Original Article

Delirium prevalence and screening in the Danish healthcare system

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ABSTRACT

INTRODUCTION. Delirium is an acute and severe syndrome, commonly occurring in elderly hospitalised or terminal patients, causing cognitive and psychotic symptoms due to somatic illness or medication. This study aimed to investigate the prevalence of delirium across hospitals and nursing homes in Denmark.

METHODS. This Danish cohort study, part of a global survey on March 15, 2023, examined delirium prevalence in hospitals and nursing homes. Data was collected on delirium screening practices, prevalence and staff experience.

RESULTS. Of 69 recruited hospitals and nursing homes, 66 participated, and 63 provided complete data for analysis. Participants included 79.4% nurses and 14.3% researchers. Delirium prevalence was 13.6% at 8 a.m. (general ward 9.7%, intensive care unit (ICU) 29.7%, emergency department 40.0% and nursing home 8.9%) and 13.9% at 8 p.m. (general ward 12.0%, ICU 19.8%, emergency department 27.2% and nursing home 10.8%) on March 15, 2023. The Confusion Assessment Method (CAM) was used by 23.8% of participants, and the confusion-assessment method for the ICU (CAM-ICU) was used by 28.6% of participants and was the most frequently used screening tool.

CONCLUSIONS. On March 15, 2023, delirium prevalence in Denmark was 13.6% at 8 a.m. and 13.9% at 8 p.m. across 63 hospital departments and nursing homes. The CAM, brief CAM, and CAM-ICU were the most used assessment tools.

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TRIAL REGISTRATION. The study was registered in the German Registry for Clinical Trials (DRKS00030002).

Delirium is an acute and serious condition, common among elderly patients in hospitals and intensive care units (ICU) [1]. It is caused by acute encephalopathy, characterised by a sudden onset of deficits in attention and other cognitive functions [2]. Delirium is typically triggered by one or more physical conditions, medical interventions, or medications [3]. During hospitalization, delirium can lead to increased mortality, prolonged hospital stay, more complications and reduced cognitive function post-discharge [1, 4]. Delirium prevalence ranges from 10% to 75% among hospitalised patients, while prevalence among nursing home residents is less documented, ranging from 1.4% to 70.3% [5, 6].

Over time, various strategies for delirium management, such as delirium assessment, prevention, treatment and professional collaboration, have been developed and implemented in daily delirium care. These comprehensive frameworks include the ABCDEF bundle in critical care and the Hospital Elder Life Program (HELP) in general wards [7-9]. Evidence finds that multicomponent, non-pharmacological interventions can reduce delirium incidence by up to 43% compared to standard care [10].

Despite these advancements, routine assessment of delirium varies widely, from 12% to over 87%, and the implementation of delirium management remains challenging [11-13]. Barriers include a lack of time and staff, insufficient interprofessional collaboration and gaps in knowledge [14-16].

On World Delirium Awareness Day (WDAD) on 15th March 2023, 18 Danish hospitals and two nursing homes took part in an international point-prevalence study [17]. The aim was to highlight the prevalence of delirium, the number of patients/residents screened for delirium using a validated tool and the interventions and medications used to prevent and treat delirium [17]. This study presents an overview of the Danish results on screening practices, delirium prevalence and interventions used to address delirium.

Methods

This is a sub-analysis of the Danish cohort from an international point-prevalence study conducted on the 15th of March 2023 at 8 a.m. and 8 p.m., on WDAD [17]. A national coordinator recruited hospital departments and nursing homes through the Danish Delirium Network that were eligible for inclusion if they had a healthcare professional with a special interest in delirium. Operating theatres and outpatient clinics were excluded. The identified contact persons, each representing a hospital ward or nursing home facility, were responsible for data collection and responded to a questionnaire developed by the international WDAD23 research group [17]. Data were collected on the profession of the contact persons, department characteristics, department guidelines for prevention or treatment of delirium and department use of validated tools for routine delirium assessment of patients/residents. The survey also included questions about the number of patients/residents present at 8 a.m. and 8 p.m., the number screened for delirium using a validated tool and the number assessed positive or negative for delirium. The Danish version of the survey is available at the Danish Delirium Association home page.

