<td>4 (5.2)</td>
<td>35 (43.2)</td>
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• Whether you achieve competency is dependent on the definition chosen

• Trainees learn a new skill at different rates
• CUSUM a useful tool

• Doesn’t tell us why some struggle to reach competency

• It is nothing without a global observation
The only way is down

- Can we ensure more CUSUM plots look like this?
So if I have an epidural, what’s the worst that could possibly happen?
• 2 maternal deaths relating to dural puncture
• 11 SDHs following obstetric epidurals in 7 years

• Rate of SDH - 1:3900 epidurals

• Rate of SDH if recognised dural puncture - 1:87

• “Subdural haematoma after labour epidural anaesthesia is rare but potentially more common than historically estimated”
Post-dural puncture headache

- Unpleasant
- Delays discharge
- Impacts caring for baby
- Possible longer term headache risk
- More serious complications
Unintentional Dural Puncture

- Institutional rates vary 0.15 – 4.4%
- Individual rates vary (0% - ?%)
- Trainees more than trained
- Some trainees more than other trainees
- Some trained more than other trained
Unintentional Dural Puncture

- No strong evidence that rates are increasing
- But not declining…. 
- Some individuals contribute more to the data
Have we taken our eye off the ball?
“we were unable to find any interventions, which reduced the incidence of ADP”
Anatomy
Anatomy

• Know your bones
• Bone is a positive
• Angles and approaches
Neuraxial sono-anatomy

- Some evidence that neuraxial US aids placement and reduces harm
- Less benefit if skilled at landmark technique
- Recommendations for use in all unlikely
Neuraxial sono-anatomy

- Real potential for training
- Level, depth, windows, deviation, etc
### Success rate after 10 epidurals

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<th>US guided teaching</th>
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<td>60%</td>
<td>86%</td>
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It would seem sensible to introduce the use of epidural sonoanatomy as a core part of training of novices.
Simulators
A simple epidural simulator

A blinded study assessing the ‘feel’ of loss of resistance in four fruits

Diana Raj, Roy M. Williamson, David Young and Douglas Russell

Results from the Visual Analogue Scale (mm) depicting the feel of loss of resistance from the four fruits in the study. CI, confidence interval.
A review of epidural simulators: Where are we today?

Neil Vaughan\textsuperscript{a}, Venketesh N. Dubey\textsuperscript{a,*}, Michael Y.K. Wee\textsuperscript{b}, Richard Isaacs\textsuperscript{b}

\textsuperscript{a} Bournemouth University, School of Design, Engineering & Computing, United Kingdom
\textsuperscript{b} Poole Hospital NHS Foundation Trust, Department of Anaestheisa, United Kingdom

17 Manikin devices

14 electronic devices
Ideal simulator

- Realistic feel and forces
- Variable characteristics
- US compatible
- External distractions
- etc, etc
Clinical Impact of Epidural Anesthesia Simulation on Short- and Long-term Learning Curve

High- Versus Low-fidelity Model Training

Friedman et al.  Regional Anesthesia and Pain Medicine • Volume 34, Number 3, May-June 2009

No difference
Too many experts?
Too many experts?
Putting it all together
LUMBAR EPIDURAL ANALGESIA IN LABOUR

ACCREDITATION FOR REGISTRARS

This accreditation process has been designed to help junior registrars with their introduction to the use of labour epidurals. It consists of two parts.
CERTIFICATION OF COMPLETION

THIS IS TO CERTIFY THAT

NIKKI HARMENY

has successfully performed a minimum of 10 FANZCA supervised epidurals during her placement at SJOG Midland Hospital.

[Signature]

12/09/2017

[Dr. Nita Pandey, FRCA, FANZCA, Consultant Anaesthetist]

SUPERVISOR

ST JOHN OF GOD
Midland Public & Private Hospitals
Nine-year audit of post-dural puncture headache in a tertiary obstetric hospital in Singapore

J.C. Tien, M.J. Lim, W.L. Leong, E. Lew
Department of Women’s Anesthesia, KK Women’s and Children’s Hospital, Singapore

- Nine year retrospective audit of >43,000 women
- Incidence of ADP: 0.15%
- Structured training:
  - Demonstrate competency in 10 simulated epidurals
  - 10 directly supervised epidurals
Conclusion

• One of the more challenging techniques to master
• People learn at different rates
• No standard objective measure of competency
• Optimal training approach is unknown
• Avoidable harm
• Can we do better?