Age and Ageing 2024; **53:** afae248
https://doi.org/10.1093/ageing/afae248
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RESEARCH PAPER

World delirium awareness and quality survey in 2023—a worldwide point prevalence study

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Abstract

Background: Delirium, an acute brain dysfunction, is proposed to be highly prevalent in clinical care and shown to significantly increase the risk of mortality and dementia.
Objectives: To report on the global prevalence of clinically documented delirium and delirium-related clinical practices in wards caring for paediatric and adult patients in healthcare facilities.
Design: A prospective, cross-sectional, 39-question survey completed on World Delirium Awareness Day, 15 March 2023.
Participants: Clinicians or researchers with access to clinical data.
Main Outcome and Measure: The primary outcome was the prevalence of clinically documented delirium at 8:00 a.m. (4 h) and 8:00 p.m. (±4 h). Secondary outcomes included delirium-related care practices and barriers to use. Descriptive statistics were calculated and multilevel modelling was completed.
Results: 1664 wards submitted surveys from 44 countries, reporting on delirium assessments at 8:00 a.m. ($n = 36\,048$) and 8:00 p.m. ($n = 32\,867$); 61% reported use of validated delirium assessment tools. At 8:00 a.m., 18% ($n = 2788/15\,458$) and at 8:00 p.m., 17.7% ($n = 2454/13\,860$) were delirium positive. Top prevention measures were pain management (86.7%), mobilisation (81.4%) and adequate fluids (80.4%). Frequently reported pharmacologic interventions were benzodiazepines (52.7%) and haloperidol (46.2%). Top barriers included the shortage of staff (54.3%), lack of time to educate staff (48.6%) and missing knowledge about delirium (38%).

Conclusion and Relevance: In this study, approximately one out of five patients were reported as delirious. The reported high use of benzodiazepines needs further evaluation as it is not aligned with best-practice recommendations. Findings provide a benchmark for future quality improvement projects and research.

Keywords: global delirium prevalence; standard of practice; delivery of health care; cross-sectional studies; older people

Key Points

- The prevalence of delirium was 18% ($n = 2788/15\,458$) at 8:00 a.m. and 17.7% ($n = 2454/13\,860$) at 8:00 p.m.
- Prevalence of delirium varied significantly between continents, countries, age groups, discipline, ward and unit types.
- Pain management and use of benzodiazepines were the top reported non-pharmacologic and pharmacologic strategies, respectively.
- Best-practice recommendations for pharmacologic management of delirium were not followed (>50% reported benzodiazepine use).
- The study established a global framework and baseline of clinically documented delirium prevalence after the COVID-19 pandemic.
- In the companion article by Nydahl *et al*. (2024), wards/units that reported the use of a delirium management protocols were more likely to also report the use of validated delirium assessment tools.

Introduction

Delirium is an acute physiologic disruption of brain networks supporting cognition and arousal, occurring in 10%–50% of hospitalised patients [1–3]. Patients across the ageing spectrum are impacted by delirium with ageing adults, critically ill adults and paediatric patients shown to be at an increased risk [1, 2, 4]. The occurrence of delirium has been significantly associated with an increased risk of mortality and dementia, and may lead to a myriad of downstream outcomes including institutionalisation, patient and family distress, anxiety, depression and functional decline [1, 2, 5–7]. While evidence exists to detect, mitigate risk and prevent delirium, adoption of these tools and protocols into clinical practice has been arduous, particularly adherence to evidence-based actions, such as administration of routine delirium assessment tools.

Over the past three decades, >20 delirium assessment tools were developed and validated across multiple patient populations and languages [8–10]. Despite the availability of tools with high validity, reliability and availability, the adoption of routine delirium assessment into clinical practice has been marred by a mix of reasons, including knowledge deficits and resource availability [11–13]. The current adoption of routine delirium assessment tool use is not known. To the authors' knowledge, no studies have evaluated the prevalence of 'invalid assessments' in clinical care. Gaining insight into how often invalid methods, such as identification based on clinical impression, are used to assess for delirium in clinical care may provide valuable information for future implementation studies focused on improving the use of validated tools for delirium assessment. We sought to understand the current rate of routine delirium assessment in clinical practice across countries and patient populations.

To begin to address this limitation, we developed and deployed an international 1-day point prevalence study on World Delirium Awareness Day (WDAD), 15 March 2023. Our primary objective was to report on the point prevalence of clinically documented delirium across countries and patient populations at two time points. Our secondary objective was to describe reported delirium assessment methods used, prevention and treatment protocols in use, and barriers to adoption in clinical practice.

