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Dépistage de l'incontinence urinaire en soins aigus gériatriques : analyse comparative des performances des ADL de Katz et de l'ICIQ-UI-sf

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THESE

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par

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Résumé :

Contexte : L'incontinence urinaire (IU) est un syndrome gériatrique fréquent mais sous-diagnostiqué et plus encore chez les patients les plus âgés, vulnérables, polymorbides et polymédiqués.

Objectif : Comparer les performances clinimétriques de l'item « continence » des ADL de Katz qui font partie de toute évaluation gériatrique standardisée et de l'ICIQ-UI-sf qui est un outil simple mais spécifique dans une démarche de dépistage systématique de l'IU par le personnel infirmier dans les 24 premières heures d'une hospitalisation chez des patients âgés vulnérables.

Méthode : Étude prospective dans une unité de soins aigus gériatrique d'un centre académique. Tous les patients en miction spontanée ont été dépistés pour une IU de façon indépendante par 2 infirmières avec les ADL et l'ICIQ-UI-sf. Le diagnostic d'IU était posé lors d'un colloque de concertation interdisciplinaire des troubles fonctionnels urinaires (TOFU) réunissant infirmiers, gériatres et neuro-urologues.

Résultats : Sur les 8 mois de l'étude, 294 patients (âge moyen 86,2 ± 6,5 ans ; 76,5 % de femmes) ont été dépistés ; 169 étaient incontinents selon les conclusions du colloque TOFU. L'item des ADL identifiait 106 patients IU dont 20 faux positifs ; 83 patients IU n'étaient pas identifiés. Si la sensibilité et la spécificité de l'ICIQ-UI-sf étaient de 100,0 %, elles étaient respectivement de 50,9 et 84,0 % pour l'item des ADL. Les valeurs prédictives positives et négatives étaient de 100,0 % pour l'ICIQ-UI-sf, elles étaient de 81,1 % et 55,9 % pour l'ADL.

Conclusion : Cette étude valide l'ICIQ-UI-sf comme un outil de dépistage simple et efficace de l'IU chez les patients âgés vulnérables et complexes. Elle valide aussi une possible délégation du dépistage aux soignants et cela dans un objectif de prise en charge interdisciplinaire de ce syndrome gériatrique.

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Monsieur le Professeur John Prior
Vice-Directeur de l'Ecole doctorale

RESEARCH PAPER

Screening for urinary incontinence in acute care for elders unit: comparative performance analysis of Katz's ADL and ICIQ-UI-SF

G. Mary-Heck[1] · H. Krief[1] · R. Akrour[1] · M. Ishida[2] · B. Schurch[2] · P.-O. Lang[1,3]

Abstract

Background Urinary incontinence (UI) is a frequent, but neglected geriatric syndrome, particularly in vulnerable older patients. Optimizing screening procedures is necessary.

Objective To compare the clinometric performances of the "continence" item of the Katz's ADL scale and the ICIQ-UI-sf for the screening of UI in vulnerable aged patients.

Methods A prospective study was conducted in the acute care for elders (ACE) unit of an academic centre. Two independent nurses screened all patients with spontaneous urination for UI with Katz's ADL item and ICIQ-UI-sf upon the hospital admission. The diagnosis of UI resulted from an interdisciplinary conciliating meeting for urinary functional disorders (TOFU), gathering geriatricians and neuro-urologists and was considered as reference.

Results 294 consecutive patients (mean age 86.2 ± 6.5 years; 76.5% female) admitted to the ACE unit were screened; 169 were incontinent (57.5%) according to TOFU. The Katz's ADL item identified 106 incontinent patients with 20 false positives; 83 incontinent patients were not identified. If the sensitivity and specificity of the ICIQ-UI-sf were 100.0%, they were, respectively, 50.9 and 84.0% for the Katz's ADL item. Positive and negative predictive values were 100.0% for ICIQ-UI-sf; 81.1 and 55.9% for ADL, respectively.

Conclusion This study validates the ICIQ-UI-sf as a simple and effective screening tool for UI in vulnerable and complex hospitalized aged patients. It also demonstrates that the "continence" item of the Katz's ADL scale is not sensitive enough for UI screening in this population.

Keywords Urinary incontinence · Katz's ADL · ICIQ-UI-sf · Screening · Aged patients · Acute care for elder's unit

Introduction

Urinary incontinence (UI) is defined as "the complaint of any involuntary leakage of urine" [1]. It is a frequent geriatric syndrome that concerns more than 50 and 40% of women and men aged 80 years or over, respectively. In acute hospital settings, UI is estimated that 35–42% of aged patients are incontinent [2, 3]. However, these figures are just unclear estimates because UI is generally under-reported and under-diagnosed [4]. Aged individuals are less likely than younger adults to seek medical assistance [4, 5] and to receive evidence-based care for UI or functional urinary disorders [6]. Indeed, even properly identified, UI is often trivialized in aged, vulnerable, polymorbid, and/or polymedicated patients [7]. Although primary care practitioners are often lacking of awareness and of specific skills concerning functional urinary disorders, aged patients from their side are often ashamed of being incontinent and/or have inappropriate beliefs about UI [8–10]. This commonly results to a sub-optimal non-pharmacological and pharmacological management whilst UI is known as a risk-factor of physical, psychological, and social disability [8–10]. This geriatric syndrome is distressing and associated with the risk of fall, fracture, and mood disorder and functional decline [11]. UI also contributes to urinary tract infections and significantly

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alters the quality of life and self-esteem. It contributes to reduce social activities [2, 3, 5, 7] and it is recognized as a reason for admission into institutional settings [2, 3].