Descriptive data for screening tools along with participating hospital departments and nursing homes are presented as numbers, in total and percentage. Age distribution and other continuous variables are presented as median and interquartile range (IQR). The participants reported the overall prevalence of delirium at 8 a.m. and 8 p.m., the point-prevalence was divided into groups for hospital wards, ICU (including one post-anaesthesia recovery ward, one intermediate care ward and one mixed ICU and one recovery ward), emergency departments and nursing homes. The point-prevalence was only performed based on data from departments that reported using a validated screening tool. Clinical experience of the staff was categorised (< 10 years, 10-20 years and > 20 years of experience), as well as the number of beds (< 500 beds, 500-1,000 beds, and > 1,000 beds) (WDAD23 Questionnaire, n.d.). Data was provided by the international WDAD23 research group, and analysis was

performed using SAS (version 9.4).

Trial registration: The study was registered in the German Registry for Clinical Trials (DRKS00030002).

Results

A total of 69 hospital departments and nursing homes were invited to participate. Of those who participated, 66 were hospital departments and nursing homes, and 63 had complete data for the point-prevalence analysis (**Figure** 1). Contact persons were mostly nurses (79.4%), followed by researchers (14.3%), doctors (4.8%) and others (1.6%). Experience levels varied, 23.8% having less than ten years, 27.0% having 10-20 years and 49.2% having over 20 years of experience. Methods used to raise the healthcare professional's awareness of delirium included delirium education (68.3%), mentioning delirium in shift handovers (68.3%), pocket cards (58.7%), local delirium experts (50.8%), delirium brochures (34.9%), delirium posters (20.6%) and feedback on department prevalence of delirium (30.2%). In 7.9% of the cases, no measures were reported. Characteristics of participating departments are described in **Table 1**. The median number of beds per department was 16 (IQR: 9-22).

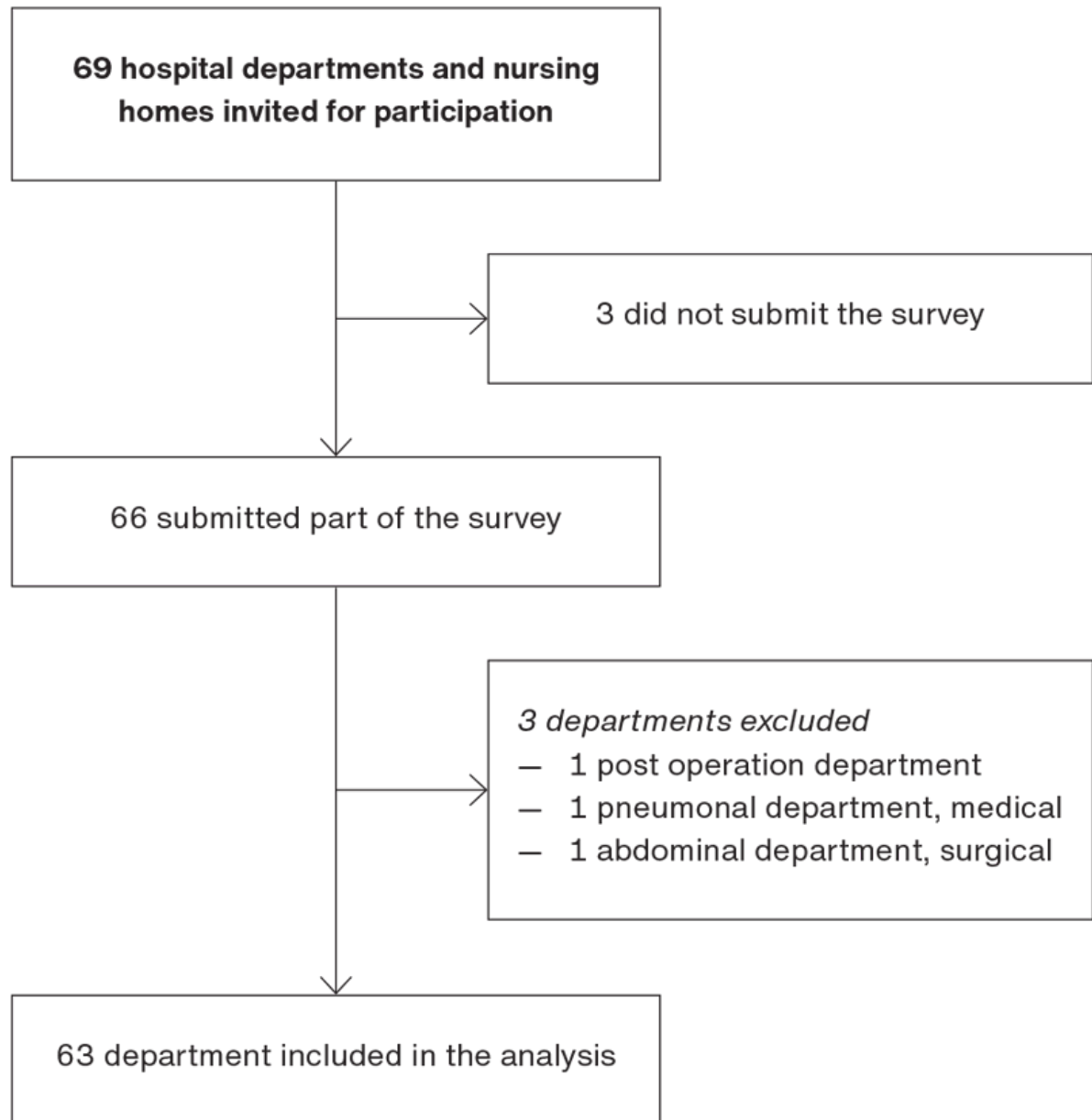**FIGURE 1** Flow chart of included hospital departments and nursing homes.