Methods

This study follows a cross-sectional survey design. The principal investigators and co-investigators obtained Ethics and IRB approvals from their sites. Respondents consented to the study within the first survey section. The report of this study follows the Checklist for Reporting of Survey Studies (Table S1).

Sample characteristics

The population studied was multilevel; healthcare facility, unit, clinician and clinically documented delirium assessment data (Table S2 further describes the levels and characteristics of collected data). Individuals working as a health care worker or representative in a health care setting were eligible to participate. Exclusion criteria were former patients, family members or clinicians working in an ambulatory care service or operation theatre/room. Snowball recruitment methods were used to recruit National Coordinators to the WDAD Study Team. National coordinators ($n = 47$) were defined as researchers or clinicians who volunteered to serve as a co-investigator for their country and/or institution and recruited local participants to assist with data collection.

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Data collection

The survey was developed and pretested by an interprofessional team of clinicians and researchers (WDAD Study Team). The survey is composed of 14 sections (39 questions, 25 min to complete). The first three sections cover data protection, consent and security measures. The next 10 sections collected demographic data (survey respondent, hospital, reporting unit) and delirium-related information (primary outcome: clinically documented delirium; secondary outcomes: structures and processes, non-pharmacological and pharmacological treatments used, and barriers to addressing delirium).

Primary outcome

The primary outcome was the prevalence of clinically documented delirium at two time points (±4 h at both 8:00 a.m. and 8:00 p.m.). The survey requested information regarding the delirium assessment method used on each unit. Valid assessment tools were defined as measures recognised in the literature as reliable and validated tools [9]. The delirium prevalence rate was analysed on reported valid assessments.

Survey

The survey was administered online using SurveyMonkey and was open for data entry on 14 March 2023 at 8:00 p.m. (CEST) and closed on 19 March, at 8:00 p.m. (CEST). Data entry for both time points of interest had to be completed in one survey. A security section was used to prevent duplicate entries. No patient-level protected health information data were collected, and no interventions or assessments were prospectively administered.

Study preparation

Virtual meetings (recorded) were held monthly for National Coordinators (October 2022–March 2023) to overview study progress, Fig. S1. All study documents are available on the study site, wdad-study.center. No additional incentives were offered. Further study details regarding consent, recruitment, survey development and study conduct are outlined in Table S3.

Statistical analysis

Data quality control found that 84.4% ($n = 1664/1972$) of responses were complete based on the primary outcome. Of the excluded surveys, 94% ($n = 290/308$) of respondents did not proceed past the demographic section of the survey. No systematic patterns of missingness were identified and given there were non-normal distributions in most outcome variables, imputing the data would likely further introduce bias [14]. Therefore, a complete case analysis was done [15]. Figure S2 in the online supplement details excluded responses. Figure 1 illustrates surveys completed per country and continent.

The analysis of nominal data is reported as absolute and relative frequencies (percentages), ordinal data in its modus. Due to non-normal distribution, metrical data are reported as medians and interquartile ranges (IQRs). Bivariate inferential tests were conducted using *F*-tests and Chi-squared tests, with a two-tailed $P < .05$. Given the exploratory nature of the study, no adjustment for multiple comparisons or confounding were made. Multilevel models were explored for the prevalence of clinically documented delirium at two time points. Models were evaluated for fit using log likelihood and Akaike's Information Criterion (AIC). All analyses were conducted with SPSS version 23.0 (IBM SPSS Statistics for Windows, version 23.0; IBM Corp., Armonk, NY).

Results

In total, 1664 surveys representing 1664 wards/units were submitted across six continents ($n = 44$ countries) with aggregate datapoints from 36 048 patients at 8:00 p.m. and 32 867 patients at 8:00 p.m. on 15 March 2023. The rate of survey completion following completion of the consent form was 84.4%.

Furthermore, 47.9% of the survey responders were nurses ($n = 797/1664$). Of these survey respondents, 39.5% ($n = 658/1664$) claimed responsibility for data acquisition and 28.9% ($n = 481/1664$) reported <5 years of experience on their unit (Table S4).

Forty-five percent of the reported wards/units were from university hospitals (44.7%, $n = 744/1664$) and 25.4% ($n = 422/1664$) reported <500 hospital beds. General wards/units represented 45.8% ($n = 758/1664$) and 36.2% ($n = 603/1664$) identified as medical/surgical disciplines. The median number of hospital beds per ward/unit was 22 (IQR 13–30) (Table S5).

