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Consciousness assessment: A questionnaire of current neuroscience nursing practice in Europe

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The questionnaire that was developed and administered using the online survey provider SurveyMonkey® was funded by the Research Unit on Brain Injury Rehabilitation Copenhagen (RUBRIC).

Abstract

Aims and objectives: To study practice in consciousness assessment among neuroscience nurses in Europe.

Background: Over the years, several instruments have been developed to assess the level of consciousness for patients with brain injury. It is unclear which instrument is being used by nurses in Europe and how they are trained to use these tools adequately.

Design/methods: A cross-sectional questionnaire, created by the European Association of Neuroscience Nurses Research Committee, was sent to neuroscience nurses in 13 European countries. The countries participated in 2016 with a response period of 3 months for each country.

Results: A total of 331 questionnaires were completed by nurses in 11 different countries. Assessment of consciousness was part of the daily routine for a majority of bedside nurses (95%), with an estimated median frequency of six times per shift. The majority uses a standardised instrument, and the Glasgow Coma Scale is the most common. Most participants assess consciousness primarily for clinical decision-making and report both total scores and subscores. The majority was formally trained or educated in use of the instrument, but methods of training were divers. Besides the estimated frequency of assessments and training, no significant difference was found between bedside nurses and other nurse positions, educational level or kind of institution.

Conclusion: Our study shows that consciousness assessment is part of the daily routine for most nurses working in neurology/neurosurgery/neurorehabilitation wards in Europe. The greatest variation existed in training methods for the use of the instruments, and we recommend standardised practice in the use of assessment scales.

Relevance to clinical practice: In clinical practice, both managers and staff nurses should focus on formalised training in the use of assessment tools, to ensure reliability and reproducibility. This may also increase the professionalism in the neuroscience nurses' role and performance.

KEYWORDS
assessment, International Health, neurology, neurosurgery, nursing, questionnaire

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1 | BACKGROUND

Neurological conditions affect people of all ages and are consequences of damage to the brain, spinal cord and nerves as a result of illness or injury. Several diseases that affect the brain result in diminished or altered levels of consciousness. In Europe, stroke is one of the leading causes of death and disability, and the burden of stroke is expected to increase (Bejot, Bailly, Durier, & Giroud, 2016). Also traumatic brain Injury (TBI) is an important cause of hospital admissions in Europe. From a European survey in 2012; 1.375.974 hospital discharges (data from 24 countries) and 33.415 deaths (25 countries) related to TBI were identified (Majdan et al., 2016). During the acute phase of TBI or diseases causing brain injury, an accurate assessment of a patient's consciousness is paramount for the early diagnosis and management of deterioration. This requires a scoring tool that offers a (visual) trend of observations and establishes a baseline from which nurses and other healthcare professionals can perform, compare and repeat evaluations of a patient's level of consciousness, and thus adjust treatment accordingly.

Over the years, several tools have been designed to address this need, of which the Glasgow Coma Scale (GCS) has been regarded as the gold standard for over 40 years (Teasdale & Jennett, 1974; Teasdale et al., 2014). Other tools are for instance "Alert Voice Pain Unresponsive Scale" (AVPU), "Full Outline of Unresponsiveness" (FOUR) or the "Coma Recovery Scale—Revised" (CRS-R). Each tool has its own strengths and weaknesses and may be more applicable to conditions or patient groups, for example stroke, unresponsive wakefulness syndrome and minimally conscious states (Baker, 2008; Brunker, 2006; Holdgate, Ching, & Angonese, 2006; Kelly, Upex, & Bateman, 2004; Kornbluth & Bhardwaj, 2011; Waterhouse, 2008).

It is essential that nurses and other healthcare professionals have the skills and knowledge to perform an accurate assessment of consciousness. One of the aims of the European Association of Neuroscience Nurses (EANN) is to contribute to the development of these skills and knowledge, but variations in both choice and use of consciousness assessment tools have been discussed at scientific meetings and discussions. The aim of this study is therefore to identify practice variation in assessing the level of consciousness among neuroscience nurses in Europe. It is not our intention to determine or dictate the best instrument to be used, but to examine the neuroscience nurses' understanding of the rationale underpinning the particular tool in use and explore the knowledge base in performing a neurological assessment of consciousness.

What does this paper contribute to the wider global clinical community?

- Insight on how well-known and internationally implemented nursing tasks may vary across countries.
- An example for the need of international standards in education or training for clinically relevant nursing assessment tasks.

