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Effectiveness of conservative urinary incontinence management among female nursing home residents—A cluster RCT

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ABSTRACT

Background: Guideline-compliant conservative management of urinary incontinence (UI) is the first step of the initial management for UI and is recommended for long-term care in older persons. Recent studies have focused on the effects of guideline-compliant UI management. However, most of these studies were tested in another setting than nursing homes and were not focused on conservative management.
Aims: To measure the effectiveness of 29 evidence-based nursing recommendations regarding the conservative management of UI in Austrian nursing homes.
Methods: The study is a cluster randomized intervention trial with institution as the unit of randomization. Twelve nursing homes in two Austrian provinces (Styria, Carinthia) were randomly allocated to the intervention group (IG) and control group (CG). Data were collected from participating residents over a three-month period. The intervention consisted of the implementation of recommendations for the conservative management of UI among female nursing home residents. The primary outcome variable was the daily UI experienced by the participating residents.
Results: Residents in the (IG $n = 216$) had a lower risk (OR = 0.14, p = 0.02) of experiencing daily UI and were less likely to receive absorbent products (OR = 0.01, p = 0.01) than residents in the CG ($n = 165$). Residents in the IG (OR = 5.16, p = 0.00) were five times more likely to receive recommended interventions (e.g., bladder training) than residents in the CG.
Conclusion: Introducing guideline-compliant management into nursing practice can increase the likelihood of evidence-based interventions for the conservative management of UI. The intervention in this study targeted on nurses/nurse managers and can be recommended for the nursing home setting.

1. Introduction

In the health care system, urinary incontinence (UI), defined as „any involuntary loss of urine" (Abrams & Society, 2016), is a major health issue that has huge psychological and social impacts on affected individuals (Hayder & Schnepp, 2010), increases nurses' workloads and health care costs (Wilson, Brown, Shin, Luc, & Subak, 2001). UI should be managed by following evidence-based guidelines to ensure high-quality health care (Harrison, Legare, Graham, & Fervers, 2010). The conservative management of UI is generally accepted to be the first step of the initial management for UI (Abrams & Society, 2016) and seen as successful intervention for long-term management in older persons (Dumoulin, Hay-Smith, & Mac Habee-Seguin, 2014; Stenzelius et al., 2015). As no guidelines for the conservative management of UI are available in Austria, the current NICE guideline "Urinary incontinence: The management of urinary incontinence in women from NICE" (NICE, 2013) was translated and adapted to the Austrian nursing home context (Hödl, Halfens, & Lohrmann, 2018). Included recommendations as first-line treatment were e.g., diagnosing UI and the subtype, using a bladder diary, considering modification of fluid intake, advising UI women who have a BMI > 30 to lose weight, offering bladder training (Hödl et al., 2018).

However, the effectiveness of adapted recommendation for the conservative management for UI among nursing home residents has not yet been sufficiently empirically assessed (DuBeau, G.A., Palmer, & Wagg, 2008). Recent research has focused on the effects of urinary incontinence guideline recommendations. Most of these have focused on the adherence of health care professionals to guidelines (Albers-Heitner, Berghmans, Nieman, Lagro-Janssen, & Winkens, 2008; Wagg, Duckett, McClurg, Harari, & Lowe, 2011), were tested in another setting

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other than nursing homes (Egnatios, Dupree, & Williams, 2010), and were not focused on conservative management (Agur, Housami, Drake, & Abrams, 2009).

For this reason, the aim of this study was to examine the effectiveness of the guideline recommendations on the conservative management of UI in Austrian nursing homes by testing three hypotheses:

1 Female residents in the intervention group (IG) are less likely to experience daily UI events than female residents in the control group (CG).
2 Female residents in the IG have a higher chance of having a UI diagnosis than female residents in the CG.
3 Female residents in the IG have a higher chance of receiving a recommended nursing interventions (e.g., bladder training) than female residents in the CG.

2. Materials and methods

2.1. Design

This study was a two-armed, cluster randomized controlled trial conducted at nursing homes level. The recommendations were implemented within nursing homes (clusters) in the IG. The residents in the CG received nursing care as usual (e.g., daily routine UI management in the institution). After the end of the study, the first author gave the recommendations as well as the supplementary documents to the CG.