In a position paper, the *European Union Geriatric Medicine Society* suggested that any medical contacts with an aged patient be the opportunity to properly detect UI and its possible consequences [12, 13]. When for some, acute medical setting is not the appropriate place for screening this geriatric syndrome, to our opinion, it should be considered as a good opportunity and in the view of the hospital demographic perspectives even recognized as a priority [7]. This systematic screening should consider, at least, the type of UI and, the non-pharmacological and, if necessary, pharmacological approach that fit the medical needs and complexity of the patients [1, 12, 14, 15]. More specifically in vulnerable patients, in addition to the global assessment of UI through the analysis of the symptom history, physical examination, bladder diary, post-voiding residual volume, and urine sample to detect haematuria or infection; the complete review of comorbidities and medications combined with the assessment of cognitive performance and frailty status are of particular importance [16]. With simple measures functional urinary symptoms with or without UI can be significantly improved [14, 16–19]. However, in acute hospital settings, detecting UI is not a priority [20, 21]. Only 10–59% of patients with UI are properly identified [7] and nursing records contain little information about this condition [7, 22].

Thus, with the aim to improve the detection and the management of UI in acute hospital setting, we have designed and implemented an interdisciplinary programme dedicated to urinary functional disorders with or without UI in the acute care for elders (ACE) unit of the university hospital of Lausanne (Switzerland). Upstream of the interdisciplinary conciliating meeting for urinary functional disorders (TOFU—for *TrOubles Fonctionnels Urinaires* in French language) that has been implemented as an usual care process, we aimed to systematically integrate UI in the nursing records by delegating the screening to nurses upon the patients' admission [7].

Among data commonly collected in nursing records are the Katz's Activities of daily living (ADL) which are one of the major elements of comprehensive geriatric assessment (CGA) [23]. One of the six items composing this scale is specifically dedicated to continence and considered as a valuable screening tool [24]. However, to our opinion, screening for UI requires more thorough approach [11–13] rather than a simple statement of (in)dependency for this item [25]. Having incontinence does not necessarily mean being dependent on this activity and many aged individuals experience UI occasionally and can manage by themselves social and hygiene problems associated with UI. This is also illustrated by a recent pilot study reporting that using

this ADL's item led to 20% false negatives [26]. Among the different screening tools specifically developed and validated, the ICIQ-UI-sf (*International Consultation on Incontinence Questionnaire-Urinary Incontinence-short form*) is appeared to be one of the most efficient in clinical practice and research [26]. While it has been validated in French language for the screening and follow-up of UI [27], its clinometric properties have not been evaluated in the aged population yet. We reported the comparison of the clinometric properties of the "continence" Katz's ADL item and ICIQ-UI-sf in the systemic screening of UI by nurses upon patients' admission in an ACE unit of an academic centre.

Materials and methods

Study design

This prospective and comparative study was conducted between the 1st of August 2016 and the 31st of March 2017 in the ACE unit of the University hospital of Lausanne (Switzerland). Its main objective was to compare the sensitivity, specificity, and positive and negative predictive values of the "continence" Katz's ADL item [23] with the ICIQ-UI-sf [27] in the systematic screening of UI. Secondary objectives were to evaluate the use of the ICIQ-UI-sf by the nurses whilst this tool was originally validated as a self-administered questionnaire and its use in a complex geriatric patient population. Two nurses independently assessed all the patients within the first 24 h of the hospital stay with the Katz's ADL item and the ICIQ-UI-sf. Blind to the results of this screening, the conclusion of the weekly interdisciplinary conciliating meeting on urinary functional disorders (TOFU—for, in French language, *TrOubles Fonctionnels Urinaires*) were considered as the reference for the diagnosis of UI (i.e., absence/presence and type). The Human Research Ethics Commission for the Canton of Vaud has approved this study protocol (CER-VD-N°2017-00297).

Population study

The sample analysed consisted of all patients (with spontaneous micturition) consecutively admitted into the ACE unit during the study period. In this unit, were hospitalized patients aged 75 years or over, with at least one geriatric syndrome or more and requiring acute medical care. Thus, in priority, were admitted patients with gait disturbances and/or having fallen at least once in the current/past year, with delirium, cognitive impairment, malnutrition, polypharmacy, and/or with multiple comorbidities. The criteria for non-admission (i.e., for non-inclusion for the present study) were patients with indwelling urinary catheter and those with instable medical condition that might require

continuous/intensive care within 24 h, and/or admission to a psychiatric ward (e.g., because of a high risk of suicide, a runaway and/or violent patient. Patients with delirium were included in the study because this is a potentially reversible condition. It was, however, then possible that the UI screening was delayed by 24 h. Patients for which urinary catheters were used as inappropriate or uncertain appropriateness (e.g., non-significant urine retention, incontinence, wounds, urine volume, urine sample collection, or comfort [18] were, however, included after the catheter was removed.

The ACE unit

The ACE unit is a 28-bed integrated internal medicine/geriatric division where, on average, 600 patients are admitted yearly. They are for 95% admitted from the emergency department and the majority are women (70.2%) with mean age of 86.4 ± 6.7 years (activity data, year 2016 and 2017). Once admitted, patients were systematically assessed within the first 48 h for medico-psycho-social problems and geriatric syndromes through a comprehensive geriatric (CGA) and medical assessment by an interdisciplinary team (geriatricians, internists, physiotherapists, occupational therapists, nursing team, specialized clinical nurses—ICLS, nutritionist, social workers). The hospital stay of each patient was thus punctuated from admission to discharge by bi-weekly interdisciplinary team meetings during which the objectives of medic-psycho-social cares were elaborated and adapted according to functional performance and the evolution of ongoing medical problems.

Urinary incontinence screening

Two screening tools have been considered: (1) the "continence" Katz's ADL item and (2) the ICIQ-UI-sf. According to the experimental protocol, the screening had to be carried out at the time of admission in the frame of the first nurse evaluation. It could be, however, delayed by 24–48 h when the patient's initial conditions (for medical and/or psychological reasons) did not allow appropriate assessment (e.g., acute delirium, disturbed consciousness).

In the pragmatic perspective of the study, to interfere as less as possible with the organization of the usual nursing cares, all patients were screened with the two tools without any specific running order. Thus, patients were independently assessed by two different nurses using either the Katz's ADL scale in first and after with the ICIQ-UI-sf or inversely. In all case, the second assessment was conducted blind to the result of the first one. In addition, the result of the screening was neither transmitted to the members of the TOFU meeting nor considered during the interdisciplinary conciliating meeting for the diagnosing process.

