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Sneyd, J. Robert; Cook, Tim M.

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Waking the dragon – national audit in China and the benefits of having a NAP

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6 Waking the dragon – national audit in China and the benefits of having a NAP
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12 J Robert Sneyd¹, M.D., F.R.C.A.
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15 Tim M Cook^{2,3}, F.R.C.A.
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- 20
21 1. Faculty of Medicine and Dentistry, University of Plymouth, John Bull Building, Plymouth
22
23 Science Park, Plymouth PL6 8BU, UK.
24
25 2. Royal United Hospitals Bath NHS Foundation Trust, Bath, UK.
26
27 3. University of Bristol School of Medicine, Bristol,
28
29

30 Corresponding author: J Robert Sneyd, Emeritus Professor, Faculty of Medicine and Dentistry,
31
32 University of Plymouth, John Bull Building, Plymouth Science Park, Plymouth PL6 8BU, UK.
33

34
35 +44 7870 271531 robert.sneyd@pms.ac.uk @robsneyd
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For Peer Review

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3 China practices medicine at scale. In 2016 the country undertook an estimated 26,098,354
4 gastroscopies and colonoscopies during which almost half of the patients received sedation. In the
5 next 10 years that number is estimated to rise to above 34,000,000. In this issue of the journal, Zhou
6 and colleagues report the first attempt at a national audit of sedation during gastrointestinal
7 endoscopy.¹ In this editorial we reflect on their process and findings, compare their work with UK
8 audits and look to the future of national audit in China.

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17 The Zhou audit project used a low-cost approach delivered by a small project team. Their
18 deployment of national audit through the widely used WeChat app elicited responses from 2758
19 hospitals (36.7% of the total). This is an enormous number albeit slightly short of the 40% minimum
20 **recommended** for survey studies.² This is a first for China and it is a welcome start. Like many audits
21 it is better suited to hypothesis generation than hypothesis testing. Given the vast estate of the
22 Chinese healthcare system it is perhaps not surprising that the data reveal some heterogeneity.
23 Comparing the audit data with social and economic indicators is confounded (the authors suggest)
24 by the tendency of prosperous patients in less affluent regions to seek their healthcare elsewhere.
25 Whereas patients may migrate by economic preference, equipment probably stays put.
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28 Nevertheless, the finding that the two regions with the lowest availability of capnography are Tibet
29 and the capital Beijing does not have an immediately obvious explanation. Those interested in the
30 detailed results may read the paper with care but here we concentrate on the principal findings.
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33 China performs a lot of endoscopies with considerably less use of sedation than in the USA or
34 Europe. Staffing for sedation is consistently below the Chinese national standard (one
35 anaesthesiologist and one nurse per room). A small proportion of sites lack pulse oximeters.
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38 Capnographs, defibrillators and difficult airway kits are sparse. Fatalities occurred, but the authors
39 suggest these were under-reported.