Primary outcome: delirium prevalence

Of the included patients, 70% ($n = 25\ 268/36\ 048$) were assessed for delirium at 8:00 a.m. and 69.6% ($n = 22\ 862/32\ 867$) were assessed for delirium at 8:00 p.m. Valid assessment tool use was reported in 61% ($n = 15\ 458/25\ 268$) of patients at 8:00 a.m., and 60.6% ($n = 13\ 860/22\ 862$) of patients at 8:00 p.m., resulting in a prevalence rate of 18% ($n = 2788/15\ 458$) and 17.7% ($n = 2454/13\ 860$), respectively. In wards/units using valid delirium assessment tools, the prevalence of delirium varied between continents, age groups, reported discipline of survey respondents and ward/unit types (all $P < .001$). Table 1 outlines all univariate results and characteristics.

The most frequently reported valid assessment tool was the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU)-ICU (20.1%, $n = 335/1664$), followed by the 4AT (19.1%, $n = 317/1664$) and the Confusion Assessment Method (CAM) (9.0%, 150/1664) (Table S6). Personal judgment was reported in 18.6% ($n = 310/1664$), 30.5% ($n = 508/1664$) reported assessing for delirium only in case of sudden changes of consciousness and 15.6%

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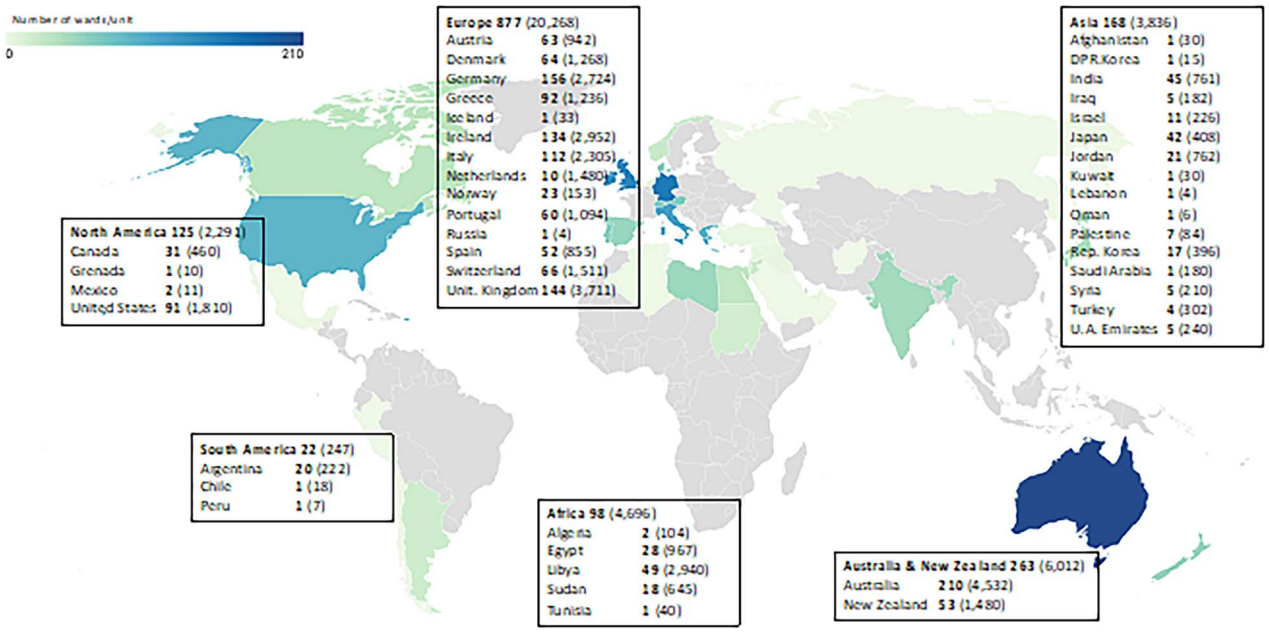


Figure 1. Surveys completed worldwide. Figure 1 illustrates the surveys completed per country and per continent. The numbers represent the total number of wards/units (bold) and total number of patients (in brackets). The grey-scale colour of the countries indicates the number of responses; a darker grey colour represents a high number of surveys received.

($n = 260/1664$) reported assessing for delirium three times per day. Nurses were reported by 58.6% ($n = 975/1664$) as the profession primarily responsible for delirium assessment (Table S7).