The "continence" Katz's ADL item

The Katz's ADL scale is an assessment scale that explores the individual's ability to perform 6 basic activities of daily living of whom grooming, dressing, transferring, feeding, toilet use, and urinary incontinence. The latter item is commonly considered to detect UI in older adults [24]. Thus, patients were scored 1 (continent) or 0 (incontinent) when they complained or not involuntary leakage of urine [1].

The ICIQ-UI-SF (International Consultation on Incontinence Questionnaire-Urinary Incontinence-short form):

This is a simple, robust, fast and validated tool to detect, characterize, and quantify UI. This questionnaire is usually self-administered and composed with 3 scored items. It provides an overall estimate of intensity, frequency and impact of UI. Thus, frequency (0–5 points), severity (0–6 points) and impact on quality of life (0–10 points) are measured, respectively. An overall frequency-severity-impact score between 0 and 21 is given (0 = no UI; 21 = frequent, major UI with a very significant impact on quality of life). In addition, the tool investigates via 8 short questions the conditions when the urine leak (never, before getting to the toilet, when coughing or sneezing, when asleep, when physically active/exercising, leakage for not obvious reason, and all the time) [27]. For the present study, all patients were asked by the nurse to give answer to the 3 scored items and the 8 short questions.

Interdisciplinary conciliating meeting for urinary functional disorders (TOFU)

During the TOFU meeting the urinary status of all admitted patients was systematically presented and discussed to identify those with urinary functional disorders (with or without UI). During this meeting, the experts (a senior geriatrician, a senior neuro-urologist, and an ICLS), blind to the results of the screening conducted by nurses, analysed all the medical-nursing data collected through the CGA and the nursing and medical follow-up since their admission. Specifically for functional independency according to the Katz's ADL, the experts were informed about the results of 5/6 items with respect to the recommendation (see "Patients' health status" for more details) [24, 25].

In the presence of urinary functional disorders (with or without UI), the TOFU meeting identified precipitating and/or aggravating factors, made a etiological diagnosis and proposed non-pharmacological and pharmacological cares. The diagnosis of UI resulting from the TOFU interdisciplinary conciliating meeting was considered as the reference for the present study.

Patients' health status

The comprehensive geriatric and medical assessment of each patient admitted into the ACE unit has generated a large quantity of medical-psycho-social information and in particular the presence (or not) of major geriatric syndromes (e.g., walking and balance disorders, functional dependency, malnutrition, cognitive impairment, delirium) in addition to incontinence. As already mentioned, the Katz's ADL ranked adequacy of performance in the 6 functions of bathing, dressing, toileting, transferring and feeding in addition to continence. Patients were scored yes/no for independence in each of 5 of 6 functions and 3 levels of functional independency were defined (independency, moderate dependency, and severe dependency). Indeed, according to the literature [24, 25], the "continence" item was not considered in the calculation of the global ADL score. Katz's ADLs were thus directly assessed by nurses to guide day-to-day care and as part of discharge planning. Thus, "independence" defined an independent patient for 5/5 activities; "moderate dependence" as the need for assistance for 1 or 2/5 activities; and "severe dependence" as dependent for at least 3/5 activities considered. In addition to the medical expertise, the presence or absence of delirium was evaluated by the Confusion Assessment Method [28], the risk of protein-caloric malnutrition according to the Kondrup [29], and an impaired cognitive functioning with the Montreal Cognitive Assessment [30].

Statistical analyses

The analyses were performed using Stata software (Stata Statistical Software: Release 14. College Station, TX: StataCorp LP) with a significance level set at $p = 0.05$. Patients' characteristics were analysed and compared according to the continence level (continent vs. incontinent) and the method of screening (ICIQ-UI-sf vs. "continence" Katz's ADL item). For quantitative data, the results are presented as mean ± standard deviation and median; for categorical variables, the calculated numbers and percentages are given. Comparative analyses were made, depending on the nature of the variables and the sample size. Chi^2 (χ^2) or exact Fisher test were considered for qualitative data; Student t test, Wilcoxon–Mann–Whitney test, or Kruskal–Wallis test for quantitative variables. For the two screening tools the clinometric properties in terms of sensitivity (Se), specificity (Sp), and positive (PPV) and negative predictive value (NPV) were calculated. The conclusion of the TOFU meeting was considered as the reference measure.

Results

During the study period, 294 patients with spontaneous micturition were admitted and enrolled in the systematic screening procedure. According to the conclusion of TOFU meeting, 169 (57.5%) were identified as incontinent. Only for 17 of them (10.0%), this condition was already known at the time of admission and notified as a comorbid in the past medical history. The characteristics of these patients are presented in Table 1. On average, they were 86.2 ± 6.5-year-old and were women for 76.5%. Globally, these patients were independent for 3.3 ± 1.6 Katz's ADL and cumulated at least 2 geriatric syndromes (gait disorders: 80.6%; cognitive impairment: 77.1%; and/or malnutrition: 43.6%).

Compared to continent, incontinent patients were more vulnerable. They cumulated more geriatric syndromes (2.5 ± 0.9—$p < 0.01$) with more frequently gait disorders (88.7%—$p < 0.001$), cognitive impairment (81.6%—$p < 0.05$) and malnutrition (48.8%—$p < 0.05$). They were also dependent with 3.0 ± 1.6 as mean Katz's ADL score ($p < 0.05$) (Table 2).

As depicted by Fig. 1 (Panel A), the "continence" item of the Katz's ADL has identified 106/294 patients as incontinent. Compared to the conclusion of the TOFU meeting, 86/106 were really incontinent (true positives); 20 were false positives; and finally, 83 patients were considered as continent whilst normally incontinent (false negatives). Thus, the Se and Sp of this modality of screening were 84.0 and 50.9% and the PPV and NPV 81.1 and 55.9%, respectively. With the ICIQ-UI-sf, 169/294 patients were identified with UI. Compared to the reference measure, neither false positives nor negatives were found. Thus, Se, Sp, PPV, and NPV were 100.0% (Fig. 1, Panel B).

