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ORIGINAL ARTICLE

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Routine management of postoperative delirium outside the ICU: Results of an international survey among anaesthesiologists

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Background: Postoperative delirium (POD) is a severe brain dysfunction. Although data indicate a high relevance, no survey has investigated the routine practice to monitor delirium outside the ICU setting after surgery. Prior to publishing of the new European Society of Anaesthesiology (ESA) guidelines on POD, an international survey was conducted to assess current practice.

Methods: European Society of Anaesthesiology-endorsed online survey; *Trial Registration*: NCT-identifier: 02513537.

Results: In total, 566 respondents from 62 countries accessed, and 564 (99.6%) completed the survey (completion rate). Overall, 385 (68%) of the respondents reported that delirium is either "very relevant" or "relevant" for their daily clinical practice. In all, 38 (7%) of the respondents routinely monitor for delirium in >50% of all patients. Asked on the monitoring time point, more than half (n = 308, 55%) indicated to screen before or at recovery room discharge, 235 (42%) up to the first postoperative day, 143 (25%) up to 3 days, and 77 (14%) up to 5 postoperative days. Although there is a lack of long-term monitoring, nearly all respondents (n = 530, 94%) reported to treat delirium. Availability of EEG/EMG-based monitoring to assess the depth of anaesthesia was high in the study group (n = 547, 97%) and was used by more than one-third of the respondents to reduce risk of burst suppression (n = 189, 34%).

Conclusion: Although delirium is perceived as a relevant condition among anaesthesiologists, there is a high demand for implementing monitoring strategies after publishing of the POD Guideline. The survey shows that tools necessary for POD Guideline implementation are available in the centres represented by the respondents.

1 | INTRODUCTION

Postoperative delirium (POD) is characterised by an acute change in mental status with a disturbance in attention and awareness, which is accompanied by changes in cognition.[1] Delirium results from an underlying medical condition, and is a typical manifestation of secondary cerebral dysfunction after surgery.[2]

Incidences of delirium vary between less than 5% up to more than 50%, dependent on the observed patient collective and the type of surgery.[3-6] POD is not limited to patients requiring

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intensive care, but can principally affect all patients undergoing surgery.

There are several guidelines recommending prevention, diagnosis, and treatment of delirium in the critically ill.[7,8] No such recommendations existed for the perioperative setting outside the ICU in 2015. As the burden of delirium is high, the "European Society of Anaesthesiology (ESA)" has established a taskforce (TF) for the reduction of POD. This TF identified experts for an advisory board and developed the first evidence and consensus-based guidelines for the management of POD in the non-ICU context (POD Guideline).[9] Prior to the launch of the guideline, and following the "Appraisal of Guidelines for Research and Evaluation" instrument (AGREE II), the TF decided to monitor current practice in the detection, monitoring and treatment of POD by performing an international survey.[10] Benchmarking implementation with surveys is not new: with respect to ICU delirium, experts, and geriatricians, there have been several surveys to evaluate the knowledge and current practice of clinicians.[11-24] In 2014, one survey on a mono-national level evaluated knowledge regarding neurocognitive complications among anaesthesiologists, and nurses specialised in anaesthesiology.[25] Another survey regarding delirium awareness was aimed at oncologic oral and maxillofacial surgeons.[26]

Despite the well-proven clinical relevance of delirium, all surveys consistently detected a low implementation of specific diagnostic tools, and a lack of implementation regarding the structured management of delirium. Luetz and co-workers reported one of the highest implementation rates in ICU settings (54% among respondents from university hospitals) so far, but showed a difference between perceived and actual practice.[17] However, it is unclear if this has any effect on the practice outside the intensive care unit.

Until today, no comprehensive, international survey has ever investigated the practice regarding the management of POD among anaesthesiologists. To set implementation benchmarks and monitor the change of practice in POD management, an international survey prior to the publication of the guideline was conducted. In the future, this survey can be used as a benchmark for ESA members and the implementation of ESA guideline recommendations.

Editorial comment

Postoperative delirium for patients on hospital wards is an important diagnosis to establish. Clinicians reported that the most common time for screening is in the recovery room or the first day after surgery and few have followed the most recent European guideline. Most often, postoperative delirium is only assessed if patients present active symptoms.

2 | METHODS

2.1 | Survey design and target population

The ESA endorsed the survey. The institutional ethical review board of Charité-Universitätsmedizin Charitéplatz 1, 10117 Berlin, Germany, approved the survey (identifier: EA2/019/15) on 12 March 2015, and the survey was registered at clinicaltrials.gov (NCT-identifier: 02513537).

