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Assessing Clinical Leadership in Nursing: Development and Validation of the Clinical Leadership Self-Awareness Tool (CLeaSAT)

Sabrina Nachtergaele

sabrina.nachtergaele@arteveldehs.be

Artevelde University of Applied Sciences

Nele De Roo

Artevelde University of Applied Sciences

Simon Malfait

Ghent University Hospital

Jolien Monteyne

Ghent University

Chloë Vanderstichelen

Ghent University

Mieke Embo

Artevelde University of Applied Sciences

Veerle Duprez

Ghent University Hospital

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Abstract

Background

Clinical leadership is essential for high-quality care, team effectiveness, and workforce sustainability in healthcare. Despite growing recognition of its importance, leadership research and assessment tools predominantly focus on formal leadership roles and transformational leadership models. Consequently, informal, practice-based clinical leadership behaviours demonstrated by frontline healthcare professionals (HCPs) remain insufficiently captured. In addition, existing instruments offer limited support for developing self-awareness of such behaviours. This study aimed to develop and validate the Clinical Leadership Self-Awareness Tool (CLeaSAT), designed to measure informal clinical leadership behavioural indicators among HCPs.

Methods

A mixed-methods design was used, following established guidelines for scale development and psychometric validation. The process comprised three phases: item development, scale development, and scale evaluation. Items were generated through a literature review, focus groups, and individual interviews with healthcare professionals, educators, and managers. Content validity was assessed via face validity and a two-round Delphi procedure with clinical leadership experts. The questionnaire was administered to healthcare professionals from four Flemish hospitals (Belgium). Exploratory Factor Analysis using principal axis factoring with varimax rotation examined the factor structure. Internal consistency was evaluated using Cronbach's alpha and corrected item–total correlations. Criterion validity was assessed using Pearson correlations with the Clinical Leadership Survey (CLS).

Results

Data from 229 healthcare professionals were analysed. Exploratory factor analysis supported a five-factor structure comprising 32 items: clinical expertise, effective communication, flexibility, continuous learning and improvement, and vision on care. The model explained 51.9% of the total variance. The overall scale demonstrated excellent internal consistency (Cronbach's $\alpha = 0.92$), with acceptable to strong reliability across subscales ($\alpha = 0.75–0.82$). Corrected item–total correlations ranged from 0.37 to 0.62. Criterion validity was supported by a strong correlation with the CLS ($r = 0.77$, $p < 0.001$).

Conclusions

The CLeaSAT is a valid and reliable tool for assessing self-awareness of informal clinical leadership behaviours among healthcare professionals. By focusing on observable, practice-based leadership behaviours rather than formal roles, the tool addresses an important gap in leadership assessment and supports leadership development in healthcare settings.

Impact

- **What problem did the study address?**

Existing leadership assessment tools primarily focus on formal leadership roles and transformational leadership behavior, leaving a gap in the measurement of clinical leadership behavioral indicators in clinical practice.

- **What were the main findings?**

The CLeaSAT provides a structured, psychometrically validated tool to self-assess five key leadership dimensions of clinical leadership, with strong reliability and validity.

- **Where and on whom will the research have an impact?**

The CLeaSAT is applicable to healthcare professionals across various settings (e.g., hospitals, primary care, long-term care) and can be integrated into education, training and continuous professional development programs.

Reporting Method: This study followed the COSMIN (Consensus-based Standards for the selection of health Measurement INstruments) reporting framework.

Patient or Public Contribution: This study did not involve patient or public participation. However, healthcare professionals actively contributed to the development and refinement of the CLeaSAT through feedback, and field testing, ensuring that the tool reflects real-world clinical leadership practices.

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

The CLeaSAT has the potential to:

- equip healthcare professionals and policy with a reliable and validated tool to support their self-awareness of clinical leadership behavioral indicators by describing practical, observable behaviours for clinical leadership.
- drive clinical leadership development and career growth by facilitating self-awareness, critical reflection, and tailored leadership training.
- strengthen the integration of clinical leadership into education and lifelong learning promoting better team collaboration, patient-centred care, and innovation across diverse healthcare settings.

Trial and Protocol Registration: This study does not involve a clinical trial and therefore does not require trial registration.

Background

Leadership is crucial in ensuring high-quality healthcare, particularly in response to the increasing complexity and evolving demands of the healthcare sector. The World Health Organization (WHO) highlights

that strengthening leadership of healthcare professionals (HCPs) is essential for building robust healthcare systems [1], as well as the well-being and retention of nursing staff [2–4]. To date, research predominantly focuses on formal, hierarchical leadership models [2, 5], often overlooking the critical role of informal nurse leaders working at the frontline of care.