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56 It is perhaps worth comparing this approach to the established UK, national audit^{2,3} of anaesthetic
57 and critical care which has been a potent tool for quantifying the (often awkward) facts about single
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3 topics including complications of neuraxial block, airway management, anaesthetic awareness and
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5 anaphylaxis.⁴⁻⁷ Once the denominator had been established with the baseline survey,⁸ and a
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7 focussed period of data collection established the numerator, it has been possible to see for the first
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9 time how often these events occurred and to characterise many of them in detail. The UK National
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11 Audit Projects (NAPs) have had a remit beyond simple data collection and sought to learn about the
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13 context and the drivers of sentinel adverse events and then built recommendations for practice to
14
15 improve patient safety and outcomes. Crucially, subsequent follow-up has shown the impact of
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17 national audit. Impact is played out in new standards of care and practice changes,^{9, 10} and we
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19 anticipate also in complications averted and lives saved, though these have not been measured.
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24 The comprehensive structure and function of the UK National Health Service (NHS) lends itself to
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26 universal audit and NAP3-NAP6 each received data from all or almost all NHS hospitals, perhaps
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28 attesting to the 'buy-in' from clinicians to these voluntary projects.⁴⁻⁷ China, also has nationwide
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30 state supported healthcare provided through publicly funded basic medical insurance¹¹ and although
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32 there are many differences to the free-at-the-point-of-delivery NHS care, it is arguably in a position
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34 to pursue a broadly similar approach. The work of Zhou and colleagues represents a welcome first
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36 step.
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40 The endoscopy suite is a rational place to start with sedation audit. The first serious spotlight on the
41
42 risks of procedural sedation came in 1995 when Quine described deaths and morbidity during
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44 sedated endoscopy and attributed them to poor technique, inadequate staffing, inappropriate
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46 facilities and inadequate experience and training.¹² This paper served as a wake-up call and
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48 subsequently much effort has been directed to improving the safety of procedural sedation.
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52 A classic medical tool for the improvement of care is the production of guidelines. In the UK and
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54 Ireland, the Academy of Medical Royal Colleges is the coordinating body for 23 medical Royal
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56 Colleges and Faculties, and therefore operates at a level above individual specialties. The Academy's
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58 2013 guidance "Safe Sedation Practice for Healthcare Procedures"¹³ set out a universal baseline
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3 standard for all areas of practice. Individual specialties and subspecialties were encouraged to
4 supplement and build on that guidance but not to subvert it. Curriculum materials were provided for
5 incorporation into specialty training programs. However, guidelines are not enough. On its own,
6 even the best guidance is useless if unread or ignored. Translation into practice implies 'ownership'
7 by the diverse community of sedationists - a group including anaesthesiologist and non-
8 anaesthesiologist physicians as well as some nurses and paramedics. Zhou's study is therefore a
9 useful exploration of the extent to which those units responding were indeed adhering to China's
10 relevant guidelines.

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22 What might China consider doing next? Firstly, there is an opportunity to address the reported
23 shortfall in monitoring equipment. European,¹⁴ UK¹⁵ and US¹⁶ guidelines on procedural sedation all
24 require the universal use of pulse oximetry and describe capnography as at least highly desirable.
25 Zhou's audit identifies a potential problem and international comparison suggests it would be
26 reasonable to address this deficit, with the potential to reduce adverse events. Crucially, national
27 audit provides leverage for improvement by shining a light on areas where performance has been
28 weak, or more commonly variable, and a clear route for improvement identified. However, on this
29 occasion we cannot say that "the facts speak for themselves..." Instead, we can regard this study as a
30 valued first step which identifies priority areas for future work. Inevitably, nothing will happen
31 unless there is buy-in, from national bodies, from hospitals, from anaesthesiologist and other
32 professional groups. This is where national audit is a gift that keeps on giving. If China can welcome
33 this first step, build on it with well-defined standards rolled out and implemented, then lives can be
34 saved (and very likely money as well). Helpfully, demonstrable success from operating the audit
35 cycle reaps enthusiasm and engagement. The UK National Audit Projects enjoy almost universal
36 voluntary engagement by British anaesthesiologists who appear proud to participate, welcome their
37 findings and have been motivated to implement changes for improvement.^{9,17} In the UK, the
38 expansion in use of capnography during airway management after NAP4 is a clear example of
39 impact.⁹ China might reap similar benefits.

