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Original Article

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Detecting Delirium in Older People: The Development of a New Web-Based Tool for Family Caregivers

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ABSTRACT

OBJECTIVE Delirium is a common yet under-recognized neuropsychiatric condition in older adults. In Thailand, many family caregivers lack accessible tools that can help them identify this condition at home. This study aimed to develop and evaluate a bilingual, web-based tool, "delirium-detect," to support early delirium detection by non-professional caregivers.

METHODS This research and development study involved literature reviews, expert interviews, key informant input, and focus group discussions to design a 22-item symptom checklist available in both Thai and English and in desktop and mobile formats. A pretest (n = 17) and a pilot test (n = 11) were conducted with family caregivers of hospitalized older adults diagnosed with delirium. Tool feasibility and user satisfaction were as-sessed using descriptive analysis.

RESULTS Expert reviews confirmed strong content validity (CVI = 1.00). All pilot participants met DSM-5 criteria for delirium using the tool, supporting its criterion validity. The average time to complete the questionnaire was 9.09 minutes. User feedback indicated high satisfaction: 54.5% "liked" and 18.2% "strongly liked" the tool, while 72.8% found it easy or extremely easy to use.

CONCLUSIONS The "delirium-detect" tool demonstrated preliminary validity, practicality, and user-friendliness, supporting its potential for early delirium detection by family caregivers. Further validation in larger and more diverse populations is recommended to enhance generalizability.

KEYWORDS delirium, family caregiver, web-based tool, older adults

INTRODUCTION

Delirium is a severe neurocognitive condition marked by a sudden onset and rapid alterations in cognition, attention, and consciousness, often leading to brain failure (1). The term "delirium" originates from the Latin word "delirare," meaning "to go out of the furrow" or stray from a straight path, reflecting the confusion and disorientation associated with the condition (2). Among older adults, delirium represents a serious and prevalent condition which increases the risk of mortality, prolongs hospital stays, and increases both the incidence of falls and the rate of functional decline (3). Approximately 14.0% of individuals over 85 experience delirium, and hospitalized patients with delirium face a 40.0% one-year mortality

rate (4). A 2020 meta-analysis of 33 studies in general medical settings further found reported a 23.0% prevalence of delirium among older inpatients (5). Despite its severity, research on delirium in older adults remains limited, and high under-recognition rates contribute to elevated morbidity and mortality (6, 7).

Delirium is categorized in three psychomotor subtypes: hyperactive, hypoactive, and mixed (8). Hypoactive delirium, the most common subtype, is frequently misdiagnosed due to its subtle presentation and overlap with psychiatric conditions (9). Risk factors include advanced age, cognitive impairment, multiple comorbidities, frailty, sensory deprivation, a history of delirium, surgery, and ICU admission, reflecting its multifactorial etiology (10). Common triggers include substance use, nutritional deficiencies, infections, dehydration, and electrolyte imbalances (8). Diagnosis typically requires evaluation by specialists such as geriatricians, Intensive Care Unit (ICU) physicians, and consultation-liaison psychiatrists (3). The Confusion Assessment Method (CAM) is the most widely used tool for its detection (11, 12).

Despite its preventability, early recognition of delirium remains challenging due to limited awareness and inconsistent screening practices (13). Clinicians' unfamiliarity with individual patients and the lack of using formal screening tools further delay detection (3). In contrast, family caregivers, through their close relationships, are often better positioned to detect behavioral and cognitive changes critical for accurate diagnosis (14). However, many lack the knowledge to implement non-pharmacological strategies for delirium prevention and management (15). Growing evidence suggests that structured education for family caregivers can significantly improve delirium knowledge and reduce delirium incidence in older adults (16). Nevertheless, most caregivers still report only limited training and support despite their pivotal role in day-to-day care in Thailand (17, 18).

Several tools have been developed to facilitate caregivers' detection of delirium, including the Family Confusion Assessment Method (FAM-CAM), the Informant Assessment of Geriatric Delirium (I-AgeD), Sour Seven, the Single Question in Delirium (SQiD), and the Single Screening Question-Delirium (SSQ-Delirium) (19, 20). However, these tools have notable limitations. For instance, the FAM-CAM is not meant to function as a standalone diagnostic tool and should always be used together with clinical assessments. The Sour Seven, a yes/no questionnaire with a sensitivity of 60.0%, may lead to underdiagnosis (21) and cannot identify the severity or nuances of symptoms. In addition, ratings may vary between caregivers and nurses, compromising reliability (20). The performance of I-AgeD can differ across settings and requires familiarity with the patient's baseline state (22). Finally, both SQiD and SSQ-Delirium have low reliability and generally require follow-up (20, 23). Additionally, none of these tools are optimized for online use, limiting their accessibility in non-clinical settings.