Nurses, widely acknowledged as the backbone of healthcare systems, are uniquely positioned to demonstrate clinical leadership at the point of care [6]. This study therefore starts from the nursing profession as a pivotal entry point, acknowledging that while most evidence on clinical leadership focuses on nurses, the concept and its development are highly relevant for all HCPs involved in the quality and coordination of care. Clinical leadership in nursing extends beyond traditional hierarchies and leadership models to include frontline nurses who demonstrate leadership through their daily actions and interactions [7]. Clinical leaders, even without formal authority, play a vital role in delivering care and shaping team dynamics. By serving as role models, they inspire, motivate, and influence others through their values and beliefs, fostering a culture of collaboration and excellence [8]. Mannix et al. (2013) identified three overarching dimensions of clinical leadership: 1) leadership with a clinical focus, 2) leadership with team-oriented dynamics, and 3) leadership grounded in personal qualities. These dimensions emphasize clinical expertise, effective communication, and foster supportive environments to enhance teamwork and care quality [8, 9]. Studies highlight the positive outcomes of clinical leadership, such as improved quality of care, continuous development of HCPs, healthy workforce and higher intention to stay in healthcare organizations [4, 8, 10–12].

Despite the critical importance of clinical leadership, many HCPs struggle to recognize their own clinical leadership, even though they are often able to identify these clinical leadership behavioral indicators in their colleagues [13].

Moreover, many HCPs with clinical leadership potential remain unrecognized or unsupported, highlighting the need for a validated tool to identify, foster, and nurture these clinical leadership behavioral indicators [13]. Existing instruments predominantly focus on formal leadership, overlooking the informal, practice-driven clinical leadership behavioral indicators that are central to frontline HCPs. A review of existing instruments uncovered three validated tools to assess formal leadership and informal clinical leadership [8]: the Multifactor Leadership Questionnaire (MLQ), the Authentic Leadership Self-Assessment Questionnaire (ALSAQ), and the Clinical Leadership Survey (CLS). The MLQ excels in measuring formal leadership but lacks the capacity to evaluate informal clinical leadership, exposing a notable gap. The ALSAQ focuses on formal leadership and does not address informal clinical leadership behavioral indicators [14]. The CLS is a tool designed to evaluate the staff nurses clinical leadership. It is derived from Kouzes and Posner's model of transformational leadership - a leadership style that inspires and motivates individuals to exceed expectations by fostering a shared vision, encouraging personal growth, and promoting innovation and engagement-, which identifies five fundamental attitudes enabling leaders to be effective in organizations: (1) challenging the process, (2) inspiring a shared vision, (3) modelling the way, (4) enabling others to act, and (5) encouraging the heart [15]. While the CLS provides a tool for assessing leadership within healthcare settings, it predominantly focuses on transformational leadership [16]. There is a need for a self-awareness

tool specifically tailored to clinical leadership. Without clear self-awareness tools, HCPs may fail to fully realize and develop their capabilities as informal clinical leaders [8].

Empowering HCPs with self-awareness of their leadership behavioral indicators fosters professional growth, job satisfaction, and employability [10]. While self-reflection promotes critical evaluation over time, self-awareness tools provide a structured approach to identifying specific strengths and areas for improvement [17, 18]. These tools also contribute to research by offering the ability to measure patient and HCPs outcomes, informing education, training and continuous professional development programs and organizational strategies [3, 10, 12]. Despite their potential, assessment tools for frontline HCPs remain underdeveloped, creating a significant gap in practice [17, 18]. Addressing this gap could enhance individual professional growth and advance a common language for research on clinical leadership.

Aim

This study aimed to develop and validate the Clinical Leadership Self-Awareness Tool (CLeaSAT), a self-awareness tool developed to measure informal clinical leadership behavioral indicators among HCPs in Flanders (Belgium).

Ethics

Ethical approval

was obtained from the ethics committees of the participating hospitals (EC22056). Informed consent was asked at the start of the online questionnaire. Participants were assured of the voluntary nature of their participation and the anonymity of the collected data.

The study

The development and validation of the Clinical Leadership Self-Awareness Tool (CLeaSAT) followed a stepwise approach with three phases: item development, scale development, and psychometric scale evaluation [19]. To enhance clarity and transparency, these phases were further delineated into eight concrete steps. Figure 1 provides a visual overview of this process, while the table below presents a structured summary of the corresponding timeline, activities, and outcomes for each phase.

Phase 1 – Item development

1. Identification of domain and item generation

Methods

The aim of this phase was to identify key dimensions of clinical leadership and develop an initial set of items to measure informal clinical leadership behavioral indicators. Measuring the behavioral indicators of HCP's as clinical leaders requires a clear understanding of clinical leadership. In this study, clinical

leadership is defined as the ability to influence, inspire, and motivate others while actively engaging in patient care. Clinical leaders serve as role models who exemplify professional values and norms, fostering improvements in care quality and team collaboration [8]. Notably, their leadership is exercised without formal authority, highlighting their impact as a frontline HCP [8,9]. A definition is essential for outlining the purpose of the domain and serves as the basis for identifying the key dimensions of clinical leadership among HCP's.