The results of the comparative analyses between the characteristics of the patients classified as incontinent according to the corresponding Katz's ADL item (i.e., true positive vs. false negative) and according the TOFU meeting are presented in Table 3. Compared to the 169 patients with UI according to the reference and the ICIQ-UI-sf, the 83 false negatives according to Katz's ADL were younger (85.3 ± 6.1 years—$p < 0.01$) and had gait disorders (83.1%) less frequently than true positive (94.1%—$p < 0.05$). Not any other significant difference was observed between the two patient groups. The results of the comparative analyses between the characteristics of the patients classified as continent according to the corresponding Katz's ADL item (i.e., true negative vs. false positive) and according to the TOFU meeting are presented in Table 4. Compared to all continent patients, false positives were more vulnerable. They were cumulated more geriatric syndrome (2.4 ± 0.8—$p < 0.05$) and had more frequently gait disorders (89.5%—$p < 0.05$) and cognitive decline (89.5%—$p < 0.05$).

Table 1 Characteristics of patients included according to their continence status evaluated during the interdisciplinary conciliating meeting for urinary functional disorders (TOFU)

Characteristics	Total	According to TOFU meeting		p^c
		Incontinent	Continent	
	$N = 294$	$N = 169$	$N = 125$	
Administrative data				
Women	225 (76.5)	132 (78.1)	93 (74.4)	0.45
Age	86.2 ± 6.5	86.5 ± 6.1	85.8 ± 7.0	0.55
Length of hospital stay	13.2 ± 7.9	13.2 ± 7.9	13.2 ± 7.9	0.99
	11.4	11.4	11.4	
Comprehensive geriatric assessment				
Katz's ADL[a]	3.3 ± 1.6	3.0 ± 1,6	3.6 ± 1.4	0.003
	3.0	3.0	4.0	
Independency (ADL score = 5/5)	99 (33.7)	49 (29.0)	50 (40,0)	0.019
Mild dependency (ADL score = 3–4/5)	99 (33.7)	54 (31.9)	45 (36.0)	
Severe dependency (ADL score = 1–2/5)	96 (32.6)	66 (39.1)	30 (24.0)	
Number of geriatric syndromes	2.3 ± 0.9	2.5 ± 0.9	2.0 ± 0.9	< 0.0001
	2.0	2.0	2.0	
Gait disorders	233 (80.6)	149 (88.7)	84 (69.4)	< 0.0001
Cognitive impairment	222 (77.1)	137 (81.6)	85 (70.8)	0.033
Risk of malnutrition	126 (43.6)	82 (48.8)	44 (36.4)	0.035
ICIQ-UI-sf scale[b]	5.8 ± 6.1	10.1 ± 4.6	0.0 ± 0.0	< 0.0001

The results are presented as mean ± standard deviation and median for the quantitative variables, and the number and calculated percentage [n (%)] for the qualitative data ($N = 294$)

[a]*ADL* Activity of Daily Living, the total score is calculated from patients' ability to achieve 5 of Katz's 6 ADLs, continence was not considered for the assessment of functional autonomy

[b]This is the composite score for frequency, intensity and impact on quality of life with a maximum impact of 21 points

[c]Results of comparative analyses of patient characteristics by level of continence (continent vs. incontinent); $p < 0.05$ indicates that there is a significant difference between the 2 groups

Discussions

This study, conducted in 294 vulnerable and complex aged patients, has provided complementary insights about the high prevalence of UI in acute hospital setting. This further reinforces the need for systematic screening. With this in mind, this study also underlines the interest of considering a specific screening tool, such the ICIQ-UI-sf, for a better efficiency. Finally, it provides convincing results about the applicability of the ICIQ-UI-sf in a vulnerable aged patient and the delegation of the screening to the nurses.

With a prevalence of about 60%, this study highlighted the complexity of incontinent hospitalized patients. This gets rise to the risk of mutual interaction between UI and comorbidities, other geriatric syndromes, and polypharmacy [30–33]. The study population, in addition to be aged 85 years or over, was also vulnerable by combining polypharmacy multiple comorbidities and geriatric syndromes. When for some, this data only adds additional data to previous observations [21, 26], they should be mirrored with the common trivialization of this common geriatric syndrome. Indeed, only 10% of the patients screened with UI were

already known with this condition based on their medical record and/or through information transmitted by primary care physicians at the time of hospital admission.

The context of acute medical setting can be also considered as a barrier or not appropriate for UI screening. However, to our opinion, this moment should be rather considered as an opportunity to take time to sort out the complex interconnection between UI and health comorbid conditions, their pharmacological treatments, and geriatric syndromes. Moreover, any urinary functional disorders with or without UI should be considered in elaborating the care planning, the therapeutic strategy of acute and chronic disorders, and finally in optimizing complex treatment regimen [34, 35].

To address the question of the efficiency of the screening, two tools were compared. One, was 1 of the 6 item of the Katz's ADL scale dedicated to "continence" which is the tool the most used to assess the activities of daily living during the CGA [24]. The Katz's ADL scale has consistently demonstrated its utility in evaluating functional status in the aged population. On the other side, was the ICIQ-UI-sf. It is a tool specifically developed for this screening but, up to now, that has been never validated in the aged

Table 2 Characteristics of patients included according to their continence status screened with the "continence" Katz's ADL item and the ICIQ-UI-sf