Multilevel modelling

Given the nested characteristics of the data, we fit a series of multilevel models to account for the clustering of observations at three levels (Level 1: hospitals, Level 2: countries, Level 3: continents) [16]. The dependent variable (outcome) was the reported n (%) of clinically documented positive delirium assessments using validated tools at 8:00 a.m. and 8:00 p.m.

8:00 a.m. Multilevel model

At the hospital level, the number of reported beds ($\beta = .032$, Std error = .574, $t = 2.225$, $P = .026$), the reported average years of experience on the unit ($\beta = 1.59$, Std error = .319, $t = 4.99$, $P < .001$) and the patients' age group ($\beta = 1.28$, Std error = .574, $t = 2.225$, $P = .026$) were all significantly related to the reported frequency of positive delirium assessments. Level 2 (country) was highly correlated with Level 3 (continent) and was omitted from the model. The continents were dichotomized into Europe ($n = 629$ wards/units) and others ($n = 453$ wards/units). Europe was significantly associated with reporting of 8:00 a.m. positive delirium assessments using validated tools ($\beta = 6.23$, Std error = 1.49, $t = 4.17$, $P < .001$). The final model explains 35% of the explainable variation in the point prevalence of clinically documented delirium across the globe at 8:00 a.m.

8:00 p.m. Multilevel model

At the hospital level, the number of reported beds was not significant ($\beta = -.240$, Std error = .455, $t = -5.27$, $P = .598$). The reported average years of experience ($\beta = .770$, Std error = .457, $t = 2.68$, $P < .050$) and the patients' age group ($\beta = -804$, Std error = .830, $t = -.968$, $P = .033$) were significantly related to the reported frequency of positive delirium assessments. Europe remained associated with the reporting of the evening positive delirium assessment using validated tools ($\beta = 6.046$, Std error = 1.62, $t = 3.73$, $P < .001$). The final model explained 29% of the variation in the point prevalence of clinically documented delirium at 8:00 p.m. and had a 9% reduction in the deviance statistic (2LL = 8714–7930) and a 3.8% reduction in AIC (8359 to 8.042).

Secondary outcomes: delirium management and barriers

The most frequently reported written protocols included pain management (78.2%, $n = 1301/1664$), delirium management (65.7%, $n = 1094/1664$) and nutrition management (58.8%, $n = 979/1664$). Interventions to provide delirium awareness on the wards/units included delirium mentioned in handovers (59.7%, $n = 994/1664$), educational trainings (48.4%, $n = 805/1664$) and availability of delirium experts (30.1%, $n = 501/1664$) (Table S8).

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Table 1. Primary outcome. Prevalence of delirium using validated assessment tools

Patients	Morning 8 a.m.				Evening 8:00 p.m.			
	Total	Delirious *N* (%)	Non-delirious *N* (%)	*P*	Total	Delirious *N* (%)	Non-delirious *N* (%)	*P*
Overall	15 458	2788 (18.0)	12 670 (82.0)		13 860	2454 (17.7)	11 406 (82.3)	
Continents				<.001				<.001
Asia	1884	443 (23.5)	1441 (76.5)		1636	287 (17.5)	1349 (82.5)	
Australia	2780	414 (14.9)	2366 (85.1)		2643	394 (14.9)	2249 (85.1)	
Africa	1302	445 (34.2)	857 (65.8)		1177	415 (35.3)	762 (64.7)	
Europe	7856	1202 (15.3)	6654 (84.7)		6883	1069 (15.5)	5814 (84.5)	
S. America	144	37 (25.7)	107 (74.3)		134	33 (24.6)	101 (75.4)	
N. America	1492	247 (16.6)	1245 (83.4)		1387	256 (18.5)	1131 (81.5)	
Age groups				<.001				<.001
0–17 years	221	36 (16.3)	185 (83.7)		227	46 (20.3)	181 (79.7)	
18–75 years	8390	1643 (19.6)	6747 (80.4)		7648	1427 (18.7)	6221 (81.3)	
>75 years	3258	657 (19.2)	2633 (80.8)		2699	579 (21.5)	2120 (78.5)	
Mixed	3586	484 (13.5)	3102 (86.5)		3282	402 (12.2)	2880 (87.8)	
Discipline				<.001				<.001
Medical/non-surgical	5427	1049 (19.3)	4378 (80.7)		4915	926 (18.9)	3989 (81.1)	
Surgical	3544	387 (10.9)	3157 (89.1)		3251	398 (12.2)	2853 (87.8)	
Palliative	46	4 (8.7)	42 (91.3)		33	14 (42.4)	19 (57.6)	
Respiratory/weaning	256	54 (21.1)	202 (78.9)		250	48 (19.2)	202 (80.8)	
Rehabilitation	934	121 (13.0)	813 (87.0)		820	119 (14.5)	701 (85.5)	
Long care	469	40 (8.5)	429 (91.5)		166	8 (4.8)	158 (95.2)	
Mixed/general	4097	1025 (25.0)	3072 (75.0)		3847	861 (22.4)	2986 (77.6)	
Other	677	106 (15.7)	571 (84.3)		570	78 (13.7)	492 (86.3)	
Ward/unit				<.001				<.001
ED	722	229 (31.7)	493 (68.3)		734	233 (31.7)	501 (68.3)	
General ward	8269	1311 (15.9)	6958 (84.1)		7566	1176 (15.6)	6390 (84.4)	
ICU, IMC, H.A.	4587	947 (20.6)	3640 (79.4)		4214	852 (20.2)	3362 (79.8)	
Rehabilitation facility	833	115 (13.8)	718 (86.2)		774	121 (15.6)	653 (84.4)	
Nursing home	447	53 (11.9)	394 (88.1)		128	5 (3.9)	123 (96.1)	
Other	594	132 (22.2)	462 (77.8)		441	67 (15.2)	374 (84.8)	