First, a review of existing tools for assessing clinical leadership was conducted. Theoretical constructs from existing literature and assessment tools were analysed to establish dimensions of clinical leadership. Next, practice-based aspects of clinical leadership were explored through three focus groups and 51 individual in-depth interviews with staff nurses, head nurses, middle management, HR professionals, and nursing students, using a semi-structured interview guide. This interview guide had been used in a previous qualitative study conducted by the research team but was not formally published. Data generated from this qualitative research informed the identification of key dimensions and items of clinical leadership and were subsequently used to support the development and further validation of the measurement instrument. Participants were recruited through social media and hospital management, ensuring a diverse sample. A thematic content analysis was conducted to identify key dimensions and items of clinical leadership. The interview guide is provided as a table in the supplementary materials (Supplementary Table 1).

Results

The review of existing measurement instruments identified three tools that could assess clinical leadership: the *Multifactor Leadership Questionnaire* (MLQ), the *Authentic Leadership Self-Assessment Questionnaire* (ALSAQ), and the *Clinical Leadership Survey* (CLS) [20–22]. As mentioned in the introduction section, the characteristics of these existing instruments do not fully capture the informal, practice-based aspects of clinical leadership that are central to frontline nursing [22]. These instruments emphasize formal traits but fail to address the informal aspects of clinical leadership that are crucial for frontline HCPs and thereby make the concept of clinical leadership observable and measurable.

The analysis of the interviews identified five key dimensions of clinical leadership: 1) clinical expertise, 2) effective communication, 3) flexibility, 4) sense of responsibility and 5) vision towards the future. *Clinical expertise* encompasses specialized knowledge, skills, and experience in a specific healthcare area. It involves being a reliable resource for colleagues, staying updated on developments, confidently performing procedures, facilitating information exchange, setting boundaries, and understanding departmental costs. *Effective communication* refers to the ability to actively listen, express viewpoints clearly, provide feedback, and tailor communication to the audience. According to the participants, this dimension includes using various methods, appreciating colleagues, educating patients clearly, collaborating across disciplines, empathizing with patients, and negotiating effectively. *Flexibility* pertains to the capacity to adapt to the changing needs of the department, customize care plans accordingly, welcome and adjust to changes, take on additional responsibilities, manage stress, prioritize tasks, delegate decisions, remain impartial, and foster collaboration within the team. *Sense of responsibility* is characterized by the confidence to take ownership of tasks, be accountable for actions, resolve conflicts, reflect on performance, and adapt approaches to ensure optimal patient care. This includes collaborating with peers, questioning norms when

necessary, and committing to ongoing professional development. *Vision towards the future* involves assessing current strengths and areas for improvement within the organization and actively addressing them. It requires recognizing contributions, fostering innovation, challenging traditional norms, and promoting a culture of continuous improvement, all while considering organizational limitations and planning strategically for future success. These key dimensions and the derived description were formulated into a set of 50 items.

2. Content validity

Face Validity

Methods

The face validity phase was initiated to assess whether the initial items appeared to measure the core concept of clinical leadership as defined for this study. Seven members of the research team, all familiar with broad concepts of clinical leadership assessed the face validity of the initial items.

Results

During this phase, five items were deemed unrelated to the concept of clinical leadership, resulting in a refined set of 45 items that were retained for further validation.

Delphi Procedure

Methods

The aim was to achieve expert consensus on the relevance, clarity, and alignment of the items to ensure the content validity of the Clinical Leadership Self-Awareness Tool (CLeaSAT).

A two-round Delphi procedure was conducted, involving purposively sampled experts from various healthcare and educational settings in Flanders, all with demonstrated expertise in clinical leadership. Twenty-seven experts were invited via email, with nine participating in the first round and eight in the second round. The first round began in October 2022, with follow-up reminders sent in October and November 2022. The second round was initiated in December 2022, with reminders in January 2023.

The Content Validity Index (CVI) was calculated to quantify agreement. According to the method of Lynn (1986), reflecting the number of experts, items with a CVI score below 0.79 in the first round or below 0.88 in the second round were either revised or removed. Feedback provided by participants in the open fields was incorporated after each round to refine and revise the items.

Results

In the first round, nine experts participated, and 16 items with a CVI <0.79 were identified as needing revision or removal. Of these, eight items were ultimately eliminated from the CLeaSAT due to their low relevance as assessed by the expert panel. The second round involved eight experts and focused on further

refining the remaining items based on their input. During this round, three items with a CVI <0.88 were further optimized based on expert input.