TABLE 1 Characteristics of participating departments (N = 63).

	n (%)
Type of department or nursing home	
University hospital	47 (71.2)
Affiliated university hospital	4 (6.4)
Regional hospital	10 (15.9)
Nursing home	2 (3.7)
Beds at hospital or nursing home level, n	
< 500	39 (61.9)
500-1,000	12 (19.1)
> 1,000	12 (19.1)
Type of department	
Emergency department[a]	4 (6.3)
General ward	28 (44.4)
ICU	26 (41.2)
Nursing homes	2 (3.2)
Other	3 (4.8)
Patients average age reported by department	
0-17 yrs	1 (1.6)
18-75 yrs	4 (65.1)
> 75 yrs	7 (11.1)
Mixed children/adult	14 (22.2)
Protocols implemented for the management of	
Delirium	57 (90.0)
Nutrition	56 (88.9)
Pain	54 (85.7)
Mobility and exercise	33 (52.4)
Sedation	26 (41.3)
Sleep	25 (39.7)
Spontaneous breathing trial	15 (23.8)
Dementia	15 (23.8)
Spontaneous awakening trial	14 (22.2)
Physical restraint	14 (22.2)
Family engagement and empowerment	13 (20.6)
ICU diaries	11 (17.5)
Other[b]	8 (12.7)
None of the above	2 (3.2)

DCI = decompression illness; ICU = intensive care unit.
a) Including medical and surgical acute departments.
b) Withdrawal management, dementia-friendly initiatives, nasal high flow, sepsis and antibiotics, diabetes protocols, seizure protocols, DCI protocols, external ventricular drainage, nausea, prevention of post-operative urinary retention, dehydration, refeeding syndrome, dysphagia, falls and use of 1-to-1 supervision.