To address these shortcomings with a caregiver-centered solution, we developed and pilot-tested "delirium-detect", a bilingual web tool co-designed with family caregivers. Although the pilot established feasibility, content validity, and caregiver usability, these foundational steps do not yet address clinical responsiveness, diagnostic sensitivity, or symptom severity grading—gaps that must be closed prior to urgently needed real-world use. In its current form, the questionnaire records responses but does not trigger immediate action; forthcoming iterations will embed alert logic that prompts caregivers to seek urgent care when high-risk patterns or severity thresholds are detected. The next phase will therefore: 1) recruit a larger, more diverse caregiver cohort across home, ward and community settings; 2) benchmark tool performance against standard clinician assessments to generate sensitivity, specificity and reliability estimates; 3) add a symptom severity scale that delivers stepped recommendations proportional to the degree of acuity detected; and 4) conduct further usability and implementation studies incorporating real-time feedback, alerts and direct links to emergency resources. These enhancements are expected to help close the identified gaps and enhance the clinical utility of delirium-detect in time-critical, non-clinical settings. This study describes the current development of deliriumdetect and reports its preliminary feasibility and validity among family caregivers.

METHODS

Study design

This study employed a research and development design to create a web-based tool – delirium-detect.com – for family caregivers to detect delirium in older adults in Thailand. The process followed a structured sequence, as outlined in the framework in Figure 1 (stage 1- tool development), Figure 2 (stage 2- validity assessment), and Figure 3 (stage 3- pilot feasibility).

Literature review

A targeted literature search catalogued caregiver-observable delirium signs and assessed existing caregiver-oriented screening tools to guide item generation. More than 60.0% of delirium episodes go undetected in hospitals, particularly in ICUs, because of knowledge gaps (24). Early detection using reliable tools could reduce adverse outcomes and patient falls (25). Family caregivers see symptom fluctuations, but they receive little training. Targeted education can reduce stress and improve detection (26, 27). In this study, web-based tools were highlighted for their potential to improve delirium knowledge and detection (13, 20, 28). These findings underpin the development of an online, caregiver-centered screening tool.

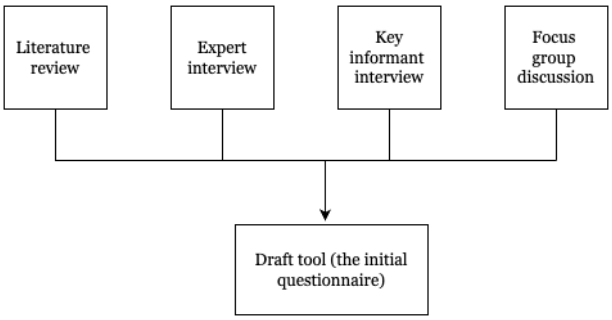

Figure 1. Flowchart for stage 1: initial tool development

Expert interviews

Five multidisciplinary experts from the research team—two geriatric psychiatrists, one geriatrician, one registered nurse, and one occupational therapist—were interviewed to delineate key delirium symptoms, assessment domains, and care tips that informed the development of the questionnaire. The same panel later performed content validation (see section The interface of the website).

Key informant interviews

Family caregivers and experienced nurses were interviewed to gather insights on user needs and tool usability. They recommended a step-by-step interface with clear instructions and actionable feedback for better understanding and application.