Pilot testing

Methods

To evaluate the clarity and usability of the developed version of the CLeaSAT, pilot testing was initiated.

Therefore, three participants completed the questionnaire using the thinking aloud method [19]. Participants verbalized their thoughts while interacting with the tool, providing real-time feedback on item interpretation and usability. This approach allowed for the identification of any potential issues with clarity of both the instructions and the items [19].

Results

Feedback from the participants indicated no significant issues with the tool. As a result, no further adjustments were made in the items, nor the instructions.

Phase 2 – Scale development

1. Survey administration and sample size

Methods

The aim of this phase was to ensure the reliable and valid administration of the survey by minimizing measurement errors and selecting an appropriate sample size required for psychometric evaluation of CLeaSAT [19].

Data were collected between March and April 2023 from four purposively selected Flemish hospitals (Belgium). To achieve a diverse and representative sample, HCPs from various disciplines, including nurses, physicians, physiotherapists and occupational therapists, were invited to participate. Efforts were made to include individuals of different age and gender from the four hospitals.

Recruitment began with emails sent by institutional administrators to maintain participant anonymity. When the initial recruitment fell short of the target, additional strategies were implemented, including posters within the institutions.

Determining the appropriate sample size for factor analysis is crucial to ensure reliable and valid results. Following evidence recommending five to ten participants per item, a minimum sample size of 185 participants (5 participants × 37 items) was required to ensure adequate statistical power for the analysis of the 37-item version of the instrument [23].

The survey was structured into distinct sections, beginning with demographic information, including gender, profession, institution, age, and leadership position. This was followed by the main survey. Each item was rated on a six-point Likert scale, ranging from "strongly disagree (1)" to "strongly agree (6)." Examples of

statements included: "I establish connections between observations to support clinical reasoning", "I provide constructive feedback to colleagues", "I am able to set priorities in my planning", "I actively reflect on my own actions," and "I spontaneously propose improvement initiatives within my department".

Results

A total of 306 responses were received from the invited participants. After data cleaning, 229 complete responses were used for analysis. The final sample included a group of HCPs, such as nurses, physicians, physiotherapists and occupational therapists, ensuring representativeness for psychometric evaluation (see Table 1 for demographic characteristics of participants).

Table 1 Demographic characteristics of participants

Characteristics	Participants (n)	Percentage (%)
Sex		
Male	34	14,8
Female	195	85,2
Profession		
Nurse	203	88,6
Occupational therapist	3	1,3
Physician	2	0,9
Physiotherapist	3	1,3
Nurses with a masters' degree	15	6,5
Organization		
Hospital 1	42	18,3
Hospital 2	54	23,6
Hospital 3	66	28,8
Hospital 4	66	28,8
Age		
20-30 years	71	31
31-40 years	61	26,6
41-50 years	42	18,3
51-60 years	45	19,7
60+ years	10	4,4
Formal leadership position		
Yes	55	24
No	174	76
Total	229	100

2. Item reduction and extraction of factors

Methods

The aim of this phase was to explore the underlying structure of CLeaSAT and to reduct items based on the findings. To assess the suitability of the data for factor analysis, normality tests were conducted to ensure that distributional assumptions were met. Sampling adequacy was evaluated using the Kaiser-Meyer-Olkin (KMO) measure (>0.50), while Bartlett's test of sphericity verified significant correlations between variables [19].

An Exploratory Factor Analysis (EFA) was conducted in SPSS using principal axis factoring (PAF) with varimax rotation to identify the latent structure of the scale and enhance interpretability [24]. The number of factors was determined using eigenvalues >1 and a scree plot. Items with factor loadings below 0.40 were reviewed and discussed within the research team. Items deemed unclear, redundant, or weakly contributing to the identified factors were removed.

Inter-item correlations within each factor were examined to assess internal coherence. Correlations between 0.3 and 0.7 were deemed acceptable, indicating sufficient coherence without redundancy[25] .

Results

The scree plot revealed an elbow after the fifth factor, indicating that the first five factooners accounted for the most meaningful variance, while additional factors contributed only minimally. The analysis identified a five-component model, with items loading between 0.39 and 0.81. A total of five items were removed: four due to unclear or multiple loadings and one due to redundancy. Following item reduction, the five constructs that emerged from the exploratory factor analysis were clinical expertise, effective communication, flexibility, continuous learning and improvement and vision on care (see Table 3). Together, these constructs accounted for 51.91% of the explained variance. Item reduction was based on both statistical criteria and content-related discussions among the research team.

The EFA resulted in a five-factor model, confirming the multidimensional nature of the CLeaSAT. Each item contributed to both the overarching construct of clinical leadership and to one of the five specific dimensions: vision on care, flexibility, clinical expertise, continuous learning and improvement, and effective communication. All five subscales demonstrated acceptable to strong internal consistency, with Cronbach's alpha values ranging from 0.75 to 0.82, and an overall alpha of 0.92 for the total scale, indicating excellent reliability (ref). Corrected item-total correlations for individual items ranged from 0.37 to 0.60 across the subscales, falling within the acceptable threshold of 0.30 to 0.70 (ref).