2 | METHODS

2.1 | Participants

The study was proposed by the EANN Research Committee to the representatives of the member countries at the 2015 annual EANN board meeting, and the questionnaire (in English) was distributed to the board members. The following countries agreed to participate and recruit participants: Austria, Belgium, Croatia, Denmark, Finland, Italy, Macedonia, Malta, the Netherlands, Norway, Sweden, Turkey and the UK. Representatives were asked to provide a list of neuroscience nurses, that is nurses currently or recently working with patients with neurological disorders, as eligible participants.

The authors aimed at completed questionnaires from at least one university hospital and/or two general hospitals for each country. Exceptions were made for Macedonia and Malta, due to the small number of hospitals in those countries.

For generalisability on a European level, the authors aimed for data from at least one country in Northern Europe, one country in Western Europe, one country in Southern Europe and one country in Eastern Europe.

2.2 | Questionnaire design

The study was conducted by distributing a descriptive cross-sectional questionnaire. An online questionnaire was created by the first author (PV). An expert panel consisting of the EANN Research Committee members reviewed the questionnaire for content and face validity. After revisions, the questionnaire was translated by the representatives of the participating countries. It was translated from English to Danish, Dutch, German, Greek, Italian, Macedonian, Swedish and Turkish. Due to logistic challenges, only a forward translation (English to native) was possible for Greek and Italian. For the remaining languages, a backward translation ensured the quality of translation according to World Health Organization (WHO) standards (Organization). After consultation of country representatives, it was decided to ask French-speaking participants in Belgium to respond in Dutch or English and participants in Finland in Swedish or English. The questionnaire was developed and administered using the online survey provider SurveyMonkey®, and each language was pretested by the countries' representatives and/or colleagues.

If a list of eligible participants was provided by each country's representative, a direct invitation to participation was sent by email through SurveyMonkey®. If such a list was not available, a direct Weblink was spread through social networks and email contacts by each country's representative.

A description of the background and purpose of the questionnaire was included in the invitation. The questionnaire consisted of 45 questions, one for language selection, 19 for participant characteristics (educational level, years of experience, level of specialisation and work setting) and five for evaluation of the questionnaire. The remaining 20 questions (Supporting Information Appendix S1) were related to consciousness assessment where conditional logic ensured that participants would only receive the questions that would apply to them. For example, if the participant replied that he or she did not receive training, all questions about the training methods would be omitted. Participants could review their replies with a back button. After submission, a participant could not change his or her answer.

Countries participated at different intervals between February–August 2016, with a response period of 3 months per country. To increase participation and completion rate, participants would receive a reminder by email every week, until they had completed the questionnaire or the study period ended. All emails were sent on Monday morning at 6 a.m. Submitted questionnaires were checked for completeness within the SurveyMonkey® Web service, so reminders for completion could be sent every week.

2.3 | Ethical issues

Participation in the study was voluntary, and responses were anonymous. Countries with only one participant were excluded from the analysis, to maintain the participant's anonymity. No ethical committee was consulted for this study, because this is not a requirement in the initiating countries of this study (the Netherlands and Denmark).

2.4 | Analysis

The results of the questionnaire are presented by descriptive analysis. All data were tested for normality by a Kolmogorov–Smirnov test, a Q-Q plot and Levene's test. Categorical variables were expressed as *n* (%). Normally distributed variables were expressed by their mean and standard deviation, and not normally distributed data by their median and range. Normally distributed data were tested with the independent-samples Student *t* test for two groups and one-way ANOVA for >2 groups. In case of skewed data, we used the independent-samples Mann–Whitney *U* test for two groups and Kruskal–Wallis test for >2 groups. Categorical variables were tested using Pearson's chi-squared test or Fisher's exact test, when appropriate. If possible, differences were compared between countries, between positions (bedside nurses vs. other nurse positions), educational level and kind of institution. Statistical analysis was performed using SPSS STATISTICAL software for Windows (version 24.0; IBM SPSS Inc., Armonk, NY). All countries with less than previously stated data saturation were excluded in the analysis. The analysis was performed for participants who replied that consciousness assessment was part of their daily routine (Figure 1).

3 | RESULTS

3.1 | Participant demographics

In total, 331 nurses returned the questionnaire of which two were excluded from analysis because they were the only respondents for their country (Croatia and Norway). The data target was accomplished for Austria, Belgium, Denmark, Finland, Italy, Macedonia, Malta, the Netherlands, Sweden, Turkey and the UK. Based on the response, groups used for analysis changed per question or set of question, as shown in Figure 1.