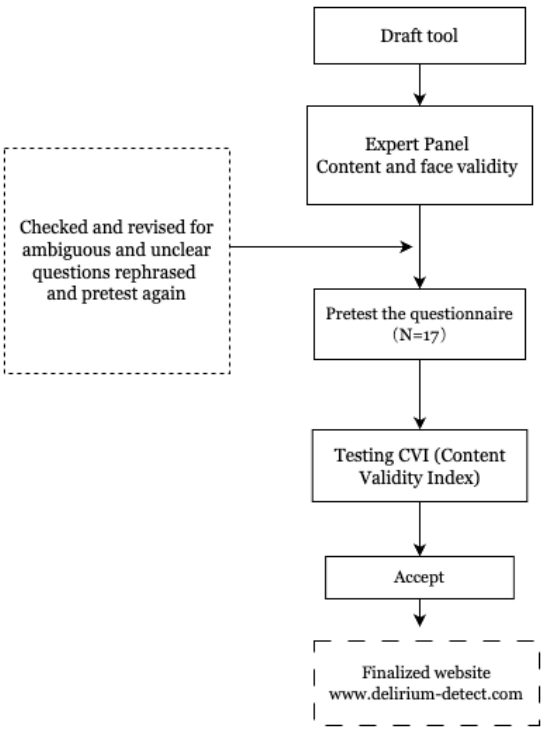

Figure 2. Flowchart of Stage 2 validity-assessment process

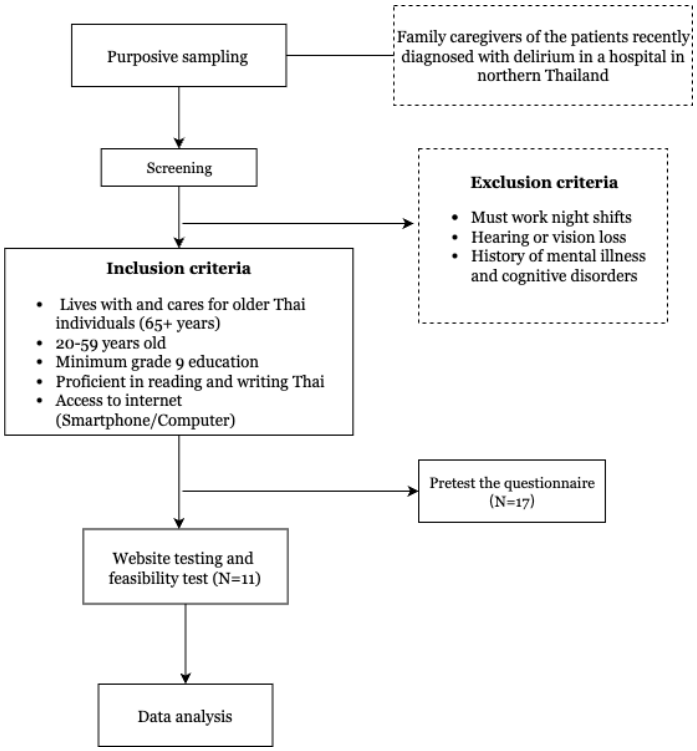

Figure 3. Flowchart of stage 3 pilot-feasibility sequence

Figure 4. Home page of the website www.delirium-detect.com (desktop version vs mobile version)

Focus group discussions

Ten participants, including family caregivers, nurses, and healthcare professionals, participated in focus group discussions that emphasized the need for an intuitive interface, culturally relevant features tailored to Thai caregivers, and practical advice based on assessment results, while also highlighting the value of additional resources like educational materials and support networks.

Following these steps and using the information from the interviews, a draft tool was developed featuring a symptom checklist, care tips, and a downloadable daily screening questionnaire.

Tool development

At the core of the "delirium-detect" is a 22-item questionnaire assessing key delirium symptoms, including cognitive function, consciousness, perceptual and emotional disturbances, psychomotor and behavioral issues, and temporal aspects. Initially based on the Sour Seven and DSM-5 criteria, the original questionnaire used yes/no questions to identify symptoms but could not capture severity or duration. To address this limitation, the questionnaire was redesigned with multiple-choice questions to measure symptom frequency and duration as well as to generate a delirium severity score.

The questionnaire employs straightforward language, enabling participants to select the most accurate responses based on their observations. They were asked to indicate the time since they first noticed the change in the older adult's condition. Each of the 22 items is evaluated for frequency, duration, and onset. Frequency is scored from "Often" (3 points) to "No change" (0 points), and similar scales are applied for duration and onset, with the "Not Sure" response option excluded from scoring.

The interface of the website

The "delirium-detect" interface features user-friendly tools for family caregivers:

- Home Page (Figure 4): Introduces the tool and includes an uncomplicated menu.