The questionnaire was developed by the same TF that was responsible for the development of the guidelines and additionally three members of the advisory board (BW, BN, and SK). Development included item generation, and the sequence of questions. After the development, the survey underwent a review and pilot testing by members of the POD Guideline advisory board. The final survey consisted of 21 questions that were subdivided in five sections: basic demographic data, relevance of delirium, assessment of pain and delirium, monitoring of anaesthesia depth, and therapy of delirium (Addendum S1).

After final preparation, the survey was launched on the server-based platform Survey Monkey® Palo Alto, CA, USA. The link to the survey was placed on the ESA website in a dedicated area. The survey was accessible with a standard internet-browser and required no additional software.

2.2 | Data sampling period

The survey was administered from 1 July to 30 September 2015. All ESA members received an invitation with a link directly leading to the survey via email. ESA members and non-members were eligible to complete the survey via direct access in the unrestricted non-member area on the website.

2.3 | Statistical analysis

The primary endpoint is status of diagnosis, prevention, and therapy up to 6 months of delirium. The secondary endpoints will be assessed according to the trial registry entry and in a follow-up analysis to this survey up to a time-frame of 5 years (NCT-identifier: 02513537). The descriptive analysis encompassed frequency distributions of answers and was automatically generated and summarised by the survey analysis package (Survey Monkey®). Data were exported to GraphPad Prism (GraphPad Prism® version 6 for Mac, GraphPad Software) and Mircosoft Excel (Microsoft® Excel for Mac, Version 16.31) for the preparation of figures.

3 | RESULTS

3.1 | Basic demographic data

In total, 566 respondents accessed and submitted the survey form. Of those, 564 (99.6%) completed the survey. The exact

response rate is not calculatable as the survey link was publicly accessible.

Respondents came from 62 countries, with 23 countries reaching more than five participants (equalling >1% of all respondents). The highest proportion of respondents came from Russia (n = 59, 11%), Germany (n = 47, 8%), Italy (n = 44, 8%), Spain (n = 37, 7%), Greece (n = 33, 6%), the United Kingdom (n = 33, 6%), and Austria (n = 31, 5%). Detailed information regarding origin of respondents is provided in Addendum S2 and Addendum S3.

More than half of the respondents (n = 328, 58%) indicated to be ESA members. The majority of respondents (n = 480, 85%) reported to be either head of the department, full professor, or having a position as a consultant/specialist in anaesthesiology, whereas only 57 (10%) were anaesthesiologists in training. In addition, 3 nurses (<1%), 5 medical students (<1%), and 19 (3%) that had neither of the above-mentioned professions completed the survey.

TABLE 1 General data and characteristics of respondents

General data	n = 564 (100%)
Profession	
Head of department and/or Full/Ass Professor	122 (21.6%)
Consultant/Specialist in Anaesthesiology	358 (63.5%)
Anaesthesiologist in Training	57 (10.11%)
Nurse	3 (0.53%)
Medical Student	5 (0.89%)
Other	19 (3.37%)
Years in anaesthesiology	
<1 y	8 (1.42%)
1-4 y	63 (11.17%)
5-10 y	112 (19.86%)
>10 y	381 (67.55%)
Type of hospital	
University/Academic/Tertiary	378 (67.02%)
Specialised	62 (10.99%)
Community	70 (12.41%)
Private	51 (9.04%)
Ambulatory Practice	3 (0.53%)
Beds in hospital	
<100	24 (4.26%)
100-299	105 (8.62%)
300-499	109 (19.33%)
500-999	181 (32.09%)
≥1000	145 (25.71%)
Anaesthesia/year	
<5.000	88 (15.60%)
5.000-19.999	236 (41.84%)
20.000-39.999	132 (23.40%)
≥40.000	47 (8.33%)
I do not know	61 (10.82%)

Note: Shown are frequencies (n) and percentage.

In line with this, respondents indicated a long working time in anaesthesiology: 381 (68%) reported to have more than 10 years of work experience and only 71 (13%) had less than 5 years of experience in the field of anaesthesiology.

The current affiliation of the majority of respondents (n = 378, 67%) was academic or a hospital providing tertiary care. For more details regarding respondents' basic characteristics, please refer to Table 1.

3.2 | Indicated relevance of delirium

Overall, two-thirds of the respondents reported that delirium is "very relevant" (n = 123, 22%) or "relevant" for their daily clinical practice (n = 262, 46%), respectively. Whereas one-third reported that it was "not very relevant" (n = 151, 27%) or "not relevant" for their daily practice (n = 28, 5%), respectively (Figure 1).