The primary study outcome of documented delirium prevalence in clinical care in the morning (8:00 a.m. ± 4 h) and in the evening (8:00 p.m. ± 4 h) is summarised in Table 1 (aggregate data). The statistical results examining the differences between the time of the assessment, reported continents, age groups, discipline, ward or unit type are displayed. Due to the exploratory nature of the study, corrections for multiple comparisons or confounders were not made. ED, emergency department, H.A., high acuity; IMC, intermediate medical care; ICU, intensive care unit.

The following routine non-pharmacological prevention and treatment interventions were reported as delivered at least once per shift, Table 2: pain management (86.7%, *n* = 1443/1664), mobilisation (81.4%, *n* = 1354/1664) and adequate fluids (80.4%, *n* = 1338/1664). The use of physical restraints and sitters were reported in 24.6% (*n* = 409) and 22.8% (*n* = 380), respectively.

The top three pharmacological interventions were reported as benzodiazepines (52.7%, *n* = 877/1664), haloperidol (46.2%, *n* = 768/1664) and quetiapine (38.4%, *n* = 639/1664), Table 3. The reduction of delirogenic medications was reported as a pharmacological intervention in 30% (*n* = 500/1664) of wards/units. Fifty-eight percent reported that pharmacological management depended on specific symptoms (58.7%, *n* = 977/1664). One-third of respondents (34%, *n* = 566/1664) report providing recommendations for withdrawal of delirium-related drugs.

The top three reported barriers to implementation and/or use of evidence-based strategies in delirium assessment and management were staff shortages (54.3%, *n* = 903/1664), lack of time to educate staff (48.6%, *n* = 809/1664) and missing knowledge about delirium (38%, *n* = 632/1664) (Table 4).

Discussion

This cross-sectional survey study represents the first global point prevalence study on delirium, covering 6 continents, 44 countries, 1664 wards/units and aggregate data from 36 048 patients at 8:00 a.m. and 32 867 at 8:00 p.m. The prevalence of delirium assessed with validated tools at 8:00 a.m. and 8:00 p.m. was 18% and 17.7%, respectively. While the use of validated tools was reported in 60%–61% of completed surveys, personal judgment was indicated in 18.6% of the surveys, indicating a large knowledge gap in clinical practice. Furthermore, one-third of survey respondents indicated that delirium is only assessed upon an observed sudden change in consciousness. This is contrary to best-practice recommendations of routine delirium assessment and substantiates the existing knowledge gap between research and clinical practice [1, 17, 18]. Multilevel modelling demonstrated that the continent and type of hospital explain approximately

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Table 2. Non-pharmacological delirium prevention and therapy