Table 1. Assessment of the symptomatology, answer choices, and scoring

Symptom-Related Questions	Often (3)	Sometime (2)	Rarely (1)	No change (0)	Not sure (N/A)
1. Temporal perception deficits	Y	Y		Y	Y
2. Spatial awareness difficulties	Y	Y		Y	Y
3. Person recognition impairment	Y	Y		Y	Y
4. Interaction attentiveness decline	Y	Y		Y	Y
5. Response accuracy patterns	Y	Y	Y	Y	Y
6. Topic coherence maintenance	Y	Y	Y	Y	Y
7. Nocturnal behavior changes	Y	Y	Y	Y	Y
8. Daytime sleep pattern alterations	Y	Y	Y	Y	Y
9. Mood fluctuations	Y	Y	Y	Y	Y
10. Indications of apathy	Y	Y	Y	Y	Y
11. Cognitive processing speed	Y	Y	Y	Y	Y
12. Variability in alertness levels	Y	Y	Y	Y	Y
13. Initiative capacity decrease	Y	Y	Y		Y
14. Expressive language coherence	Y	Y	Y	Y	Y
15. Hallucinations or illusions	Y	Y		Y	Y
16. Mnemonic function impairment	Y	Y		Y	Y
17. Task organization challenges	Y	Y	Y	Y	Y
18. Recall of surroundings	Y	Y	Y	Y	Y
19. Adherence to instructions	Y	Y		Y	Y
22. Fluctuations in awareness and behavior	Y	Y		Y	Y

20. Duration of observed symptoms	Within 24 hours (4)	Few days (3)	One week ago (2)	Less than 1 month (1)	More than 1 month (0)
Responses	Y	Y	Y	Y	Y
21. Onset of symptoms	Abrupt onset (4)	Shift within one day (3)	Within days to weeks (2)	Over months (1)	Not Sure (N/A)
Responses	Y	Y	Y	Y	Y

A "Y" is marked in the relevant column to signify a positive response

• Delirium Detection Questionnaire Page: Contains 22 multiple-choice questions with guided assessments, conditional navigation, progress indicators, and completion alerts.

• Importance of early detection page: Provides educational resources and a downloadable PDF questionnaire emphasizing real-time monitoring.

• Home care tips: Offers practical caregiving advice.

• Contact page: Lists contact information and outlines plans for future AI integration for online support.

Validation and testing

A five-member multidisciplinary panel (two geriatric psychiatrists, one geriatrician, one registered nurse, and one occupational therapist) who had participated in the expert-interview stage subsequently evaluated the draft questionnaire for content and face validity. Each expert rated every item independently and anonymously, minimizing bias and yielding a Content Validity Index of 1.00 (29). Panel feedback was also used to refine wording, readability, and on-screen layout of the web interface. Internal consistency and test-retest reliability will be assessed in the larger validation phase once final item-weighting is established.

A pretest with 17 participants guided multiple rounds of refinement based on their experiences and observations, culminating in the final questionnaire and associated website. After the pretest and expert panel validation, the website was finalized. A subsequent pilot test with 11 participants evaluated the tool's usability.

Participants

A purposive sample of family caregivers of older adults with clinician-diagnosed delirium was