Characteristics	Katz's ADL		p^c	ICIQ-UI-sf		p^c
	Incontinent	Continent		Incontinent	Continent	
	$N = 106$	$N = 188$		$N = 169$	$N = 125$	
Administrative data						
Women	79 (74.5)	146 (77.7)	0.543	132 (78.1)	93 (74.4)	0.45
Age	87.6 ± 6.1	85.4 ± 6.7	0.004	86.5 ± 6.1	85.8 ± 7.0	0.55
Length of hospital stay	14.3 ± 8.2	12.6 ± 7.6	0.073	13.2 ± 7.9	13.2 ± 7.0	0.99
	12.5	11.0		11.4	11.4	
Comprehensive geriatric assessment						
Katz's ADL[a]	2.4 ± 1.5	3.8 ± 1.4	< 0.001	3.0 ± 1.6	3.6 ± 1.4	0.003
	2.0	4.0		3.0	4.0	
Independency (ADL score = 5/5)	13 (12.3)	86 (45.7)	< 0.0001	49 (29.0)	50 (40.0)	0.019
Mild dependency (ADL score = 3–4/5)	35 (33.0)	64 (34.0)		54 (31.9)	45 (36.0)	
Severe dependency (ADL score = 1–2/5)	58 (54.7)	38 (20.3)		66 (39.1)	30 (24.0)	
Number of geriatric syndromes	2.5 ± 0.9	2.1 ± 0.9	< 0.0001	2.5 ± 0.9	2.0 ± 0.9	< 0.0001
	2.0	2.0		2.0	2.0	
Gait disorders	97 (93.3)	136 (73.5)	< 0.0001	149 (88.7)	84 (69.4)	< 0.0001
Cognitive impairment	88 (84.6)	134 (72.8)	0.022	137 (81.6)	85 (70.8)	0.033
Risk of malnutrition	56 (53.9)	70 (37.8)	0.008	82 (48.8)	44 (36.4)	0.035
ICIQ-UI-sf scale[b]	9.4 ± 6.2	3.8 ± 5.1	< 0.0001	10.1 ± 4.6	0.0 ± 0.0	< 0.0001

The results are presented as mean ± standard deviation and median for the quantitative variables, and the number and calculated percentage [n (%)] for the qualitative data ($N = 294$)

[a]For ADL, the total score is calculated from patients' ability to achieve 5 of Katz's 6 ADLs, continence was not considered for the assessment of functional autonomy

[b]It is the composite score of frequency, intensity and impact on quality of life with a maximum impact of 21 points

[c]Results of comparative analyses of patient characteristics by level of continence (continent vs. incontinent); $p < 0.05$ indicates that there is a significant difference between the 2 groups
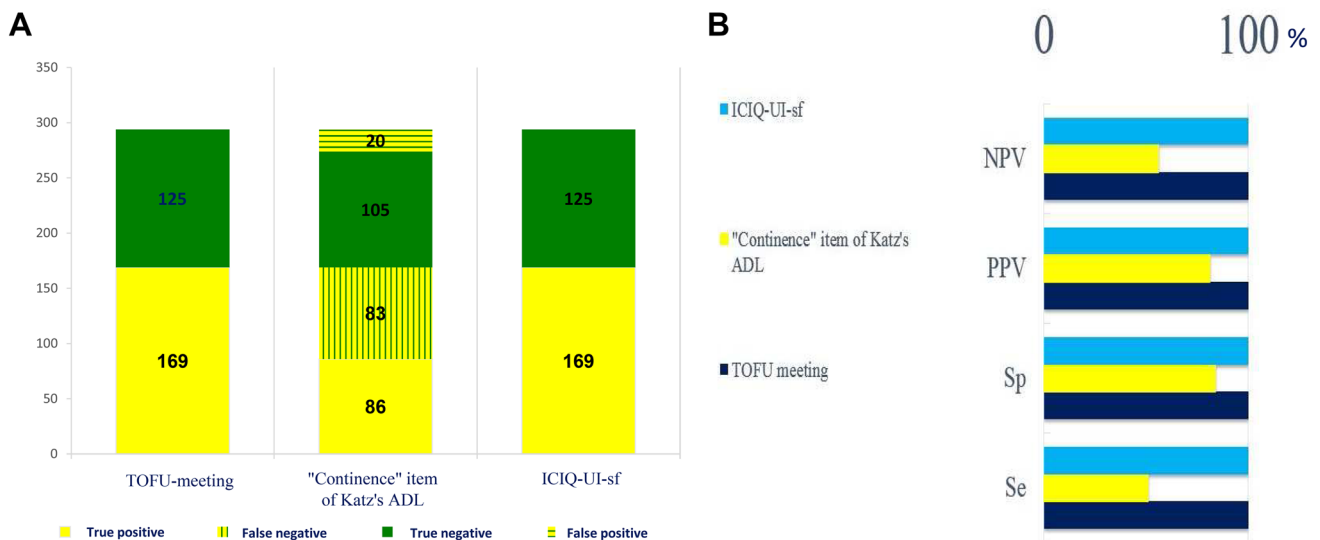

Fig. 1 Presentation of the results of the UI screening with the "continence" Katz's ADL item and the ICIQ-UI-sf compared to the TOFU meeting (panel **a**) and the resulting clinometric properties (*NPV* nega- tive predictive value, *PPV* positive predictive value, *Se* sensibility, *Sp* specificity) of the two screening tools (panel **b**—$N = 294$)

Table 3 Comparative analysis between the characteristics of the patients screened as true positive and false negative for UI with the "continence" Katz's ADL item and all urinary incontinent patients according to the TOFU meeting

Characteristics	UI according to TOFU meeting	UI according to the "Continence" item of Katz's ADL		p^c
		True positive	False negative	
	$N = 169$	$N = 86$	$N = 83$	
Administrative data				
Women	132 (78.1)	66 (76.7)	66 (79.5)	0.663
Age	86.5 ± 6.1	87.6 ± 6.0	85.3 ± 6.1	0.007
Length of hospital stay	13.2 ± 7.9	14.2 ± 8.5	12.1 ± 7.1	0.146
	11.4	12.4	11.0	
Comprehensive geriatric assessment				
Katz's ADL[a]	3.0 ± 1.6	2.4 ± 1.5	3.7 ± 1.5	< 0.0001
	3.0	2.0	4.0	
Independency (ADL score = 5/5)	49 (29.0)	11 (12.8)	38 (45.8)	< 0.0001
Mild dependency (ADL score = 3–4/5)	54 (31.9)	27 (31.4)	27 (32.5)	
Severe dependency (ADL score = 1–2/5)	66 (39.1)	48 (55.8)	18 (21.7)	
Number of geriatric syndromes	2.5 ± 0.9	2.6 ± 0.9	2.3 ± 0.9	0.208
	2.0	2.0	2.0	
Gait disorders	149 (88.7)	80 (94.1)	69 (83.1)	0.025
Cognitive impairment	137 (81.6)	71 (83.5)	66 (79.5)	0.503
Risk of malnutrition	82 (48.8)	46 (54.1)	36 (43.4)	0.164
ICIQ-UI-sf scale[b]	10.1 ± 4.6	11.5 ± 4.7	8.7 ± 4.1	< 0.0001