For 279 (85%) of 329 nurses, the assessment of consciousness is part of their daily routine. The majority were bedside nurses (*n* = 199, 71%), and other characteristics are presented for each country in Table 1. Countries where some bedside nurses do not perform consciousness assessment as part of their daily routine were Austria, Denmark, Sweden and Turkey. In the description of the results, the 20 questions regarding the consciousness assessment are gathered in six themes as described below.

3.2 | How often do neuroscience nurses in Europe assess consciousness?

The median frequency of consciousness assessment was estimated at 6 [0–100] times per shift for the overall sample. There was a statistically significant difference in the estimated frequency per country ($\chi^2(10) = 48.132$, $p = <0.001$). The results for each country are shown in Table 2. There was no statistically significant difference between bedside nurses and other nurse professionals or educational level. Consciousness assessment was less frequent in rehabilitation centres (median 2, range 1–10), compared to general and university hospitals ($\chi^2(2) = 6.361$, $p = 0.042$).

3.3 | How do nurses in Europe assess consciousness?

Of the participants who assess consciousness, most (*n* = 254, 91%) use a standardised instrument to assess consciousness. Countries where not all nurses use a standardised instrument were Austria (*n* = 1, 25%), Belgium (*n* = 4, 9%), Finland (*n* = 5, 31%), Italy (*n* = 5, 20%), Macedonia (*n* = 3, 60%), Sweden (*n* = 2, 11%), Turkey (*n* = 1, 7%) and the UK (*n* = 4, 6%). There was no statistically significant difference between bedside nurses and other nurse professionals, educational level or kind of institution (Table 3).

The GCS was the most commonly used instrument in each country and in 85% (*n* = 237) of the total sample. There were more variations in instruments used among bedside nurses than other nurse professionals. Other known instruments besides the GCS were (among others) the Coma Recovery Scale—Revised (*n* = 37, 13%), Full Outline of Unresponsiveness (*n* = 27, 10%) and the Moscow Coma Scale (*n* = 14, 5%). The frequency of use and knowledge of the existence of instruments are shown in Table 3.

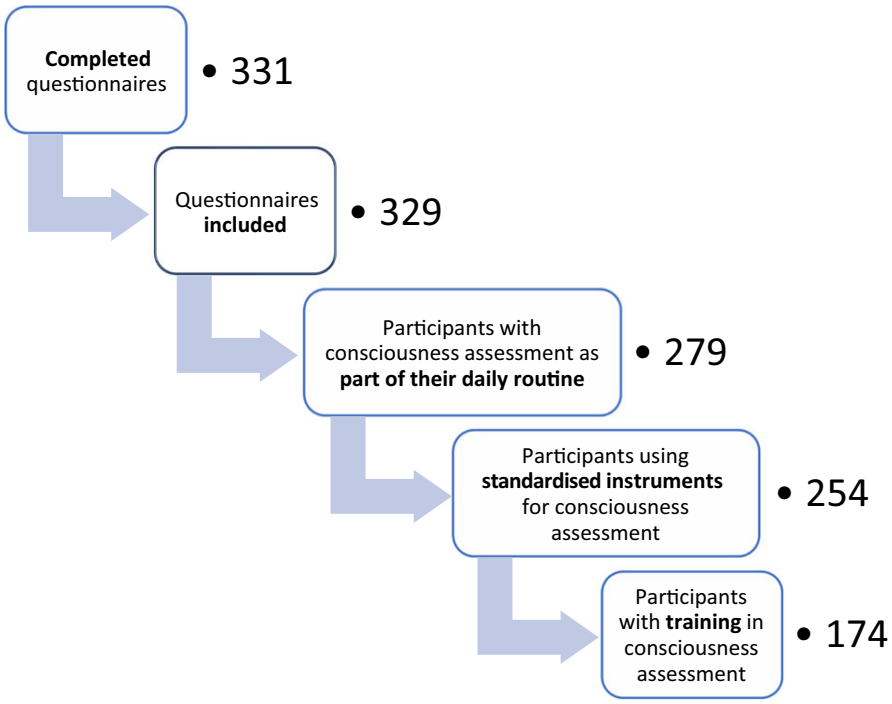


FIGURE 1 Flow chart of analysis, based on the participants' responses [Colour figure can be viewed at wileyonlinelibrary.com]

3.4 | How do nurses in Europe report their consciousness assessment?