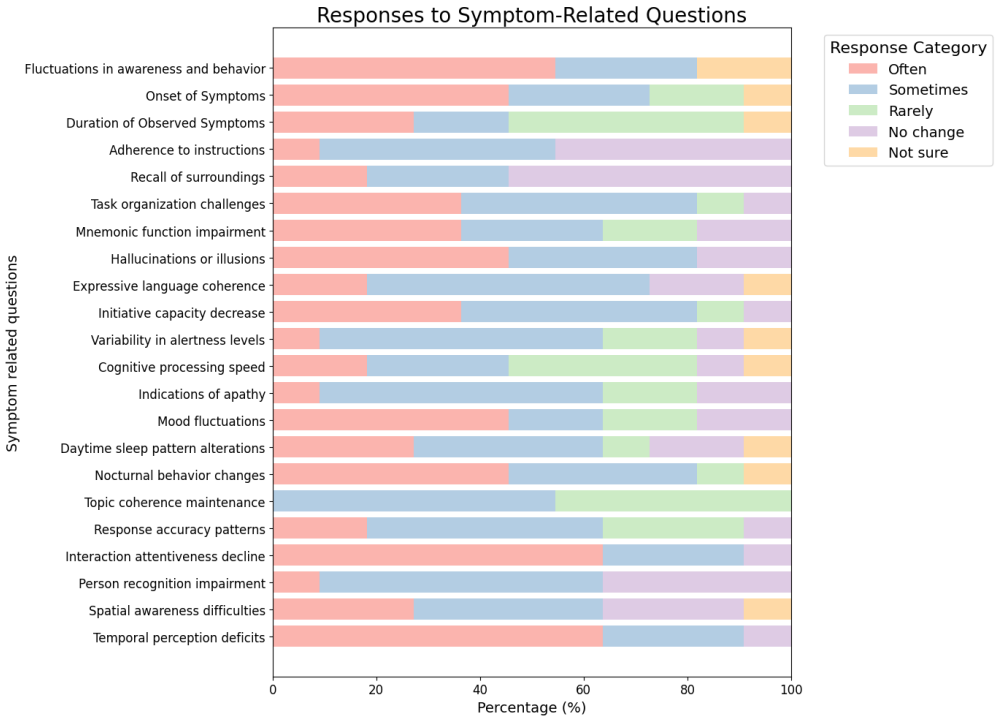

Figure 5. Delirium detection questionnaire responses from participants

recruited from the medical wards of a tertiary hospital in northern Thailand. Seventeen family caregivers completed a pre-test between 27 February and 26 June 2024. Eleven of these also took part in a home-based pilot evaluation from 27 June to 7 July 2024 via the study website. After completing the 22-item web questionnaire, participants were asked to complete an online survey assessing feasibility and satisfaction. The feasibility sample size ranged from 10 to 50, depending on the effect size previously studied (30). The sample size of 17 is sufficient for estimating feasi-bility metrics (completion time, variance, and usability), although it is insufficient for inferential hypothesis testing. A formal power calculation will be conducted in the subsequent validation phase.

Inclusion criteria

Caregivers aged 20-59 years living with older Thai individuals aged 65 and who had at least a grade 9 education, were able to read and write Thai, and had internet access (either smartphone or computer).

Exclusion criteria

Individuals working night shifts, those with hearing or vision impairments affecting symptom assessment, and those with a history of mental illness or cognitive disorders.

Pilot test

The pre-test (n = 17) was conducted face to face on the ward: caregivers completed an early draft of the questionnaire under researcher observation, and cognitive-debrief probes captured comprehension, wording clarity, layout issues, and suggestions for improvement. Feedback led to minor language revisions and the removal of two ambiguous items.

The subsequent pilot (n = 11) evaluated the final 22-item questionnaire under real-world conditions. Caregivers accessed the web platform at home without researcher assistance. On submission, the system generated a total delirium-detect score that was stored in the study database but which was not displayed to participants. Immediately afterward, each caregiver completed an online feasibility and satisfaction survey. Sociodemographic variables (sex, educational attainment, family income, marital status, caregiver relationship) and feasibility metrics (overall satisfaction, completion time, perceived usability) were recorded for descriptive analysis.

Statistical analysis

Sociodemographic data were summarized using descriptive statistics, including percentages for categorical variables (gender, education level, family income, marital status, caregiver relationship),

presented as means with standard deviations for continuous variables. Feasibility analysis focused on overall satisfaction with the tool, the questionnaire, time spent, and website usability, and is presented using descriptive statistics (percentage, mean, standard deviation). Participants' responses to delirium detection questions are presented as percentages, aligned with DSM-5 criteria. No inferential comparisons or statistical analyses were conducted between total delirium detection scores and external reference tools in this pilot phase. All statistical analyses were performed using standard descriptive methods.

Ethics

Institutional ethics approval was obtained from the Faculty of Medicine, Chiang Mai University. All participants provided written informed consent, and their data were fully anonymized.

RESULTS

Demographic analysis

In this research project to improve delirium detection for family caregivers, the pretest phase involved 17 participants, of whom 11 completed the final pilot test. Some participants withdrew due to emotional distress following the recent loss of relatives affected by delirium, underscoring the topic's sensitivity and the importance of providing emotional support and ensuring a compassionate research approach.

Demographic analysis provided insights into the caregiver population's diverse backgrounds and experiences. As shown in Table 2, the majority (81.8%) of partici-pants were female. Participants ranged in age from 20 to 59 years, with most between 30 and 40. Among the participants, 45.5% were married, and 54.5% were single. Additionally, 36.4% were sons or daughters of patients, 45.5% were grandsons or grand-daughters, and the rest were siblings or had other relationships with patients.