Phase 3 – Psychometric evaluation

1. Reliability

Methods

To evaluate the reliability of the CLeaSAT internal consistency among the items was examined. Reliability was assessed using Cronbach's alpha to measure the internal consistency of the scale. Average inter-item correlations were also calculated to determine the degree of covariation between items, ensuring that the items were sufficiently related without introducing redundancy [26].

Results

Corrected item-total correlations ranged from 0.37 to 0.62, indicating that all items showed sufficient to good alignment with their respective dimension. No items fell below the commonly accepted threshold of 0.30, demonstrating that all items adequately contribute to the underlying construct [26].

Within the subscale clinical expertise, corrected item-total correlations ranged from 0.37 to 0.58, with the item related to performing tasks autonomously showing the lowest correlation (0.37). Although this item showed slightly lower alignment with the other items in this dimension, it remains within an acceptable range. For the subscale effective communication, corrected item-total correlations ranged from 0.38 to 0.62. The strongest contribution was observed for the item addressing clear and structured patient education (0.62), indicating strong alignment with the dimension.

The subscale flexibility showed corrected item-total correlations ranging from 0.46 to 0.56, reflecting good internal coherence among items capturing adaptability, stress management, and prioritization skills. Within the subscale continuous learning and improvement, corrected item-total correlations ranged from 0.43 to 0.61, with the highest value observed for the item regarding confidence in one's own abilities (0.61), underscoring the importance of self-reflection and professional growth within this dimension. The subscale vision on care showed corrected item-total correlations between 0.44 and 0.58, indicating good coherence among items addressing awareness of strengths and areas for improvement, proposing enhancements, and coaching colleagues during improvement projects.

The internal consistency of the CLeaSAT was high, with a total Cronbach's alpha of 0.92. Subscale reliabilities were also acceptable to excellent: 0.81 for clinical expertise, 0.75 for effective communication, 0.81 for flexibility, 0.77 for continuous learning and improvement, and 0.82 for vision on care, indicating strong internal coherence within each dimension. The item analysis (32 items) confirmed the internal consistency and coherence of the CLeaSAT (Table 2).

Table 2 Item-level and subscale statistics for the CLeaSAT

	Items	Mean *(Std. deviation)*	95% Confidence Interval (Lower and Upper)	Corrected item-total correlation	Factor Loadings (range)	Cronbach's α subscale
Subscale Clinical expertise	Connecting observations (clinical reasoning)	5,19 *(0,72)*	5,09-5,29	0,48	-	-
	Possessing clinical expertise	4,88 *(1,02)*	4,74-5,02	0,46	-	-
	Point of contact for colleagues	4,45 *(1,20)*	4,29-4,61	0,58	-	-
	Aware of recent developments	4,54 *(0,96)*	4,40-4,66	0,57	-	-
	Performing tasks autonomously	5,00 *(0,88)*	4,88-5,12	0,37	-	-
	Providing experience-based information	5,00 *(0,81)*	4,89-5,10	0,45	-	-
	Indicating personal limits	5,26 *(0,66)*	5,17-5,35	0,43	-	-
	7 items	**4,89 *(0,62)***	**4,98-5,11**	**-**	**0,52-0,81**	**0,81**
Subscale Effective communication	Using various communication forms	5,15 *(0,70)*	5,06-5,25	0,39	-	-
	Adapting language to audience	5,24 *(0,71)*	5,14-5,33	0,48	-	-
	Handling conflicts constructively	4,79 *(0,78)*	4,68-4,89	0,56	-	-
	Expressing appreciation to team	5,17 *(0,73)*	5,07-5,27	0,56	-	-
	Giving constructive feedback	0,41 *(0,79)*	4,74-4,96	0,55	-	-
	5 items	**5,05 *(0,48)***	**4,98-5,11**	**-**	**0,43-0,79**	**0,75**