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6 Thinking more broadly, beyond the circumscribed confines of Zhou's audit and sedation practices,
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8 what else might help those in China, or other countries, considering or planning national audits, to
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10 evaluate services and seeking to improve them? Let us first presume that the method, like the NAPs
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12 will combine some sort of large scale service evaluation of practice combined with registry based
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14 collection of cases of interest. Is this a suitable or indeed the best method to tackle the subject? If
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16 planning to study an occurrence that is frequent (perhaps post-operative pain or failure of regional
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18 anaesthesia) the answer is no - because a smaller cohort study, or suitably designed randomised
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20 controlled trial (RCT) is likely to be both more suitable and better. If planning to study a topic of
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22 limited interest to staff (perhaps thirst) or to patients (failure to adequately reverse neuromuscular
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24 blockade) again no, as a voluntary service evaluation and registry will likely be poorly complied with,
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26 through lack of interest by staff, or will be of little interest to patients (and funders). The NAPs
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28 therefore have a fairly niche group of topics for which they are perhaps suitable: these include
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30 exploration of events that are rare (seldom studied in RCTs), important to patients and to staff and
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32 that are, before the project, incompletely studied. It is not an accident that the topics of the NAPs to
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34 date have been those described above, and in reality, there are rather few additional topics that
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36 meet the brief. In the UK perioperative cardiac arrest is planned as NAP7 and major complications of
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38 peripheral nerve block (perhaps also reprising NAP3's work on central neuraxial block), is a likely
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40 contender to become the bride for NAP8.
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47 The NAPs have hitherto focused on adverse events, studying them in detail and learning from them
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49 – so called Safety 1.¹⁸ As Moppet has pointed out^{19, 20} there is also much to learn from good practice
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51 that avoids complications or captures and mitigates harm when that was the likely course (Safety 2).
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53 Those considering national audits might therefore seek to learn not only from examples of
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55 complications and harm but also from those with the highest standards of harm avoidance or
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57 mitigation. Zhou and colleagues were ambitious in seeking to capture data on process, personnel
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3 and complications from a single survey and the NAPs have separated these out into a denominator
4 phase (a national survey/ service evaluation) and a numerator phase (registry based detailed case
5 studies). The former seeks only to survey a representative caseload related to the topic of interest
6 and extrapolate to a national denominator, while the latter aims to capture all or very nearly all
7 cases of the numerator. Detailed review, classification and qualitative analysis of the numerator
8 cases enables identification of patterns and learning that are not otherwise visible. This transforms
9 the project from one that simply collects data and reports numbers, to one that studies patient
10 events, learns from cases and uses the quantitative data to put the qualitative in context (i.e. uses
11 numbers to tell stories) and to drive logical recommendations for change and patient centred
12 improvement. In this regard the use of vignettes remains a popular and powerful, though perhaps
13 time-limited, method for exemplifying, or illustrating key messages and the rationale for
14 recommendations. At their best the NAPs also explore standards, beliefs and practices that relate to
15 the chosen topic before they are undertaken. This enables more informed, guided exploration of the
16 data when it is collected and an exploration of changes in the same standards, beliefs and practices
17 in the years after the main project is complete^{9, 17} This is one way of measuring the impact of such
18 projects.

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40 The UK NAPs have many limitations – best described and discussed elsewhere^{2, 10, 19} - but there are
41 two things above all that drives their success. First is the selfless enthusiasm of anaesthesiologists,
42 intensivists and perioperative physicians. Projects of the scale of the NAPs cannot succeed without
43 enormous ‘buy in’ from the constituency. This underpins awareness of the project by all relevant
44 staff, local engagement, reliable and complete data collection and a willingness to assimilate and act
45 on the recommendations made by the projects. Second is a commitment by the organisers of the
46 NAPs to collect and manage data in an entirely anonymous manner. In the ideal situation – as for the
47 NAPs - there is a barrier such that the researchers are unaware of the origin of any case reports
48 (location, date, personnel) and the analysis is held completely in-camera so that no individual
49 patient, clinician or institution is or can be identified in the project outputs and no one involved in a
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3 case can know what was said when it was reviewed. Such anonymity engenders high reporting rates,
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5 and detailed, honest accounts, safe in the knowledge there will be, indeed can be, no retribution for
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7 any deemed misadventure. Such audits are of little value unless they collect data on cases 'warts and
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9 all'.

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12 There are many pitfalls and challenges to setting up national audit of the type described above. We
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14 salute China's welcome and important study and look forward to documenting sequential benefits
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16 to patients as audit translates into learning and learning translates into practice.
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20 21 22 23 Authors contributions

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25
26 JRS Conceived the editorial. JRS and TMC both contributed to the first draft and revisions. Both
27
28 authors approved the final draft.
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