3.3 | Assessment of delirium and pain

The majority of respondents indicated to assess POD only in selected patients presenting symptoms (n = 277, 49%). In all, 36 respondents (7%) reported to routinely assess delirium in more than 50% of the cases. This equals the amount of respondents that indicated to "never" assess for delirium (n = 41, 7%) (Figure 2).

Whereas more than half of the respondents indicated to assess delirium before recovery room discharge (n = 308, 55%), only a quarter assessed delirium up to 3 days (n = 143, 25%) and only 77 (14%) for up to 5 days. In total, 403 respondents (71%) used a clinical observation for assessment and only 155 (27%) used a quantitative score/delirium screening tool. Of those, 78 (50%) used the Confusion Assessment Method for the ICU (CAM-ICU) and 46 (30%) used the Confusion Assessment Method (CAM) followed by the Minimal Mental State Examination (MMSE) (n = 29, 19%) and the Nursing Delirium Screening Scale (NuDESC) (n = 21, 14%).

Although the single screening items (when, how, and where) revealed high values, the combination of a bundle comprising comprehensive screening with a validated tool up to 5 postoperative days was found in very few respondents (n = 5, <1%).

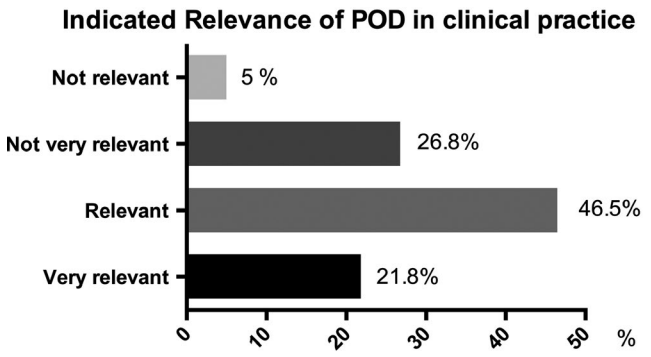

FIGURE 1 Indicated relevance of POD in clinical practice. POD, Postoperative delirium

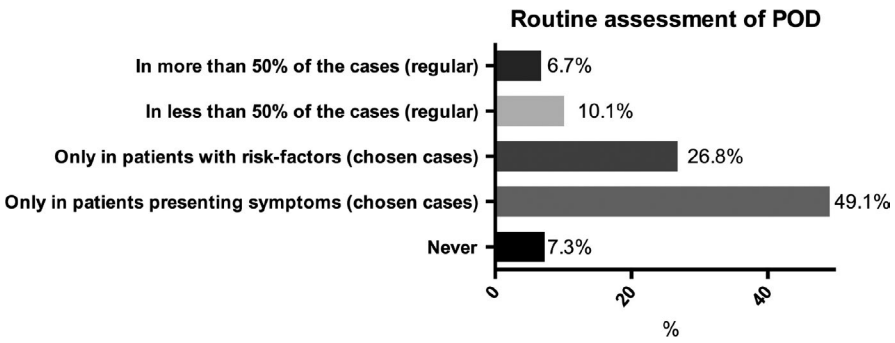

FIGURE 2 Routine assessment of POD. POD, Postoperative delirium

In contrast, the majority of respondents indicated to monitor pain with a quantitative score (n = 368, 65%). The most frequently used scales were self-assessment scales (Visual analogue scale: 54%; Numeric Rating Scale (NRS): 50%; Verbal Rating Scale: 30%). In all, 35 (6%) of the respondents indicate to use the visually enlarged and laminated version of the NRS (NRS-V), which is considered to be the reference standard among self-assessment tools for pain assessment.

3.4 | Monitoring of anaesthesia depth

Most respondents indicated the availability of an EEG/EMG-based monitoring to assess the depth of anaesthesia (n = 547, 97%). Only 17 respondents (3%) indicated to never use this monitoring although it is available. Despite the high availability, a minority indicated to use EEG/EMG-based monitoring to assess the depth of anaesthesia in the majority of the cases (n = 118, 21%). The most frequent indication reported is "reduce the risk of intraoperative awareness" (n = 443, 79%) followed by "reduced turn over time" (n = 203, 36%) and "reduced risk of burst suppression" (n = 189, 34%).

3.5 | Therapy of delirium

Nearly all respondents (n = 530, 94%) reported to use some kind of treatment for delirium. Three-quarters (n = 431, 76%) of the respondents indicated to use an individualised treatment for delirium, and every fifth (n = 99, 18%) reported to use a standard algorithm.