Subscale Flexibility	Adapting to department needs	5,17 *(0,69)*	5,07-5,26	0,55	-	-
	Handling last-minute changes	5,19 *(0,82)*	5,08-5,30	0,53	-	-
	Taking on extra tasks	5,20 *(0,87)*	5,09-5,32	0,47	-	-
	Coping with work-related stress	5,03 *(0,79)*	5,07-5,26	0,52	-	-
	Setting priorities in planning	5,29 *(0,69)*	5,19-5,38	0,56	-	-
	Being objective in decisions	4,90 *(0,74)*	4,80-5,00	0,46	-	-
	Allowing dependence on others	4,61 *(0,96)*	4,48-4,74	0,47	-	-
	7 items	**5,05 *(0,54)***	**4,98-5,13**	**-**	**0,53-0,74**	**0,81**
Subscale Continuous learning and improvement	Feeling responsible for actions	5,60 *(0,53)*	5,52-5,63	0,43	-	-
	Performing tasks meticulously	5,30 *(0,66)*	5,21-5,39	0,60	-	-
	Reflecting on own actions	5,29 *(0,67)*	5,20-5,38	0,43	-	-
	Valuing interdisciplinary collaboration	5,53 *(0,69)*	5,44-5,63	0,44	-	-
	Active listening to others	5,37 *(0,63)*	5,29-5,42	0,42	-	-
	Working by mission and vision	4,84 *(0,89)*	4,72-4,96	0,50	-	-
	Representing patient's opinion	5,09 *(0,76)*	4,99-5,19	0,38	-	-
	7 items	**5,11 *(0,47)***	**5,05-5,18**	**-**	**0,40-0,64**	**0,77**
Subscale Vision on care	Addressing strengths and	4,84 *(0,82)*	4,73-4,95	0,58	-	-

	weaknesses					
	Work-related networking skills	4,42 *(1,01)*	4,28-4,55	0,55	-	-
	Formulating improvement proposals	4,59 *(1,09)*	4,44-4,73	0,58	-	-
	Coaching during improvement projects	4,27 *(1,22)*	4,11-4,43	0,58	-	-
	Skilled in negotiating	4,48 *(0,93)*	4,35-4,60	0,54	-	-
	Questioning rules openly	4,80 *(0,96)*	4,67-4,92	0,45	-	-
	6 items	**4,79 *(0,66)***	**4,71-4,88**	**-**	**0,57-0,79**	**0,82**
Total scale	**32 items**	**-**	**-**	**-**	**0,40-0,81**	**0,92**

2. Criterion validity

Methods

The aim of this phase was to evaluate the criterion validity of the CLeaSAT by comparing it with an established and validated instrument, the Clinical Leadership Survey (CLS).

The CLS, a validated tool for assessing clinical leadership, was included alongside the CLeaSAT in the questionnaire administered to participants. To determine the degree of association between the two instruments, the Pearson correlation coefficient was calculated, assessing the consistency of the CLeaSAT with the CLS as a benchmark [26]. According to Portney and Watkins (2015), a correlation above 0.75 is considered excellent, indicating that both instruments assess a highly related underlying construct.

The CLS is a validated instrument designed to assess the staff nursing clinical leadership. The CLS is based on Kouzes and Posner's transformational leadership model, which identifies five core leadership practices: (1) challenging the process, (2) inspiring a shared vision, (3) modelling the way, (4) enabling others to act, and (5) encouraging the heart. These practices form the foundation for effective leadership within organizations. The CLS has been extensively used in nursing leadership research and is currently the most widely used tool to assess clinical leadership in nursing practice [22].

The CLS was selected as the benchmark instrument for this study due to its established validity and reliability, as well as its frequent use in international research on clinical leadership. Despite its broad application, the CLS primarily focuses on transformational leadership attitudes and results into a single

total score, based on only 15 items. This unidimensional approach captures an overall picture of clinical leadership but does not provide insight into specific subdimensions.

Results

A significant Pearson correlation of $r = 0.768$ ($p < 0.001$) was found between the total scores of the CLeaSAT and the CLS.

To further explore the relationship, correlations were examined between each CLeaSAT subscale and the CLS total score. The CLS total score correlated with each of the five CLeaSAT subscales as follows: clinical expertise ($r = 0.503$, $p < 0.001$, effective communication ($r = 0.665$, $p < 0.001$), flexibility ($r = 0.514$, $p < 0.001$), continuous learning and improving ($r = 0.703$, $p < 0.001$), and vision on care ($r = 0.740$, $p < 0.001$),

Discussion

The aim of this study was to develop and validate the Clinical Leadership Self-Awareness Tool (CLeaSAT), a self-awareness tool to assess informal clinical leadership behavioral indicator among HCPs.

The CLeaSAT consists of 32 items, organized in five dimensions: clinical expertise, effective communication, flexibility, continuous learning and improvement and vision on care. The exploratory factor analyses confirmed the multidimensionality of the tool, which aligns with previous conceptual frameworks describing clinical leadership as a multifaceted construct combining personal, relational, and organizational behavior [12,19]. Internal consistency was high, with a Cronbach's alpha of 0.92, indicating excellent reliability [27]. The psychometric evaluation highlights the internal coherence and reliability of the CLeaSAT as a tool for assessing clinical leadership within the practice of HCPs. The CLeaSAT showed strong internal consistency and construct validity, supported by a clear five-factor structure reflecting key dimensions of clinical leadership. Corrected item-total correlations ranged from 0.37 to 0.62 suggesting that all items contribute meaningfully to their respective dimensions without redundancy. These findings confirm that the CLeaSAT is a psychometrically robust tool, providing a reliable and internally coherent means of self-reporting clinical leadership among HCPs.