Of the 254 participants who use a standardised instrument, 56% (n = 142) reported both total scores and subscores of the consciousness assessment. This was also the main method of reporting in each individual country, except for Malta where most participants (n = 4, 57%) reported clinical signs of decline in consciousness (not part of a scale). This answer was also given by a large group (n = 11, 37%) in Italy and in 17% (n = 44) of all participants. The second largest group of the total sample, 18% (n = 46), only reported the total score. There was no statistically significant difference between bedside nurses and other nurse professionals, educational level or kind of institution.

3.5 | With what purpose do nurses in Europe assess consciousness?

Most of the participating nurses (49%, n = 125) answered "clinical decision-making" as their primary purpose of consciousness assessment. There was, however, statistically significant variation between countries ($\chi^2(77) = 151.463$, p = <0.001). In Belgium, the primary purpose of consciousness assessment was "reporting" according to 39% (n = 16). In Finland, 45% (n = 5) replied "reporting" and the same proportion "clinical decision-making." In Malta, the main purpose was divided among participants between "clinical decision-making" (28%, n = 2), "reporting" (28%, n = 2) and "communication with medical staff" (28%, n = 2). There was no statistically significant difference between bedside nurses and other nurse professionals, educational level or kind of institution.

3.6 | Are nurses in Europe trained to assess consciousness?

Of 254 participants who use a standardised instrument, 68% (n = 174) stated that they had been formally trained or educated in the use of the assessment scale. In all participating countries, the majority confirmed being trained or educated, except for Belgium where 59% (n = 24) indicated not to have received formal training or education. This difference was statistically significant ($\chi^2(22) = 385.75$, p = <0.001). There was no statistically significant difference between bedside nurses and other nurse professionals, educational level or kind of institution.

3.6.1 | If yes, how are they trained?

The way nurses were trained was very diverse among the participants. Among the nurses who were trained, 22% (n = 39) had been trained by teachers/trainers, 20% (n = 35) by colleagues and 21% (n = 36) by both colleagues and teachers/trainers. Bedside nurses were less often trained by teachers/trainers (19%, n = 23) than nurses in other positions (29%, n = 16) and were mostly trained by colleagues. In all countries, at least some participants were trained by physicians. Belgium was the only country where physicians were primary teachers/trainers. The difference in methods of learning per country was statistically significant ($\chi^2(30) = 45.592$, p = 0.034).

Most participants trained practically in the clinical setting (73%, n = 127), and the second largest group (25%, n = 43) had been educated in classroom teaching. In this questionnaire, only Denmark, the Netherlands and Sweden seemed to have an online training for consciousness assessment.

TABLE 1 Participant characteristics

	N	Age in years mean (SD) or median [range]	Educational level n (%)				Female/male n	Years of experience as a nurse mean (SD) or median [range]	Specialized neuroscience nurse n (%)	Work setting n (%)		
			Bachelor degree (%)	Master degree (%)	Doctoral degree (%)	Other (%)				University hospital (%)	General hospital (%)	Rehabilitation centre (%)
Austria	4	30.8 (3.8)	0 (0)	1 (25)	**3 (75)**	0 (0)	3/1	9.8 (3.7)	2 (33)	**4 (100)**	0 (0)	0 (0)
Belgium	45	49 [25–58]	**30 (67)**	2 (4)	8 (18)	5 (11)	37/8	18 [1–37]	30 (64)	10 (22)	**35 (78)**	0 (0)
Denmark	26	42.1 (1.9)	**14 (54)**	1 (4)	9 (35)	2 (8)	25/1	13.5 (1.8)	22 (47)	**18 (69)**	3 (12)	5 (19)
Finland	16	39.1 (2.3)	**9 (56)**	1 (6)	4 (25)	2 (13)	16/0	11.4 (2.1)	2 (11)	**16 (100)**	0 (0)	0 (0)
Italy	35	37.2 (1.6)	3 (9)	**21 (60)**	8 (23)	3 (9)	27/8	13.9 (1.7)	0 (0)	15 (43)	**20 (57)**	0 (0)
Macedonia	5	45.6 (1.5)	**5 (100)**	0 (0)	0 (0)	0 (0)	5/0	19.2 (3.4)	4 (80)	**4 (80)**	1 (20)	0 (0)
Malta	7	34.3 (2.4)	1 (14)	0 (0)	2 (29)	**4 (57)**	6/1	11.3 (3.0)	0 (0)	0 (0)	**7 (100)**	0 (0)
Netherlands	42	38.7 (1.7)	**19 (45)**	2 (5)	7 (17)	14 (33)	34/8	14.6 (1.6)	32 (73)	11 (26)	**31 (74)**	0 (0)
Sweden	18	41.3 (2.7)	**13 (72)**	1 (6)	2 (11)	2 (11)	16/2	10 [1–39]	2 (10)	**12 (67)**	6 (33)	0 (0)
Turkey	14	33.2 (2.0)	**9 (64)**	2 (14)	3 (21)	0 (0)	13/1	11.8 (2.3)	5 (31)	**11 (79)**	3 (21)	0 (0)
UK	67	41.1 (1.2)	**29 (43)**	10 (15)	11 (16)	17 (25)	59/8	15 [1–40]	66 (80)	30 (45)	**36 (54)**	1 (1)
Total	279	40 [21–67]	132 (47)	41 (15)	57 (20)	49 (18)	**241**/38	15 [2–29]	167 (50)	131 (47)	142 (51)	6 (2)