Routine non-pharmacological interventions, *n* (%)	*n* = 1664 units[a]
Pain management	1443 (86.7)
Mobilisation (i.e. sitting on the edge of the bed or more, daytime)	1354 (81.4)
Adequate fluids	1338 (80.4)
Verbal re-orientation	1137 (68.3)
Provision glasses, hearing, mobility aids	1045 (62.8)
Cognitive stimulation (i.e. provision of newspapers, TV, music, other)	1005 (60.4)
Open or liberal visiting times for families (daytime)	969 (58.2)
Provision day and night rhythm	920 (55.3)
Family information	898 (54.0)
Non-disturbed sleep (i.e. reduction of noise and light)	856 (51.4)
Family engagement	795 (47.8)
Multiprofessional team rounds	782 (47.0)
Avoidance bladder tubes/catheters	679 (40.8)
Bed boarders	675 (40.6)
Informing patients about delirium	595 (35.8)
Multiprofessional daily goals	520 (31.8)
Physical restraints (i.e. on wrists or others)	409 (24.6)
Sitter (besides the patient for longer time, mostly over hours)	380 (22.8)
Ear plugs, sleep glasses	319 (29.2)
Ground-levelled beds	307 (18.4)
Going outside the unit or ward (i.e. hospital hall, garden, sunlight)	269 (16.2)
Special trained experts	174 (10.5)
Activities in patient groups (i.e. singing, eating, doing exercises, other)	133 (8.0)
Animal-assisted therapy	69 (4.1)

Table 2 describes survey responses to the question 'Do most patients (≥50%) on your unit or ward receive routine non-pharmacological interventions (at least once per shift) for delirium prevention and treatment? (Check all that apply)'. [a]Multiple responses, total percent >100%.

Table 3. Reported pharmacological management of delirium

Majority (>50%) of patients with delirium receive ...	*n* = 1664 units
Haloperidol	768 (46.2)
Quetiapine	639 (38.4)
Reducing of delirogenic drugs	500 (30.0)
Evaluation by a specialist	439 (26.4)
Lorazepam[a]	424 (25.5)
Dexmedetomidine	401 (24.1)
Risperidone	372 (22.4)
Melatonin	268 (16.1)
Clonidine	250 (15.0)
Midazolam[a]	231 (13.9)
Diazepam[a]	222 (13.3)
Beta-Blockers	102 (6.1)
Melperone	96 (5.8)
Levodopa	35 (2.1)
Phenobarbital	34 (2.0)
Distraneurin	19 (1.1)
I do not know	129 (7.8)
Missing data	170 (10.2)
Pharmacological management ...	
Depends on specific symptoms of each patient's delirium	977 (58.7)
Is a more individual approach, depending on patients, and side effects	913 (54.9)
Is reported in handovers	852 (51.2)
Is discussed with families in most cases	574 (34.5)
Includes recommendations for withdrawal of delirium-related drugs	566 (34.0)
Is based on a standard operation procedure/protocol	501 (30.1)
Includes psychiatrist or delirium specific liaison team	454 (27.3)
Is a more general approach, including a few pharmacological agents	396 (23.8)
Includes pharmacologists	342 (20.6)
Is discussed with patients in most cases	310 (18.6)
None of the above	50 (3.0)
Missing data	67 (4.0)

This table describes the survey responses received to following questions: (1) Do most delirious patients (≥50%) of your unit or ward receive pharmacological interventions (click all that apply)? (2) In general, the pharmacological management on my unit or ward in delirium ... (click all that apply). [a]Indicates a benzodiazepine. When combined (lorazepam, midazolam and diazepam), benzodiazepines are the leading pharmacological measure reported.

one-third of the observed variation in reported rates of clinically documented delirium. Implications of this study are far-reaching as delirium represents a global public health problem [19]. Substantial efforts to implement and adopt best-practice recommendations for delirium assessment into clinical practice are needed so that the delirium is routinely and effectively assessed with validated tools.

To our knowledge, this is the first study using a broad survey approach to understand the global point prevalence of delirium. The prevalence rates are comparative to a recent meta-analysis summarising nine point prevalence studies with an estimated delirium point prevalence of 22.3% (95% confidence interval 17.8%, 27.7%) [20]. However, the report differs from the current study in terms of differences between clinical settings and countries. The current study identified significant differences between continents, ward/unit types, age groups and disciplines reported on the unit. Table S9 compares the meta-analysis results to the current point prevalence study. The review, nor the included studies, reported on the use of validated tools versus non-validated approaches across two different timepoints. This comparison is essential to consider as a metric for future point prevalence studies as it aids in identifying practice gaps. Future studies should further examine how the continent and type of hospital contribute to varying delirium prevalence rates.