The content of the CLeaSAT was developed using a mixed-methods approach, combining literature review, expert consultation, qualitative and quantitative data from HCP in practice, ensuring both theoretical validity and practical relevance [19]. The five dimensions reflect key aspects of clinical leadership described in previous studies, including clinical expertise for sound decision-making, adaptability to changing care needs, effective communication to support teamwork, and a focus on continuous learning and improvement [8,9,12]. The inclusion of the following new dimensions, "continuous learning and improvement" and "vision on care" reflects the growing expectation that nurses and HCPs not only provide high-quality care, but also actively contribute to team development, innovation, and quality improvement processes [28]. While clinical leadership is recognized as critical across different healthcare professions, their measurement remains largely focused on formal leadership roles and transformational leadership.

The five dimensions identified in the CLeaSAT— "clinical expertise", "effective communication", "flexibility", "continuous learning and improvement", and "vision on care"—reflect key behavior indicator domains

essential for effective clinical leadership of HCPs.

The first domain “clinical expertise” encompasses the ability to apply advanced clinical reasoning, knowledge, and skills. It is considered a cornerstone of clinical leadership, as it enables HCPs to guide others and make complex care decisions. This domain aligns with previous research identifying clinical expertise as a defining feature of informal leadership, emerging through credibility and peer recognition [8,9,13]

The second domain, “effective communication”, is consistently identified as a critical leadership behavioral indicator domain and is consistently identified as a critical leadership behavior. It includes skills that facilitate care coordination, foster psychological safety for patients, and support constructive conflict resolution within teams. Studies by Chávez and Yoder (2015), Enghiad et al. (2022), and Nachtergaele et al. (2024) highlight that the ability to communicate clearly, adaptively, and empathetically is central to influencing team dynamics and sustaining effective collaboration in healthcare settings [13,29,30].

The third domain, “flexibility” refers to the ability to adapt quickly to changing care needs, such as sudden patient deterioration, staff shortages, or unexpected clinical situations. It encompasses resilience, situational awareness, and the initiative to act decisively—often without formal authority. As highlighted by Mannix et al. (2013) and Boamah (2019), such flexibility is essential in dynamic healthcare environments where informal leaders must frequently take the lead in real time to ensure continuity and quality of care [4,9].

The fourth domain “continuous learning and improvement” reflects the orientation toward growth, reflection, and quality enhancement. As Duprez et al. (2023) and Mlambo et al. (2021) show, such learning-focused behavior fosters innovation, interprofessional learning, and accountability—elements that are essential for sustainable clinical leadership in healthcare teams [28,31].

The last domain, “Vision on care”, captures the ability to formulate shared goals, inspire others, and challenge existing practices. Clinical leaders with a clear vision contribute to innovation, change management, and collective engagement. Zuber and Moody (2018), Kitson (2023), and Nachtergaele et al. (2024) describe this visionary capacity as essential to initiate change and mobilize teams in healthcare improvement processes [5,13,32].

The Clinical Leadership Self-Awareness Tool (CLeaSAT) has practical value in self-reporting and developing clinical leadership among HCPs. By focusing on observable clinical leadership behavioral indicators, the CLeaSAT provides a structured tool for self-awareness, professional development, and organizational leadership training [13,28]. From an organizational perspective, the CLeaSAT can be used to identify leadership potential, allowing organizations to design targeted training programs and support career progression in clinical leadership roles [28,31]. Studies indicate that effective clinical leadership is strongly linked to improved patient outcomes and staff retention, making leadership development a priority in healthcare settings [2,4]. In educational settings, the CLeaSAT can be integrated into curricula of HCPs to foster informal, clinical leadership awareness and behavior development early in a professional’s career

[33]. Given that clinical leadership is a key expectation for modern HCPs [12], tools like the CLeaSAT offer valuable insights for self-reflection and behavior enhancement.

Although the current validation process confirms the reliability and initial validity of the CLeaSAT, further development and refinement are recommended to strengthen its applicability across diverse healthcare contexts and to assess its sensitivity to change over time. Future research could explore its applicability in different healthcare sectors, including primary care, home care, and long-term care settings [28]. Further studies could also examine the predictive validity of the CLeaSAT, assessing its relationship with observed leadership behaviors, team effectiveness, and patient outcomes. Additionally, evaluating the test-retest reliability of the CLeaSAT would provide insights into the stability of responses over time [19]. Moreover, as clinical leadership is inherently multidisciplinary, future refinements could enhance the tool's applicability across healthcare professions, ensuring its relevance in team-based care settings [13,34]. Finally, conducting cross-cultural validation would further enhance the tool's applicability across different healthcare systems, contributing to international benchmarking and comparison of clinical leadership [12].