Table 2. Sociodemographic overview of pilot test participants (N = 11)

Characteristic	Frequency n (%)
Sex	
Female	9 (81.8)
Male	2 (18.2)
Age (years)	
20-29	2 (18.2)
30-39	5 (45.5)
40-49	1 (9.1)
50-59	3 (27.3)
Education level	
Junior high school	2 (18.2)
High school	1 (9.1)
University	2 (18.2)
Bachelor's Degree	3 (27.3)
Master's Degree and above	3 (27.3)
Monthly family income (THB)	
0-5,000	1 (9.1)
5,001-10,000	1 (9.1)
10,001-15,000	2 (18.2)
15,001-20,000	1 (9.1)
Over 20,000	6 (54.5)
Marrital status	
Married	5 (45.5)
Single	6 (54.5)
Relationship with patient	
Son/daughter	4 (36.4)
Grandson/granddaughter	5 (45.5)
Brother/sister	1 (9.1)
Other	1 (9.1)

Participants' responses to the questionnaire

As illustrated in Figure 5, participants' responses to the "delirium-detect" questionnaire yielded valuable insights into the prevalence and characteristics of various delirium-related symptoms. These insights are crucial for refining the ability of the delirium detection tool to address common challenges. By emphasizing symptoms such as disorientation, inattention, disrupted sleep patterns, mood fluctuations, and cognitive challenges, the tool provides more robust support for family caregivers, strengthening their capacity to manage delirium and elevating the overall care provided to their loved-ones.

We add one more label to explain "onset of symptoms"

Raw scores on the 22-item instrument ranged from 15 to 58 (mean ± SD = 39 ± 14). Figure 3 displays the distribution of responses by participants. Higher totals (e.g., P2 = 58, P10 = 53, P9 = 50) reflect frequent observations of disorientation, inattention, mood fluctuation, and sleep disturbance, whereas lower totals (P8 = 15, P1 = 19, P5 = 22) indicate milder symptom profiles. All eleven caregivers scored at least 7 points, the provisional threshold for delirium.

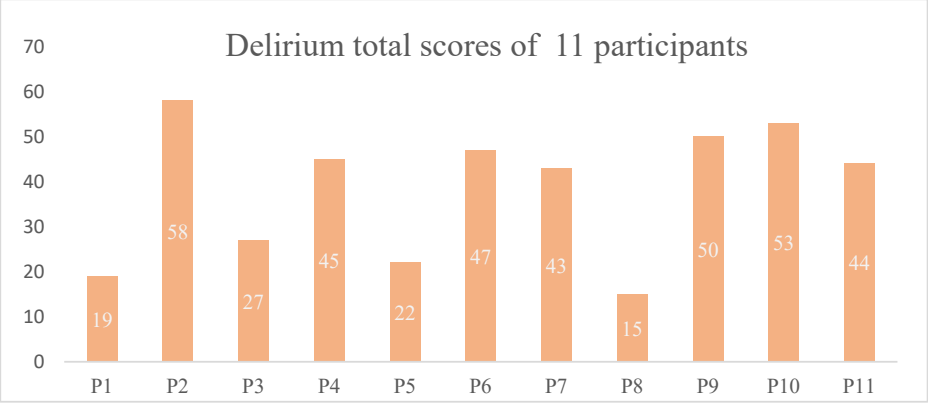

Figure 6. The total score for each participant in the final pilot test

Table 3. Participants' endorsement according to DSM-5 criteria (N = 11)

	DSM-5			Criterion validity
Participant no.	Criteria A (attention & awareness)	Criteria B (acute onset, fluctuation)	Criteria C (cognitive disturbance, behavior, perception, etc.)	
1	Items 1-4, 6,12	Items 20, 21,22	Items 7-8, 13-16, 18,19	Yes, established
2	Items 1-4, 6,12	Items 20, 21,22	Items 5, 7-11, 13-19	Yes, established
3	Items 1-4, 6,12	Items 20, 21	Items 5, 7-11, 13-15, 17-19	Yes, established
4	Items 1-4,6,12	Items 20, 21,22	Items 5, 7-11, 13-19	Yes, established
5	Items 1,3,6,12	Items 22	Items 5, 9, 10, 13, 15-19	Yes, established
6	Items 1-4,6,12	Items 20, 21,22	Items 5, 7-9, 13-19	Yes, established
7	Items 1-4, 6, 12	Items 20, 21,22	Items 5, 7-11, 13-19	Yes, established
8	Items 1-4,6	Items 20, 21	Items 5, 7, 10, 11, 14, 15, 17-19	Yes, established
9	Items 1-4,6,12	Items 20, 21,22	Items 5, 7-11, 13-19	Yes, established
10	Items 1-4, 6,12	Items 20, 21,22	Items 5, 7-11, 13-19	Yes, established
11	Items 1-4,6,12	Items 20, 21,22	Items 5, 7, 9-11, 13-19	Yes, established