The results are presented as mean ± standard deviation and median for the quantitative variables, and the number and calculated percentage [n (%)] for the qualitative data ($N = 169$)

[a] For ADL, the total score is calculated from patients' ability to achieve 5 of Katz's 6 ADL, continence was not considered for the assessment of functional autonomy

[b] It is the composite score of frequency, intensity and impact on quality of life with a maximum impact of 21 points

[c] Results of the comparative analyses of the characteristics of True and False Negative; $p < 0.05$ indicates that there is a significant difference between the 2 groups

and vulnerable population. With a Se and Sp of 100%, the ICIQ-UI-sf appears as a powerful and acceptable tool in the population to screen. This result is explained, in part, by the format and construct of the tool. Indeed, this tool addresses thoroughly the issue of UI and in less than 3 min (data not shown) via simple questions exploring the 4 main mechanisms (i.e., urge, stress, mixed, and bladder overflow) [27].

The systematic screening considered in this study aimed also to ease and improve the awareness of nursing staff about UI [7, 11, 31, 32, 34, 35]. From research, it is known that what was learned (knowledge) and how the individual felt about something (attitude) influence how someone acts (practice) [7]. This awareness is thus a fundamental step to insure efficient interdisciplinary cares. This is particularly important when it is considered that most of the non-pharmacological strategies that could be proposed and initiated in acute hospital setting, (but not only) have to be managed and/or coordinated by the nursing staff (e.g., bladder diary, timed voiding, control of fluid intakes, post-voiding residual volume measurements, adaptation of incontinence pads, intermittent catheterization, etc.)

Well-beyond the statistics and the Se and Sp values measured for the ICIQ-UI-sf, this study, first of all, showed that the "continence" Katz' ADL item was not sensitive enough (Fig. 1 panel B), probably because not explicit enough, for an effective screening of UI in this population. Moreover, considering the high prevalence of UI, considering this item in the assessment of basic activities of daily living would erroneously define many completely independent individuals as dependent. Thus, it might be rational and clinically relevant to define dependence in continence item as needing care because of incontinence or inability to manage hygiene or social problems with it [25]. This would, however, provide information important to consider rather for the management of individuals correctly identify with UI. With this in mind, this study also shows that the ICIQ-UI-sf is more than a simple screening tool and the information rapidly gathered using this tool ease the understanding of the pathophysiological processes leading to the development of UI which is fundamental for an appropriate management. These data have, however, to be completed with the result of the CGA to elaborate non-pharmacological and

Table 4 Comparative analysis between the characteristics of the patients screened as false positive and true negative for UI with the "continence" Katz's ADL item and all urinary continent patients according to the TOFU meeting

Characteristics	Continence according to TOFU meeting	Continence according to the «Continence» item of Katz's ADL		p^a
		False positive	True negative	
	$N = 125$	$N = 20$	$N = 105$	
Administrative data				
Women	93 (74.4)	13 (65.0)	80 (76.2)	0.293
Age	85.8 ± 7.0	87.2 ± 6.8	85.5 ± 7.1	0.262
Duration of hospital stay	13.2 ± 7.0	14.5 ± 6.8	13.0 ± 8.0	0.201
	11.4	13.3	10.5	
Comprehensive geriatric assessment				
Katz's ADL[a]	3.6 ± 1.4	2.5 ± 1.5	3.8 ± 1.3	0.0002
	4.0	2.5	4.0	
Independency (ADL score = 5/5)	50 (40.0)	2 (10.0)	48 (45.7)	0.002
Mild dependency (ADL score = 3–4/5)	45 (36.0)	8 (40.0)	37 (35.3)	
Severe dependency (ADL score = 1–2/5)	30 (24.0)	10 (50.0)	20 (19.0)	
Number of geriatric syndromes	$2.0 \pm 0,9$	2.4 ± 0.8	1.9 ± 0.9	0.021
	2.0	2.0	2.0	
Gait disorders	84 (69.4)	17 (89.5)	67 (65.7)	0.030
Cognitive impairment	85 (70.8)	17 (89.5)	68 (67.3)	0.041
Risk of malnutrition	44 (36.4)	10 (52.6)	34 (33.3)	0.108
ICIQ-UI-sf scale[b]	0.0 ± 0.0	0.0	0.0	0.0002

The results are presented as mean ± standard deviation and median for the quantitative variables, and the number and calculated percentage [n (%)] for the qualitative data ($N = 125$)

[a]For ADL, the total score is calculated from patients' ability to achieve 5 of Katz's 6 ADLs, continence was not considered for the assessment of functional autonomy

[b]It is the composite score of frequency, intensity and impact on quality of life with a maximum impact of 21 points

[c]Results of comparative analyses of the characteristics of false positive and true negative; $p < 0.05$ indicates that there is a significant difference between the 2 groups

pharmacological recommendations and/or eventually advice for further investigations (i.e., urinary sample for detection of haematuria or bacteriuria, cystoscopy, etc.) that really fit the needs of this vulnerable population [12, 14, 18, 19]. This is the added value to the ICIQ-UI-sf of the interdisciplinary conciliating meeting implemented in the usual process of care in the ACE unit.