Note. Numbers in bold are the largest group (modus).

Most of the participants who replied to this question (58%, *n* = 52) claimed that they were trained in the same way as their colleagues. The rest was trained differently (12%, *n* = 21) or did not know (30%, *n* = 52). Only 17% (*n* = 30) were trained in the same way as physicians, but the majority (72%, *n* = 125) was unsure of this. For those participants who had received training/education, this was usually not repeated (39%, *n* = 62) or less than once a year (36%, *n* = 58). Only in Italy, Sweden and Turkey, most of the participants stated that they trained at least once a year.

4 | DISCUSSION

Our study confirms that consciousness assessment is part of the daily routine for most nurses working in neurology/neurosurgery/neurorehabilitation wards/units in Europe. It has been well known that nurses with specialist education and/or training in neuroscience nursing have higher competence in consciousness assessment than nurses who only have basic education (Heron, Davie, Gillies, & Courtney, 2001; Mattar, Liaw, & Chan, 2013; Reith, Brennan, Maas, & Teasdale, 2016). However, our study also demonstrates that there is a great variability of practice in our group of neuroscience nurses.

Even though frequencies varied widely among the participants, consciousness assessment is performed about six times per shift in hospital settings and two times per shift in the rehabilitation centres. This is not surprising, as patients in the rehabilitation clinic are generally more stable than in the acute hospital care and thus not in need of having frequent assessments. The highest number of assessment per shift was 100 (Table 2). This can be explained by variation in how many hours a shift lasts. We did not ask for that in the questionnaire. Besides the estimated frequency and training of participants, no statistically significant difference was found between bedside nurses and nurses in other positions, levels of education or kind of institution. This suggests that consciousness assessment has been implemented to the same extent across Europe.

In general, a standardised instrument is used, and, as expected, the GCS is the most commonly used instrument in Europe. However, there was a small group of participants (9%) who replied that they did not use a standardised instrument. Considering the fact that even the use of GCS does not warrant standardisation in assessment, this finding indicates serious practice variations and potential lack in quality of care and safety for patients with disorders of consciousness (Braine & Cook, 2017; Reith et al., 2016). From an extensive review of scientific studies Braine and Cook (2017), concluded that there are at least eight different ways to apply noxious stimuli in the two subscales of GCS (motor and eye-opening) to assess reaction. This variation may, besides other challenges, result in a limited inter-rater reliability of the GCS. Thus, standardisation not only in education and training, but also in guidelines in how to use an assessment tool is crucial.

In our study, we found it satisfactory to learn that most participants using a standardised instrument report the outcome of the assessment with both total scores and subscores. To effectively

TABLE 2 Estimated frequency of consciousness assessment per shift

Country	Consciousness assessment per shift. Median [range]
Austria	6.5 [6–15]
Belgium	4 [1–25]
Denmark	4 [1–20]
Finland	4 [1–20]
Italy	10 [2–100]
Macedonia	6 [1–10]
Malta	10 [5–20]
Netherlands	8 [0–60]
Sweden	2.5 [1–20]
Turkey	6 [1–24]
UK	12 [1–60]
Total	6 [1–100]