Concurrent criterion validity was assessed by comparing delirium-detect classifications with the clinician's DSM-5 diagnosis recorded at the same encounter (Table 3). All eleven participants scored ≥ 7 on the 22-item instrument, and each index patient carried a clinician-confirmed diagnosis of delirium, resulting in 11/11 concordance (100.0%). As the pilot contained only positive cases, correlation could be expressed solely as raw agreement; κ or ROC analysis will be possible when non-delirium controls are included in the forthcoming validation phase. The perfect overlap indicates that delirium-detect captures the core DSM-5 elements in parallel with clinical assessment.

Delirium Score for participants' responses

Figure 6. The total score for each participant in the final pilot test

Feasibility of the web-based tool

As Table 4 shows, the tool received high satisfaction ratings, with 54.5% indicat-ing they "Liked" it and 18.2% reporting they "Strongly Liked" it. Regarding user-friendliness, 36.4% found it "Extremely Easy," while another 36.4% deemed it "Easy." Overall comprehension was high; most participants reported a solid understanding of the content. On average, users spent 9.09 minutes engaging with the tool, dedicating around 5 minutes to the questionnaire portion.

DISCUSSION

This study aimed to develop a web-based tool, "delirium-detect", designed to help family caregivers detect delirium in older adults. The tool's development involved comprehensive literature reviews, expert interviews, focus group discussions, and pilot testing to ensure validity, usability,

Table 4. Feasibility ratings from 11 participants were assessed using a 5-point scale

Characteristic	Frequency (n)	Percentage (%)	Mean±SD
Satisfaction with website (1-5)			
Strongly liked (5)	2	18.2	3.73±0.72
Liked (4)	6	54.5	
Neutral (3)	3	27.3	
Dissatisfied (2)	0	0.0	
Highly dissatisfied (1)	0	0.0	
Ease of use (1-5)			
Extremely easy (5)	4	36.4	3.91±0.85
Easy (4)	4	36.4	
Moderate (3)	3	27.3	
Slightly difficult (2)	0	0.0	
Very difficult (1)	0	0.0	
Time spent total on the tool (minutes)			
5-10	8	72.7	9.09±2.10
10-20	3	27.3	
0-5	0	0.0	
20 or above	0	0.0	
Understanding of the website (1-5)			
Understood very well (5)	1	9.1	3.73±0.83
Well understood (4)	5	45.5	
Fairly understood (3)	5	45.5	
Partially understood (2)	0	0.0	
Not understanding (1)	0	0.0	

SD = standard deviation

and effectiveness. The results indicate that "delirium-detect" is a feasible, user-friendly, and effective tool for the early detection of delirium symptoms. The demographic analysis of participants revealed a diverse caregiver population, highlighting the necessity for an adaptable and accessible tool. The gender distribution aligned with the known prevalence of women in caregiving roles, and the varied age, educational, and income levels underscored the tool's design to cater to a broad user base. The delirium detection questionnaire responses yielded valuable insights into the frequency and characteristics of delirium symptoms. Commonly reported issues included notable temporal disorientation, inattentiveness, altered sleep patterns, fluctuating alertness, mood swings, and cognitive difficulties. These findings are consistent with existing literature on delirium symptoms, emphasizing the importance of a comprehensive and multifaceted assessment approach. The feasibility study demonstrated high satisfaction rates and ease of use, with most participants finding the tool easy to navigate and understand. The time-efficient design further supports its integration into daily caregiving routines. This website constitutes a crucial preliminary step toward establishing a comprehensive, user-friendly resource that enables family caregivers to detect delirium and access appropriate support efficiently.

Positioning delirium-detect among existing web-based tools

Web-based delirium platforms such as the Hospital Elder Life Program (HELP), DelApp, and the Electronic Delirium Assessment (e-DA) are primarily designed for clinicians and presuppose bedside expertise; as such, they may have limited applicability for lay caregivers. By contrast, delirium-detect was purposely built for family members, employing everyday language and behavior-anchored questions that can be completed without clinical supervision.