The results presented can be explained by the characteristics of the patients since those with UI were more vulnerable and complex than the continent ones. More particularly they were more frequently cognitively impaired. Thus, addressing the problem of UI in this population through a single and simple question has certainly contributed to the lower performance measured with the Katz's ADL item. When frequency-severity-impact score of the ICIQ-UI-sf was considered for all 294 patients and particularly in false negatives according to Katz's ADL, it was observed that it was low (3.8 ± 5.1) but not null. This indicates that for patients the presence of bladder weakness is not always synonymous with UI. This was not observed with ICIQ-UI-sf. The rapid but careful evaluation of the urinary symptoms explores also circumstances, frequency, severity, and impact on the quality of life of UI and hence has contributed to increase Se and Sp. The performance of a screening tool is of importance. This is, moreover, important when UI is considered as an early marker of frailty for which interventions contribute to reduce disability, hospitalization, institutional admission, and mortality [11, 31–33, 35, 36]. Furthermore, UI and/or its pharmacological approach can also mutually interfere with comorbidities and/or their respective treatment and/or reveal or exacerbate all the geriatric syndromes [26].

One limitation of the ICIQ-UI-sf is that, like other existing screening tools, it does not distinguish UI induced by environmental factors and functional UI from over-active bladder [19]. Indeed, continence control does not only depend on neurological and bladder function but also on the patients' ability to access/use the bathroom and/or to undress, as well as sensory abilities and particularly visual perception. This functional and/or cognitive ability of the patient to use the toilet is addressed through another item of the 5 Katz's ADL considered for functional independency [24]. Thus, while this study showed that ICIQ-UI-sf is more

efficient to detect UI than Katz's ADL, in the context of the TOFU program the two tools are complementary as well as all the medico-psycho-social information collected through the CGA. An important limitation of the study is that in the pragmatic approach taken there was not any specific design (e.g., crossover design) or timing (i.e., one tools systematically considered in first) in applying the two screening tools by nurses. Thus, patients could be assessed with the ICIQ-UI-sf in first and the Katz's ADL after, or inversely. When patients were screened first with the ICIQ-UI-sf, it is difficult to think that the result of the screening with the "incontinence" Katz's ADL item could be different whilst the opposite it is not. The bias potentially thus induced would have been controlled, or at least measurable, with a cross over design. However, to maximize the implementation of this screening in nursing records it was, to our opinion, necessary to limit as much as possible any supplementary constraints on nurses and in their daily care planning. This bias was inherent in the experimental set up and then skewed the result consistently in the same direction. In other words, it has potentially led to minimize the difference between the two tools and to over-estimate the performance of the "continence" Katz's ADL item. Finally, this study's rather very specific sample of complex inpatients from a single hospital division may prevent generalization of these findings. Even though this systematic screening with the ICIQ-UI-sf is easily transposable to other vulnerable populations like in institutional settings it could be also to less complex aged population. Validated as being used in hospital setting, this tool could be also certainly of interest for primary care physicians in community care.

Conclusion

This study provides clinometric arguments for considering the ICIQ-UI-sf as an effective means of screening UI in hospitalized aged patients compared to Katz's ADL as commonly considered. This includes the most vulnerable and complex patients. It also shows that delegating to nurses the screening of UI with a specific but easy to use tool is feasible and effective. Se and Sp of the ICIQ-UI-sf have, however, to be confirmed in larger and more heterogeneous aged populations.

hospital setting during the stay to facilitate and improve the continuity of care with the community care.

Compliance with ethical standards

References

1. Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U, van Kerrebroeck P, Victor A, Wein A (2002) Standardisation Sub-committee of the International Continence Society. The standardisation of terminology of lower urinary tract function: report from the standardisation subcommittee of the International Continence Society. Neurourol Urodyn 21(2):167–178
2. Ernst V, Saïah L, Cerantola Y, Bosshard W, Haftgoli N, Büla C (2015) Urinary incontinence in older women: what can a GP do? Rev Med Suisse 11(494):2104–2109
3. Jaunin-Stalder N, Lagro-Janssen AL (2013) Urinary incontinence: neither men nor women should be forgotten. Rev Med Suisse 9(395):1535–1537
4. Gibson W, Wagg A (2014) New horizons: urinary incontinence in older people. Age Ageing 43(2):157–163
5. Li Y, Cai X, Glance LG, Mukamel DB (2007) Gender differences in healthcare-seeking behavior for urinary incontinence and the impact of socioeconomic status: a study of the medicare managed care population. Med Care 45(11):1116–1122
6. Wagg A, Duckett J, McClurg D, Harari D, Lowe D (2011) To what extent are national guidelines for the management of urinary incontinence in women adhered? Data from a national audit. BJOG 118(13):1592–1600
7. Zürcher S, Saxer S, Schwendimann R (2011) Urinary incontinence in hospitalised elderly patients: Do nurses recognise and manage the problem? Nurs Res Pract 2011:671302. https://doi.org/10.1155/2011/
8. Thom DH, Haan MN, Van Den Eeden SK (1997) Medically recognized urinary incontinence and risks of hospitalization, nursing home admission and mortality. Age Ageing 26(5):367–374
9. John G, Gerstel E, Jung M, Dällenbach P, Faltin D, Petoud V, Zumwald C, Rutschmam OT (2014) Urinary incontinence as a marker of higher mortality in patients receiving home care services. BJU Int 113(1):113–119
10. Coyne KS, Wein A, Nicholson S, Kvasz M, Chen CI, Milsom I (2013) Comorbidities and personal burden of urgency urinary incontinence: a systematic review. Int J Clin Pract 67(10):1015–1033
11. Gibbs CF, Johnson TM 2nd, Ouslander JG (2007) Office management of geriatric urinary incontinence. Am J Med 120(3):211–220
12. Aharony L, De Cock J, Nuotio MS, Pedone C, Rifel J, Vande Walle N, Velghe A, Vella A, Verdejo-Bravo C (2017) Consensus document on the management of urinary incontinence in older people. Eur Geriatr Med 8(3):210–215

13. Aharony L, De Cock J, Nuotio MS, Pedone C, Rifel J, Vande Walle N, Velghe A, Vella A, Verdejo-Bravo C (2017) Consensus documents on the detection and diagnosis of urinary incontinence in older people. Eur Geriatr Med 8(3):202–209