Delirium assessment

The mostly reported used delirium screening tools in the hospital departments were the Confusion Assessment Method (CAM) (23.8%), the brief CAM (bCAM) (17.5%) and in the ICU, the CAM-ICU (28.6%) (**Table 2**). Nurses typically conducted the assessments (88.9%), and 49.2% of the screenings were triggered by changes in the patient's mental state. In 22.2% of departments, the delirium screening was done systematically twice every 24 hours and in 15.9% thrice every 24 hours (Table 2). In 15.9% of the departments, a validated tool was not used, leaving healthcare professionals to rely on personal judgment only.

TABLE 2 Delirium screening tools used in participating departments (N = 63).

	n (%)
Delirium screenings tools[a]	
Personal judgement	10 (15.9)
bCAM	11 (17.5)
CAM	15 (23.8)
CAM-ICU	18 (28.6)
CAM-ICU-7	1 (1.6)
ICDSC	4 (6.4)
NU-DESC	3 (4.8)
SOS-PD	1 (1.5)
Other	0
Health professionals performing delirium assessment	
Nurse	56 (88.9)
Mixed healthcare professionals	3 (4.8)
None	2 (3.2)
Other	2 (3.2)
Delirium assessment frequency	
1 × every 24 h	3 (4.8)
2 × every 24 h	14 (22.2)
3 × every 24 h	10 (15.9)
Only at department/hospital admission	1 (1.6)
Only at the change in patient's mental baseline	31 (49.2)
Other[b]	4 (6.4)

3D-CAM = 3-Minute Diagnostic Interview for CAM-defined Delirium; 4AT = Alertness, Abbreviated mental test, Attention, Acute change Test; bCAM = brief CAM; CAM = Confusion Assessment Method; CAM-ICU = CAM in the ICU: CAM-ICU7 = delirium severity scale for the ICU; DSM = Diagnostic and Statistical Manual of Mental Disorders; DTS = Delirium Triage Screen; ICDSC = Intensive Care Delirium Screening Check List; ICU = intensive care unit; NU-DESC = The Nursing-Delirium Screening Scale; PAED = Pediatric Anesthesia Emergence Delirium; pCAM = paediatric CAM; psCAM = preschool-CAM; SOS-PD = Sophia Observation withdrawal Symptoms-scale and Delirium; SQID = Single Question to Identify Delirium; sspCAM = severity scale for pCAM; UB = ultra brief.
a) 3D-CAM, 4AT, DTS, DSM-IV-, DSM-V-, and DSM-VI criteria, SQID, UB2, PAED Scale, pCAM-ICU, psCAM-ICU, sspCAM-ICU, and psychiatric consult were options in the survey as well, but not reported as used in Denmark.
b) Prescribed by medical doctors, depends on type of patient, frequency based on collective knowledge of staff, at admission, and discharge of acute and elective surgery patients.

Prevalence of delirium

At 8 a.m., there were 1,203 patients/residents present at participating departments, with 87 of 641 screened positive for delirium, resulting in a 13.6% prevalence (**Table 3**). At 8 p.m., 1,099 patients/residents were present, with 75 of 539 screened positive for delirium, resulting in a 13.9% prevalence (Table 3). The distribution of the point-prevalence of delirium across emergency departments, hospital wards, ICU and nursing homes is presented in Table 3.

TABLE 3 Delirium point-prevalence at the participating department.

	Patients, n				Departments, n
	admitted	screened	delirious	non-delirious	
At 8 a.m.					
General ward	844	473	46	427	28
ICU[a]	188	118	35	83	29
Emergency department	69	5	2	3	4
Nursing home	102	45	4	41	2
Subtotal	1,203	641	87	554	63
At 8 p.m.					
General ward	746	375	45	330	28
ICU*a*	199	116	23	93	29
Emergency department	57	11	3	8	4
Nursing home	97	37	4	33	2
Subtotal	1,099	539	75	464	63

ICU = intensive care unit.
a) Including 1 post-anaesthesia recovery ward, 1 intermediate care ward, 1 mixed ICU, and 1 recovery ward.

Management of preventive and treatment measures

Most departments (90.7%) reported having a protocol implemented for delirium management (Table 1). Also, 88.9% reported having a nutrition protocol, and 85.7% reported having a protocol for pain implemented. The Family Engagement and Empowerment Protocol was reported in 20.6% of departments. Eleven out of 26 ICUs reported using ICU diaries (Table 1).