Given that existing tools and delirium detectors differ in target users, are at different developmental stages, and utilize varying evaluation designs, a direct head-to-head comparison is not yet feasible, particularly as few have been experimentally evaluated for community or caregiver use. Rigorous comparative studies will be required

once each platform reaches a comparable level of maturity. Nonetheless, delirium-detect addresses a distinct gap by providing a community-ready screening option to support non-professionals; future research will aim to validate its effectiveness further.

Implications of the research

These findings have notable implications for prompt identification and management of delirium in older adults. Delirium frequently goes undetected due to lengthy evaluations and uncertainty over diagnostic responsibilities (31). To address these challenges, "delirium-detect" enables family caregivers to complete the questionnaire in about five minutes. This efficiency facilitates the early recognition of potential delirium symptoms and provides timely alerts, empowering caregivers to act proactively and consult healthcare professionals as needed. As a result, this tool strengthens early detection and management efforts, ultimately enhancing outcomes for older individuals.

Limitations and areas for further development

Despite its contributions, this study has several limitations. First, the participant pool included only family caregivers of older adults (aged over 65) with diagnosed delirium and who lacked representation from spouses, who constitute about 30.0% of caregivers. This omission may have influenced the findings, as spousal caregiving experiences can differ from those of adult children. Moreover, the age range of caregivers (20-59 years) excluded older caregivers, who are often reluctant to participate in online research due to hesitancy to engage in online activities. Moreover, the small sample size and single hospital setting in Thailand limit the broader applicability of these findings.

Although the tool includes questions addressing acute onset and fluctuating symptoms—key indicators of delirium—it does not yet assign weighted importance to these responses. This constrains the tool's ability to differentiate delirium from dementia, which often present with overlapping symptoms. In the next phase, weighted importance will be assigned to these indicators using data from a larger population to establish more precise cut-off scores.

Future development should also focus on completing the website's interactive components, such as adaptive questioning and automated scoring with tailored recommendations. This enhancement will increase the tool's accuracy and offer more reliable feedback to caregivers. Expanding the tool's functionality to include interactive features and professional healthcare service links will further empower caregivers and improve delirium management. Enhancing the tool and gathering more user data will improve health outcomes for older adults experiencing delirium.

Future research should aim to validate the tool's effectiveness across more extensive and diverse populations. Additionally, the scoring criteria for a positive delirium screen should be established through rigorous validation. Investigating the tool's long-term impact on patient outcomes and caregiver burden would also yield valuable insights into its overall benefits. As technology continues to evolve, integrating artificial intelligence to provide more personalized support and offering multilingual options will be essential for broadening global accessibility.

CONCLUSIONS

This research introduces "delirium-detect", a web-based tool developed to help family caregivers in Thailand identify delirium in older adults. The tool, validated by experts and refined through pretesting and pilot testing, covers 22 delirium symptoms. It demonstrated high content and criterion validity, with most symptoms endorsed by participants. User feedback highlighted high satisfaction and ease of use, with the tool being quick and easy to complete. Future improvements will focus on refining the less sensitive items, adding real-time monitoring and interactive features, and further validation with more extensive and diverse groups to ensure robustness and facilitate integration into healthcare systems.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to report.

ADDITIONAL INFORMATION

Author contributions

J.H.: Conceptualization and methodology, software, validation, formal analysis, investigation, data cura-tion, writing—original draft preparation, writing—review and editing, visualization; N.W.: Conceptualiza-tion and methodology, validation, resources, data curation, writing—original draft preparation, writing—review and editing, supervision, project administration; T.W.: Conceptualization and methodology, software, validation, formal analysis, resources, data curation, writing—original draft preparation, writing—review and editing, visualization, project administration; D.T.: Conceptualization and methodology, valida-tion, writing—review and editing; P.R.: Conceptualization and methodology, validation, writing—review and editing; J.T.: Conceptualization and methodology, validation, writing—review and editing.

All authors have read and agreed to the published version of the manuscript.

Data availability statement

According to the policy implemented during this study, the ethics committee does not permit the authors to share the data with other entities. The datasets used and/or analyzed for the current study are available from the corresponding author upon reasonable request.

Institutional review board statement

The study was conducted following the Declaration of Helsinki and approved by the Institutional Review Board (or Ethics Committee) of the Faculty of Medicine, Chiang Mai University (study code, PSY-2566-0466 and date of approval, January 15, 2024).

Informed consent statement

Informed consent was obtained from all subjects involved in the study.

Supplementary materials

The following supporting information can be downloaded at www.delirium-detect.com, including the delirium detection questionnaires in Thai and English.

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