There is evidence that upwards of 70% of delirium is missed in clinical care [21–24]. The binational point prevalence study conducted by Elliot et al. (2013) across 41 ICUs may provide a more representative sample of existing practices, finding that 3% of patients were routinely assessed for delirium [25]. This finding is similar to a point prevalence survey study completed in Portugal, which reported that delirium assessment was performed in <10% of ICU patients [26]. Many studies have identified the knowledge and practice gap in clinical practice, citing the lack of resources among the top barriers. The reported barriers in this survey are not different. The lack of resources (staff and time) and knowledge deficits were reported as the top

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Table 4. Reported barriers to delirium care

Survey responses (*n*, %)	*n* = 1664 units[a]
Shortage of personnel/staff	903 (54.3)
Lack of time to educate and train staff	809 (48.6)
Missing knowledge about delirium	632 (38.0)
Lack of awareness	585 (35.2)
Patients who are difficult for assessment	538 (32.3)
Communication gaps between professions	535 (32.2)
Lack of non-pharmacological interventions	357 (21.5)
Not enough motivated staff	328 (19.7)
No cost/resources for promoting at the department	301 (18.1)
Missing attitude, delirium is not important	299 (18.0)
Other problems are more challenging	275 (16.5)
No appropriate scores for assessment of delirium	254 (15.3)
We have no barriers, delirium is regularly assessed	170 (10.2)
Leadership does not support	137 (8.2)
Lack of pharmacological interventions	100 (6.0)
Interprofessional conflicts	97 (5.8)
Missing data	93 (5.6)

The survey responses of participants are summarised in Table 4. These responses answered the question 'On this unit or ward, barriers against implementation and/or use of evidence-based strategies are ... (click all that apply)' [a]Multiple responses, total percent >100%.

three barriers to the use of evidence-based strategies. Recent publications highlight the need for healthcare agencies, institutions and educational curriculums to incorporate recommended training on delirium and to consider a system-based approach to allocate the needed resources to facilitate the integration of evidence-based care practices [19, 27, 28]. The incorporation of recommended training and integration of evidence-based care practices with the needed resources may decrease the downstream impact of delirium on hospital length of stay and cognitive decline including dementia [19, 29, 30].

Multicomponent, non-pharmacological, bundled interventions such as the ABCDEF bundle or the HELP program have repeatedly demonstrated effectiveness in the reduction or prevention of delirium [2, 31–35]. Yet, their adoption to practice is limited and often short-lived, dependent on individual champions of evidence [11–13]. Pain management, mobilisation and adequate fluids were the top three reported non-pharmacological interventions to manage delirium. These are each essential components of multicomponent, non-pharmacological, bundled interventions. It is revealing that other essential components, such as re-orientation, were reported <75% of the time. This finding informs future projects and studies implementing delirium prevention interventions into routine clinical practice. Existing resources and learnings from previous implementation studies could further the chances of successful practice change [11, 36–43].

The use of pharmacologics to prevent delirium is not supported by evidence, specifically benzodiazepines, haloperidol or quetiapine [44–47]. Several studies have shown that benzodiazepines increase the risk of delirium and their use to sedate or treat agitation should be avoided [48–51]. A study in a palliative care population reported increased delirium symptom profiles in the intention-to-treat arms for haloperidol and risperidone [45]. For pharmacological management, both haloperidol and quetiapine are recommended in some guidelines for the reduction of hyperactive delirium symptoms (i.e. agitation) to maintain patient safety. Other guidelines, such as the Australian Clinical Standards, strongly recommend the avoidance of antipsychotics [52]. In most guidelines, there is a clear recommendation to exhaust all non-pharmacological options and reconsider all contraindications before opting for antipsychotics [1, 2, 49, 53, 54]. The results of this survey indicate that best-practice recommendations may not be followed. Future awareness campaigns and quality improvement projects should aim to address this knowledge and practice gap.

Implications for future research

A global infrastructure for future delirium research was established through the design and conduct of the reported survey study. Future research studies can use this infrastructure to further examine the differences between wards/units, healthcare systems and countries in their adoption and use of best practices for delirium care. Future quality improvement projects could leverage the global infrastructure to learn from the success and failure of previous projects focused on the implementation of best practices for delirium care. A secondary analysis of this survey study identified that the presence of delirium management protocols increased the likelihood of the use of validated delirium assessment tools. Future projects could include policy recommendations at the country level to establish delirium care standards, similar to Australia.

Limitations and strengths

While being the first global estimates of delirium, the study reported has five central limitations. These include selection bias, study design, survey design, non-response bias and the validity of reported clinical delirium assessments. These are outlined and discussed below.

First, the findings of this study may be influenced by selection bias as clinicians and scientists interested in delirium may have been more likely to participate in the survey. Therefore, the survey findings may represent hospital systems and units that are aware of delirium and not be representative of overall healthcare settings.