Asked for the specification of the treatment, nearly half of the respondents (n = 271, 48%) reported to consult a specialist, 379 (67%) reported a symptom-oriented treatment, and 220 (39%) include a cause-based approach in their treatment.

Finally, respondents were asked to openly describe their treatment in their own words. On the basis of a text analysis, the most frequently used specific agents were haloperidol (n = 100, 18%), clonidine (n = 41, 7%), dexmedetomidine (n = 20, 4%), and propofol (n = 20, 4%). The overall most used words in the description were haloperidol (n = 100, 18%), agitation (n = 72, 13%), and sedation (n = 51, 9%). The list of the 28 phrases that have been used by at least five participants are shown in Table 2.

TABLE 2 Text analysis of treatment strategies for delirium

Words and phrases	N	Percent
Pain/Analgesia	125	22.2%
Haloperidol	45	8.0%
Drugs/Medication	45	8.0%
Alcohol	19	3.4%
Clonidine	13	2.3%
Sedation	11	2.0%
Cause of delirium/Underlying cause	9	1.6%
Propofol	8	1.4%
Specialist	8	1.4%
Nutrition	8	1.4%
Noise	7	1.2%
Blood Pressure	6	1.1%
Early mobilisation	6	1.1%
Opioids	6	1.1%
Risk factors	5	0.9%
Intensive Care Unit	5	0.9%

Note: The underlying question was "briefly explain your causal treatment." Most used phrases are quantified automatically by "surveymonkey-text analysis tool." Total number of responses: n = 564. The phrases "treatment," "treat," "patient," "therapy," "case," and "according" were deleted from the table. "Analgesia and Pain," "Drugs and Medication," and "Cause of delirium and Underlying cause" were summarised to one item. All words and phrases mentioned ≥5 times are shown.

4 | DISCUSSION

The presented investigation is the first international survey conducted among anaesthesiologists also open to allied healthcare professions, nurses, and students. It assesses common practice in the management of POD and revealed that although the majority of respondents recognise delirium as a serious challenge in perioperative care and nearly everybody treats it, less than every hundredth anaesthesiologist applies an evidence-based practice regarding monitoring of delirium that is recommended in the "European Guidelines for the Management of Postoperative delirium."[9]

The study provides new information regarding POD management and it extends findings from other delirium surveys to the non-ICU context. It is the prerequisite of all efforts that aim at implementing

the POD Guideline. Respondents came from 62 countries, which allows—compared to surveys conducted on a national or bi-national level—an overview of current, international practice.

The majority of respondents indicated delirium to be a "very relevant" or "relevant" condition. This result is in line with a previous investigation among anaesthesiologists, nurses, and allied health professionals working in Sweden that revealed 69% considered the risk of neurocognitive side effects as important.[25] Comparability might be limited because despite delirium, the other survey summarised the perceived importance of other neurocognitive complications, such as long-term cognitive impairment and awareness.

Our survey revealed that there is a particular lack of comprehensive screening, as only 7% of the respondents indicated to screen routinely in more than 50% of all patients, which is in line with previous surveys from the critical care context: those revealed implementation rates of delirium monitoring tools between 2% and 54%, depending on the year and the collective.[11,15,17,21-27] Luetz and colleagues reported that 11% of the respondents indicated to screen for delirium without a validated tool, which is much lower than in our survey (71%).[17] Keeping in mind that a clinical judgement results in high-failure rates, and has an overall low diagnostic validity, this result seems comparably high.[28] A recently published study showed that the use of a validated screening tool is associated with two times higher awareness of key recommendations of ICU-delirium guidelines.[29] In our survey, most respondents indicated to use either the CAM-ICU [30] or the CAM.[31] It seems that especially those tools that have been validated and examined in the recovery room context, like, for example, the Nu-DESC, are not widespread at the moment, although they might be easier to implement.[32-34] Nevertheless, especially for the CAM-ICU it has been shown that intensive training is required to obtain these good diagnostic abilities in routine.[35] Surprisingly, nearly every fifth respondent using a validated screening tool indicated to use the MMSE,[36] which has not been validated for delirium screening and it does not screen for delirium.

The POD Guideline recommends delirium screening with a validated tool, for up to 5 postoperative days, and in all adult patients: less than 1% of the respondents indicated a practice that would match the recommendations a priori publishing of the guideline. This underlines the demand for implementation of a sufficient delirium monitoring in current practice. Nevertheless, it clearly shows that many clinicians implemented a part of the monitoring protocol already.