This study has several methodological limitations that should be acknowledged. First, purposive sampling was used to ensure diversity in the sample, self-selection bias may have influenced participation, particularly if individuals with an interest in leadership were more likely to complete the survey. Second, the cross-sectional design limits the ability to draw conclusions on the scale's stability, nor the possibility to capture change over time.

Additionally, while the strong overall correlation with the CLS confirms the criterion validity of the CLeaSAT, it is important to note that the CLS predominantly captures clinical leadership within a unidimensional structure [22]. In contrast, the CLeaSAT assesses a broader range of observable clinical leadership behavioral indicators across five distinct domains. The highest correlations with the CLS were found for the dimensions "continuous learning and improvement" and "vision on care", indicating conceptual proximity to the principles measured by the CLS. However, the lower correlations with the other dimensions—"clinical expertise", "effective communication", and "flexibility"—highlight the added value of the CLeaSAT in capturing informal leadership behavioral indicators that are less represented in CLS. This suggests that, although there is overlap between the two tools, the CLeaSAT provides a more differentiated and practice-oriented perspective on clinical leadership. Moreover, differentiation by known groups could be explored to validate whether CLeaSAT scores align with expected variations across professional roles, experience levels, educational background, or organizational hierarchy. Examining differences based on training level (e.g., bachelor's vs. master's degree) or job role (e.g., registered nurses vs licensed practical nurses) could provide further insights into how clinical leadership develop and manifest within different professional contexts. Additionally, a longitudinal approach is needed to assess whether clinical leadership evolve over time, and if the CLeaSAT is sensitive to these developmental changes.

Conclusions

The CLeaSAT fills a gap in existing clinical leadership assessment tools by focusing on practical, observable informal leadership behaviors. This study aimed to develop and validate the tool to assess such behaviors among HCPs. The psychometric analysis confirmed its validity and reliability, with strong internal consistency and a clear multidimensional structure. The final version of the CLeaSAT consists of 32 items structured across five dimensions— clinical expertise, effective communication, flexibility,, continuous learning and improvement, and vision on care —reflecting key aspects of clinical leadership. Further research is needed to examine its applicability across different healthcare settings, professions, and its sensitivity to change over time.

Abbreviations

CLeaSAT – Clinical Leadership Self-Awareness Tool

CONSORT – Consolidated Standards of Reporting Trials

Declarations

Ethics approval and consent to participate

Ethical approval for this study was obtained from the Ethics Committee of Ghent University Hospital (EC number: EC22056), Ghent, Belgium. All procedures involving human participants were conducted in accordance with the ethical standards of the institutional ethics committee and with the Declaration of Helsinki. Informed consent to participate was obtained from all participants at the start of the study.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

The contributions of each author to this manuscript are detailed according to the CRediT (Contributor Roles Taxonomy):

· Sabrina Nachtergaele: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing – Original Draft, Visualization, Project Administration.

· Nele De Roo: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing – Original Draft.

· Simon Malfait: Conceptualization, Methodology, Formal analysis, Resources, Supervision.

· Jolien Monteyne: Software, Data-collection, Formal analysis, Investigation.

· Chloé Vanderstichelen: Software, Data-collection, Formal analysis, Investigation.

· Mieke Embo: Writing – Review & Editing.

· Veerle Duprez: Conceptualization, Methodology, Validation, Formal analysis, Writing – Review & Editing, Supervision, Resources

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35. List of Abbreviations CLeaSAT – Clinical Leadership. Self-Awareness Tool CONSORT – Consolidated Standards of Reporting Trials.

Figures

Phase	Period	Activities
Phase 1 – Item development	Sep – Oct 2022	**Identification of domain and item generation** • Initial item pool (N=50) **Content validity:** • Face validity (N of items =45) • Delphi Round 1: 45 items evaluated → 8 removed/revised • Delphi Round 2: 38 items evaluated; 3 items optimized **Pilot testing** (N of items =38)

Phase 2 – Scale development	Nov 2022 – Apr 2023	**Survey administration** (N of items=38)
		Item reduction and factor extraction (N of items=32)
		• 5 dimensions:
		  • Clinical expertise (7 items)
		  • Effective communication (5 items)
		  • Flexibility (7 items)
		  • Continuous learning and improvement (7 items)
		  • Vision on care (6 items)

Phase 3 – Scale evaluation	May 2023	**Reliability analysis:** • Cronbach's alpha = 0.92 **Criterion validity:** • Pearson correlation with CLS: r = 0.76 (p < 0.001)

Figure 1

Development and validation phases of the CLeaSAT

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- CLeaSATEnglish25062025.docx
- SupplementaryTable1.docx