2.2. Process evaluation

Data were collected at baseline (T1) and during two follow-up measurements after six and twelve weeks (T2, T3). During T3, structured interviews were conducted with either the nurse manager or the person responsible for the project (Grant, Treweek, Dreischulte, Foy, & Guthrie, 2013). The conducted process evaluation on the following domains based on Grant et al. (2013), including the research question and data source, is shown in Table 1.

2.3. Ethical considerations

The ethical committees of the Medical University of Graz and the province Carinthia approved the study protocol (Styria: 29-007 ex 16/17; Carinthia: MZ 28/16). Both nursing homes and residents could cancel their participation without justification. The informed written consent of all participating residents or their legal representatives was obtained.

2.4. Sample size calculation

We used the „Sample Size Calculator “(Campbell, Thomson, Ramsay, MacLennan, & Grimshaw, 2004) to determine the sample size needed to detect a difference between the CG and IG with respect to a 10% decrease in the number of daily UI events. We assumed a power of 80%, a significance level of 0.05 and an intraclass correlation coefficient of 0.01 (Campbell, Fayers, & Grimshaw, 2005; Kuß, Jahn, Renz, & Landenberger, 2009), which resulted in a total of 600 residents in twelve nursing homes.

2.5. Randomization

Due to the study intervention, blinding was not possible. Twelve nursing homes were included, six in each province and then randomized by the use of computer-generated, random-number tables to either IG or CG, three IG and three CG in each province.

2.6. Sampling / recruitment

All nursing homes in two provinces in Austria (Styria and Carinthia) registered in a national database (Federal Ministry of Labour, S.A.a.C.P., 2012) that had a capacity ≥ 50 beds were invited to participate in the trial. The provinces of Styria and Carinthia were chosen for practicability.

Identified organizations were contacted by telephone and recruited if they met the following criteria (van der Putten, De Visschere, Schols, de Baat, & Vanobbergen, 2010): (1) The institution's management agreed to random allocation to the IG or CG; (2) no evidence-based UI guideline was used; (3) no specialized training on UI prevention or management for nursing staff had been offered during the past two years; (4) fewer than five other major nursing care innovation projects had been implemented during the past two years; and (5) no specialized nurse was available for the management of incontinence.

Inclusion criteria for nursing home residents were: They were living in the nursing home at the date of baseline measurement, were female and planned to stay for the whole duration of the study (three months).

2.7. Intervention group

The intervention targeted on the nurse manager or person responsible for the study in the IG and consisted of three parts:

1 A one-hour instructional meeting after the baseline measurement with each nurse manager or person responsible in the IG nursing homes. Detailed information regarding the nursing recommendations were discussed, and printed material was handed out to the IG.
2 The 29 guideline recommendations for the conservative management of UI (Hödl et al., 2018).
3 Supplementary documents (e.g., posters with abridged versions of the UI management recommendations, bladder diaries (NICE, 2013) and questionnaires about the quality of life regarding UI (NICE, 2013) were provided. The posters about the guideline recommendations for the conservative management of UI were communicated to the rest of the nursing staff within each participating

Table 1
Aspects of process evaluation (Grant et al., 2013).

Domain	Research question	Source of data
Recruitment of clusters	How are clusters sampled and recruited?	Documentation of recruitment process
	Who agrees to participate?	
	Why do clusters agree to participate?	Interview question 1
Response of clusters	What are the cluster members' perceptions of the intervention and the uptake of trial components?	Interview questions 2,3,4
Response of individuals	What is the target population's experience of and response to the intervention?	Interview questions 5,6,7
Unintended consequences	Are there unintended changes in processes and outcomes, both related to the trial intervention and unrelated care measures?	Interview questions 8,9

nursing home.

The IG received the recommendations and supplementary documents in both hardcopy and PDF formats.

Data collection

We enrolled twelve nursing homes from January to April 2017. Data were collected at baseline (T1) and during two follow-up measurements after six and twelve weeks (T2, T3) from April to September 2017 by the first author and a nurse in each nursing home.