In contrast to delirium monitoring, the majority of respondents showed high awareness about pain and analgesia monitoring. 65% reported using a quantitative score. These numbers are close to ICU surveys that revealed up to 80% adherence to pain monitoring with a validated tool.[17] Most respondents of our survey indicated to use self-assessment scales, which is in line with previous investigations from the critical care context. Very few respondents indicated the use of observational scales, as they should be used in delirious patients because pain is frequently underestimated in those patients.[37]

Several controlled trials indicate that a prolonged period in burst suppression puts the patient at risk for delirium and neurocognitive dysfunctions.[38-41] Therefore, an EEG/EMG-based monitoring is part of the guideline recommendation and holistic prevention concept. Our data indicated that EEG/EMG-based monitoring is available in the study group and frequently used. Interestingly, 80% of the respondents use it to prevent awareness and only 34% use it to reduce burst suppression. This result is consistent with previous surveys [25]: anaesthesiologists are rather concerned about too light than to deep anaesthesia. Although we monitored a high availability of EEG/EMG monitoring in our study group, this is a necessary equipment to fulfil the guideline recommendations. Especially for resource-poor settings, this is a potential implementation barrier that should be considered.

Despite the lack of monitoring, 94% of the respondents used a treatment for delirium.

Less than one in five respondents used a standard algorithm, and although two-thirds reported a symptom-based treatment, less than half used a cause-based approach.

This might reflect the lack of available treatment algorithms for clinical routine, and shows a demand to focus on implementation strategies that focus on an improved standardisation.

Limitations are inherent to surveys, and although our survey delivers important information about current practice, the comparability to ICU surveys is not entirely given.

There are guidelines on the management of delirium in critically ill patients,[7,8] but there has been no evidence-based guideline on the management of POD in the non-intensive care unit setting until now. Our survey preceded the publication of the guideline, and is part of the implementation-monitoring programme, as decided by the guideline's TF and the advisory board. Therefore, it is not observing a change in practice, but a "baseline" status.

Second, surveys do not observe actual but perceived practice, which might differ significantly from each other.[14,17] This effect might be mitigated, as we observed a perceived a priori implementation that is close to zero. Even if perceived practice is more optimistic than actual practice, this does not affect our results, but future investigations should address this topic, when implementation increases. Ultimately, our target population was not limited to ESA members but open to all anaesthesiologists. The target population and recall rate can therefore not be estimated precisely; however, they are comparable to previous ESA surveys. Answers may be biased, as it is more likely that anaesthesiologists interested in the topic completed the survey. In addition, the respondents came mostly from academic medical centres. Therefore, in the future, it is important to look beyond the scope of academic centres and conduct surveys in non-academic settings and lower-resource settings to adequately estimate the potential demand for resources. Although the diversity of countries being represented is very high, the quantity of respondents coming from western European countries was higher compared to other countries.

The 2015 implementation rate is very low (close to zero). However, if the implementation rate potentially increases in the future, a pre-planned subgroup analysis and stratification should be performed to reveal potential differences in implementation that might be caused by access to guideline recommendations or resources necessary to implement the guideline.

Ultimately, the completion rate measured in absolute numbers was comparable to previous ESA surveys, but considering individual countries the response rates varied. On the one hand, it is a strength that we had participants from 62 countries, on the other hand the generalisability of a current practice within a country is not given. We addressed this issue, as we did not compare regional practice.

5 | CONCLUSIONS

In conclusion, the survey demonstrates that delirium is perceived as a relevant condition among anaesthesiologists. Albeit, reported practice indicates a high demand for implementing delirium monitoring into the non-ICU perioperative care. Nevertheless, it is encouraging that tools for implementation, for example, the EEG/EMG-based monitoring, are available in the centres represented by the respondents. Future studies should monitor the implementation after publication of the POD Guidelines and especially evaluate whether adequate equipment is available in all care settings (especially non-academic settings) and whether or not this is a barrier for guideline implementation.

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CONFLICTS OF INTEREST

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AUTHORS' CONTRIBUTIONS

FB and BW contributed equally to the manuscript and share the first authorship. FB, BW, and CS conceived the presented idea and developed the methodology. BW programmed the survey, FB revised it critically for content. SK, CA, GB, BN, and RS verified the methods and the survey. BN and CS directly supervised BW in doing the work. FB helped to carry out the survey. BN and SD analysed the results. FB and BW wrote the manuscript in consultation with CS, SK, CA, GB, RS, and BN. All authors reviewed and apporved the final manuscript.

CONGRESSES

Preliminary data of this manuscript were presented as an oral presentation in the POD Guideline Meeting during the ESA 2018 in Copenhagen, Denmark.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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