TABLE 3 Use and knowledge of consciousness assessment tools

Instrument	Used by (*n*, %)	Known of its existence (*n*, %)
Glasgow Coma Scale	237 (84.9)	243 (87.1)
Reaction Level Scale 85	4 (1.4)	7 (2.5)
Coma Recovery Scale—Revised	3 (1.1)	37 (13.3)
Modified Glasgow Coma Scale	2 (0.7)	2 (0.7)
Moscow Coma Scale	2 (0.7)	14 (5.0)
NIH Stroke Scale	1 (0.4)	1 (0.4)
Alert Voice Pain Unresponsive (AVPU)	1 (0.4)	9 (3.2)
Scandinavian Stroke Scale	1 (0.4)	2 (0.7)
Full Outline of Unresponsiveness (FOUR) Score	0 (0.0)	27 (9.7)
Jouvet Coma Scale	0 (0.0)	6 (2.2)
Bozza-Murribini Scale	0 (0.0)	3 (1.1)
Do not know the name	3 (1.1)	NA
No instrument used	25 (9.0)	NA
Total	279 (100)	

Note. NA: not applicable.

monitor consciousness levels and individual patient's functional limitations, it is essential to report the subscores. This allows other succeeding nurses and other healthcare professionals to repeat the assessment and previous measurements and pinpoint the change in different neurological functions such as arousal, motor function and verbal response. The results also show that there are a large number of participants who do not report the subscores at all, which suggests that the above-mentioned statements are not commonly known or implemented. In an international study covering 48 countries including neurological physicians and nurses from different disciplines, it was reported that strategies for reporting the GCS varied greatly, and 35% of the participants limited the reporting to a summary score (Reith et al., 2016).

It is also interesting to learn that the primary purpose of consciousness assessment is not always clinical decision-making, even though this is most often what the instruments are intended for. Some of the participants only perform the assessment, simply to report it to nurse colleagues and/or physicians. One of the major conclusions is that this study shows a difference in autonomy among neuroscience nurses across Europe. In some countries, clinical decision-making may only be limited to physicians, instead of based on interdisciplinary collaboration. Further education and positioning of neuroscience nurses may change this in future.

Our results confirm that consciousness assessment by nurses may be considerably improved with formal and uniform training. Even though most participants using standardised instruments were formally trained to do so, teaching methods were very diverse and possibly difficult to implement in the same way across Europe. Bedside teaching may be feasible in well-organised and well-staffed clinical settings, but it is reliant on several factors such as the prevalence of patients with disorders of consciousness, workload, colleagues' teaching skills. From the findings of this study, it is also concluded that a more systematic approach is needed, such as classroom teaching or e-learning, which may be beneficial in addition to bedside training.

4.1 | Limitations

Limitations in this study are related to the logistics of an international questionnaire. The study was dependent on the network of the EANN board members, quality of translations and purely digital communication, and it was found difficult to obtain equal groups in the different participating countries. Selection bias cannot be completely avoided in online surveys, as the participants might be more (technologically) skilled or educated than those not to participate. All of these factors may have caused a response reflecting local practices instead of general practices in a country, considering the relatively small number and a wide variety of the participants. This emphasises the need for well-established networks both within and between countries in Europe. Another limitation is the lack of qualitative input from the participants, besides the multiple-choice questions. Because of several languages involved, it was not possible to insert open-ended questions for further analysis.

5 | CONCLUSION

In conclusion, our study shows that consciousness assessment is part of the daily routine for most nurses working in neurology/neurosurgery/neurorehabilitation wards in Europe. The majority uses a standardised instrument, in particular the Glasgow Coma Scale. The greatest variation existed in training methods for the use of the instruments, and we recommend standardised practice in the use of assessment scales.

5.1 | Future research

Future research should focus on developing new, or implementing existing, instructions or training material and recognition of

neuroscience nurses across Europe as specialists in assessment of consciousness.

6 | RELEVANCE TO CLINICAL PRACTICE

This study shows that a frequent and clinically relevant task for nurses has been implemented across Europe, but in different ways and to different extents. Consciousness assessment is an important step in diagnoses and treatment of patients with brain injury. As the mortality rate of these patients drops, adequate diagnosis of consciousness level will prove to be more and more important in future of neuroscience care. Therefore, both managers and staff nurses should focus on formalised training in the use of assessment tools, to ensure reliability and reproducibility. This may also increase the professionalism in the neuroscience nurses' role and performance.

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CONFLICT OF INTEREST

None declared.

CONTRIBUTION

Study design: PV, ZT, KG, AJ, JB, CW, IP; data collection and analysis: PV, ZT, IP; and manuscript preparation: PV, ZT, KG, AJ, JB, CW, IP.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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