Second, a cross-sectional, observational, survey-based study design was used, limiting the ability to examine causal relationships among variables and draw substantive conclusions. Multivariable modelling was not possible due to the lack of patient-level data. The survey encompassed several different types of healthcare settings (i.e. ICU, general care, rehabilitation facilities) and therefore there may be differences between settings that is not shown in this reporting.

Third, non-response bias may have influenced reported delirium prevalence rates. Due to the design of the survey, it

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is not possible to discern information related to incompleteness at a survey stage. Incomplete surveys could represent several different clinical scenarios as respondents started the survey but were unable to, or choose not to, proceed past the consent point. Figure S2 outlines missing survey data.

Fourth, the design of the survey may have introduced bias. Data points within the survey were designed for feasibility of completion in busy clinical environments. Therefore, broad concepts and aggregate data available in the electronic health record were prioritised over the granularity of data (i.e. patient-level factors like biological sex, genetics, cognition). This study design limits the ability to examine patient-level data in relation to patterns of missingness or relationships between risk factors, tools or other patient-level characteristics.

Lastly, we were not able to verify data collection or entry strategies by each institution. We did exclude invalid assessment methods from the prevalence estimates. As the study design did not allow for the verification of clinically documented assessments, the training process of the clinical assessors or the accuracy of documented assessments, the results should be interpreted cautiously.

Future point prevalence studies focused on delirium can further address these limitations by improving study and survey design, outlined in Table S3.

Strengths

Strengths of this study include its design, interprofessional team involvement and global representation. All the principal investigators are known experts in delirium. An interprofessional team of scientists and clinicians across disciplines assisted with survey development, testing and deployment across six continents, representing 44 countries. These data provide a diverse clinical picture as various units and cultures are involved. Lastly, this survey requested aggregate data on delirium assessments at two time points, providing a comprehensive clinical picture of delirium prevalence.

Conclusion

This study reports results from the first global point prevalence study on delirium, covering 6 continents, 44 countries and 1664 units, and the point prevalence of clinically documented delirium was 18% at 8:00 a.m. and 17.7% at 8:00 p.m. Reported delirium management strategies do not consistently follow best-practice recommendations and the reported barriers were all resource related. Future studies and quality improvement projects can use these findings as a baseline to measure future advancements in improving delirium care.

Acknowledgements: H.L. and P.N. had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. The WDAD Study Team would like to thank the American Delirium Society, Australian Delirium Association, European Delirium Association, iDelirium and Latin American Delirium Interest Group for their support of this study. The authors would like to gratefully acknowledge participating clinicians and researchers for supporting the study and contributing information. The contributors who approved their mention are listed in—link to the Supplementary Data File – 'WDAD_Study_Team-2023-Update-24-07-27'.

Supplementary Data: Supplementary data is available at *Age and Ageing* online.

Declaration of Conflicts of Interest: H.L. is funded by the NIA 1AGK23076662-02, serves as a board member for the American Delirium Society and was the 2023 conference co-chair for the American Delirium Society, and serves as the web committee chair for the American Thoracic Society, Nursing Assembly. She has received royalties for keynote addresses at nursing conferences in 2022 and received a travel scholarship to attend the 2023 DECLARED conference in Sydney, Australia and the 2024 Hunters Geriatrics Conference in Newcastle, Australia. G.C. is the Past President of the Australian Delirium Association. M.G. has received royalties for the edited books (*Manual of ICU Procedures*, *Textbook of Ventilation Fluids, Electrolytes, and Blood Gases*) from the publisher Jaypee Brothers Medical Publishers and has received financial support to attend the Annual Conference of Indian Society of Critical Care Medicine. G.H.C. has spoke on Humanization of Healthcare (Pfizer) and was supported by Pfizer to attend the COMMEC 2022 meeting. E.S.O. is supported by NIH/NIA funding (unrelated to this manuscript), received honoraria to present at the Edmund Beacham Annual Current Topics in Geriatrics, has patents issued or pending, and was the 2022 President of the American Delirium Society. M.O.C. received funding unrelated to this manuscript from Novo Fonden, Lundbeck Funden and Dagmar Marshells Fond. R.V.H. received support from OrionPharma to attend meetings and/or travel.

Declaration of Sources of Funding: This study was not financially supported. H.L. is supported by a National Institute on Health, National Institute on Aging, 5K23AG076662-02. This funding organisation did not have any role in the survey design, implementation or analysis.

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Received 17 April 2024; editorial decision 13 August 2024

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