Discussion

The Danish results from the international delirium point-prevalence study showed an overall delirium prevalence of 13.6% at 8 a.m. and 13.9% at 8 p.m. in participating departments. Delirium was mostly identified using validated screening tools by nurses, while 15.9% of healthcare professionals used their personal judgment. Common methods to raise awareness included education, mentioning delirium in shift handovers and the use of pocket cards. Only half of the patients present on the day of the point-prevalent study were assessed for delirium.

The international point-prevalence study showed a slightly higher prevalence of 18.0% at 8 a.m. and 17.7% at 8 p.m. [17]. The international study also showed a variation in the prevalence of delirium across continents. At 8 a.m. and 8 p.m., the rates were higher in Asia (23.5%, 17.5%), Africa (34.2%, 35.3%) and South America (25.7%, 24.6%) than in Australia (14.9%, 14.9%), Europe (15.3%, 15.5%) and North America (16.6%, 18.5%), whose rates which were comparable to the Danish results [17]. In the international study, the prevalence of delirium varied between participating departments [17]. The actual occurrence in Denmark and globally may be higher, as not all patients were routinely screened. Additionally, three departments did not use a validated screening tool, which meant that their delirium prevalence data were not included in the delirium prevalence analysis. A previous study showed that delirium was underestimated without the use of a validated screening tool [18]. Also, in the international study, 70% of patients were screened at 8 a.m. and 69.6% were screened at 8 p.m., which was higher than the screening rates in Denmark. Currently, we lack tools to measure the incidence of delirium. Continuous and objective measurement of delirium presence may be possible, in the future, through delta-scan technology, which measures the brain's electrical activity generated in the cerebral cortex [19]. Until then, our best approach is to routinely screen 2-3 times a day using one of the validated instruments.

Half of the participating departments were ICUs, which showed a point prevalence in the morning of 29.9% and in the evening of 19.6%. This prevalence aligns with other prevalence studies [20]. In the present study, more

than half of the patients present in the participating departments were screened for delirium at both 8 a.m. and 8 p.m. Contrary to expectation, we found no difference in prevalence between morning and evening screenings. However, the lack of systematic screening of all patients using validated tools may explain our inability to detect a difference between the morning and evening prevalence of delirium. Only 22.2% of participants reported to systematically screen for delirium twice daily, while 49.2% screened only when there was a change in the patient's mental state. The national clinical guideline recommends screening patients at risk for delirium but does not specify the frequency [1]. Hence, the fluctuating nature of delirium presents a challenge for systematic screening and highlights the need for healthcare professionals to remain vigilant to risk factors and symptoms rather than rely solely on changes in mental state. When validated screening tools are used, such as ICDSC, these fluctuations are partly accounted for, as the tool is designed to capture changes in the patient's mental status over time.

Strengths and weaknesses

This is the first Danish study exploring the prevalence of delirium across hospital departments and nursing homes. The department that participated most used a validated screening tool to assess delirium prevalence, enhancing the validity of the results.

A key limitation of our study was that only approximately half of the patients were screened for delirium using a validated screening tool at the time of the point-prevalence study. We did not collect detailed clinical data on the unscreened patients, which may have introduced a selection bias. Also, recruitment through the Danish Delirium Association may have introduced a participant bias, as participating departments may have a greater focus on delirium, as evidenced by the interest of contact persons in the Danish Delirium Network. Furthermore, there was an overrepresentation of ICU in this study, possibly due to their longer tradition for screening and research in delirium. Due to the large variation among the participating departments and nursing homes, we chose not to perform comparative analyses.

Conclusions

On the 15th of March 2023, the prevalence of delirium in Denmark was 13.6% at 8 a.m. and 13.9% at 8 p.m. among patients and residents across 63 hospital departments and nursing homes. The most frequently used tools for delirium assessment were the CAM and the bCAM in hospital departments and the CAM-ICU in the ICU.

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