14. Da Costa A, Ishida M, Akrour R, Mary-Heck G, Grilo N, Schurch B, Lang P (2017) Nocturia in aged patient: in practice. Rev Med Suisse 13(582):1946–1951

15. Sharma NL, Foley S (2017) The management of adult urinary incontinence. Surg Oxf Int Ed 35(6):306–312

16. Samuelsson E, Odeberg J, Stenzelius K, Molander U, Hammarström M, Franzen K, Andersson G, Midlöv P (2015) Effect of pharmacological treatment for urinary incontinence in the elderly and frail elderly: a systematic review. Geriatr Gerontol Int 15(5):521–534

17. Cheater FM, Baker R, Gillies C, Wailoo A, Spiers N, Reddish S, Robertson N, Cawood C (2008) The nature and impact of urinary incontinence experienced by patients receiving community nursing services: a cross-sectional cohort study. Int Nurs Stud 45(3):339–351

18. Akrour R, Ishida M, Da Costa A, Gomes Da Rocha C, Nakamura C, Mary-Heck G, Schurch B, Lang PO (2017) Comment optimiser l'utilisation des cathéters urinaires chez les patients âgés hospitalisés. mt 23(2):105–114

19. Lang PO, Ishida M, Akrour R, Schurch B (2018) Bladder over-activity in hospitalized geriatric patients. A structured approach. Neurol Psychiatr Geriatr. https://doi.org/10.1016/j.npg.2018.01.001

20. Min L, Kerr EA, Blaum CS, Reuben D, Cigolle C, Wenger N (2014) Contrasting effects of geriatric versus general medical multimorbidity on quality of ambulatory care. J Am Geriatr Soc 62(9):1714–1721

21. Lang PO, Heitz D, Hédelin G, Dramé M, Jovenin N, Ankri J, Somme D, Novella JL, Gauvain JB, Couturier P, Voisin T, De Wazière B, Gonthier R, Jeandel C, Jolly D, Saint-Jean O, Blanchard F (2006) Early markers of prolonged hospital stay in older people: a prospective, multicenter study of 908 inpatients in French acute hospitals. J Am Geriatr Soc 54(7):1031–1039

22. Wagg A, Lowe D, Peel Potter J (2008) Continence care for older people in England and Wales: data from a national audit. J Wound Ostomy Cont Nurs 35(2):215–220

23. Katz S (1983) Assessing self-maintenance: activities of daily living, mobility and instrumental activities of daily living. J Am Geriatr Soc 31(12):721–727

24. Lang PO, Meyer N, Heitz D, Dramé M, Jovenin N, Ankri J, Somme D, Novella JL, Gauvain JB, Couturier P, Lanièce I, Voisin T, de Wazières B, Gonthier R, Jeandel C, Jolly D, Saint-Jean O, Blanchard F (2007) Loss of independence in Katz's ADL ability in connection with an acute hospitalization: early clinical markers in French older people. Eur J Epidemiol 22(9):621–630

25. Tufan F, Topcu Y, Bahat G, Karan M (2016) Limitations of the continence item in Katz activities of daily living scale. Gerontol Geriar Res 2(1):1008

26. Akrour R, Ishida M, Lang PO (2017) Screening and evaluation of urinary incontinence among elderly patients with complex needs: exploratory study in an acute care unit for the elderly. Neurol Psychiatr Gériatr 17(100):270–278

27. Timmermans L, Falez F, Mélot C, Wespes E (2013) Validation of use of the international consultation on incontinence questionnaire-urinary incontinence-short form (ICIQ-UI-SF) for impairment rating: a transversal retrospective study of 120 patients. Neurourol Urodyn 32(7):974–979

28. Inouye SK, Van Dyck CH, Alessi CA, Balkin S, Siegal AP, Horwitz RI (1990) Clarifying confusion: the confusion assessment method: a new method for detection of delirium. Ann Intern Med 113(12):941–948

29. Kondrup J, Allison SP, Elia M, Vellas B, Plauth M (2003) ESPEN Guidelines for nutrition screening 2002. Clin Nutr 22(4):415–421

30. Nasreddine ZS, Phillips N, Bedirian V, Charbonneau S, Witehead V, Collin I, Cummings JL, Chertkow H (2005) The Montreal cognitive assessment, MoCA: a brief screening tool for mild cognitive impairment. J Am Geriatr Soc 53(4):695–699

31. Riat F, Rochat S, Monod S, Büla C, Renard D (2012) Principles for the assessment and management of polymorbid elderly patients: a guide for clinicians. Rev Med Suisse 8(361):2109–2114

32. Wagg A, Gibson W, Ostaszkiewicz J, Johnson T 3rd, Markland A, Palmer MH, Kuchel G, Szonyi G, Kirschner-Hermanns R (2015) Urinary incontinence in frail elderly persons: report from the 5th International Consultation on Incontinence. Neurourol Urodyn 34(5):398–406

33. Bettez M, Tu M, Carlson K, Corcos J, Gajewski J, Jolivet M, Bailly G (2012) 2012 update: guidelines for adult urinary incontinence collaborative consensus documents for the Canadian Urological Association. Can Urol Assoc J 6(5):254–263

34. Boyd CM, McNabney MK, Brandt N, Correa-de-Araujuo R, Daniel M, Epplin J, Fried TR, Goldstein MK, Holmes HM, Ritchie CS, Shega JW (2012) Guiding principles for the care of older adults with multimorbidity: an approach for clinicians: American geriatrics society expert panel on the care of older adults with multimorbidity. J Am Geriatr Soc 60(10):E1–E25

35. Boudon A, Riat F, Hasso Y, Lang PO (2017) Comment optimiser la prise en charge des patients âgés complexes? Forum Med Suisse 17(13):306–312

36. Irwin D, Agatep B, Milsom I, Abrams P (2011) Worldwide prevalence estimates of lowe urinary tract symptoms, overactive bladder, urinary incontinence and bladder outlet obstruction. BJU Int 108(7):1132–1138