2.8. Instrument

The questionnaire used for data collection was based on the Austrian questionnaire of the "International Prevalence Measurement of Care Problems" research project (Lohrmann, 2015). Residents' characteristics were age, medical diagnoses of dementia or nurses' clinical assessment of cognitive impairment (yes/no) and the Care Dependency Scale (CDS, German version). The CDS was used to measure the degree of care dependency with reference to 15 different needs such as hygiene or continence, whereby lower scores indicated higher levels of care dependency (15–75) (Dijkstra, Buist, & Dassen, 1996). Other collected data were participation (yes/no), reason for non-participation (e.g., refusal, cognitive impairment), prevalence of urinary incontinence (yes/double incontinence/no), catheter because of UI (yes/no), start of UI after admission to this institution (yes/no), frequency of UI (3–4 times a month, a few times per week, daily), documented UI diagnosis (no, yes; if yes: stress UI, mixed UI, urge UI) and interventions for the management of UI. According to hypothesis one for example, we assumed that the proportion of female residents in IG that experience daily UI events is statistically significantly smaller than the proportion of female residents in the CG that experience daily UI events.

The residents were asked which interventions (multiple answers possible) were conducted for the UI management (e.g., bladder diary, modification of fluid intake). In case of doubts, e.g., due to cognitive impairment, the nurses were asked which interventions were conducted for UI management for the resident. These nursing interventions were divided into two categories: (1) recommended interventions included modification of fluid intake, pelvic floor muscle training, bladder diary, bladder training, multidisciplinary team, weight reduction and caffeine reduction; and (2) provision with absorbent products such as absorbent inlay pads, slips, pants and bed pads and were not considered standard treatment.

2.9. Outcomes

All data were collected by the first author and a nurse in each nursing home. We evaluated the effectiveness of the introduction of nursing recommendations into nursing homes (cluster level) by measuring the differences in numbers of daily UI events (primary outcome), number of UI diagnoses and use of nursing interventions between the IG and the CG. The primary outcome was measured by the frequency of UI according to the questionnaire (3–4 times a month, a few times per week, daily) by asking each participating resident. Daily UI rates were calculated for residents with "only" UI as well as for residents with double incontinence. Data with regard to the documented nursing diagnosis in hypothesis two (no, yes; if yes: stress UI, mixed UI, urge UI) in the questionnaire was filled in by the nurse collecting the data together with the first author. Use of nursing interventions was analyzed as yes, when one of the interventions was conducted.

2.10. Data analysis

Data analysis was performed using SPSS (Version 24) in consultation with the Institute for Medical Informatics, Statistics and Documentation of the Medical University of Graz, Austria. Calculations were performed to identify differences at baseline between the IG and CG, using the chi-squared test for binary outcomes (participation, dementia) and the Mann–Whitney *U* test for non-normally distributed variables (age, care dependency sum). We included the province (Styria vs. Carinthia) as a potential confounder in the analysis. This could be explained by the fact that in January 2017 the contract between the biggest Carinthian health insurance and the company for continence products was canceled. The first author heard of this circumstance at the time of baseline measurements in the Carinthian nursing homes. However, this fact might have a critical influence on the study results because, at the time of the study period, the Carinthian nurse managers' major focus regarding UI management was to obtain a sufficient number of absorbent products. Therefore, province (Styria vs. Carinthia) was included as a potential confounder in the analysis.

Due to the binary outcomes (daily UI, diagnosis UI, interventions UI), the odds ratios (OR) between the two groups were estimated using a generalized estimating equation (GEE) model (Landerman, Mustillo, & Land, 2011). The GEE model is also commonly applied by repeated measure data (Landerman et al., 2011). In addition, the GEE is recommended by the Cochrane Handbook of systematic reviews of interventions (Higgins et al., 2011) and is a valid model for cluster level analysis (Richardson, Garner, & Donegan, 2016) in order to overcome the "unit of analysis error" (Higgins et al., 2011).

The GEE model was constructed by including all main effects and interactions, omitting interactions that were not statistically significant. We used the GEE model with logit link and an autoregressive order 1 to model the within-nursing homes correlation (missing values were assumed to be completely random).

To construct the GEE model, we used the primary outcome (daily UI) with the resident as the subject and the province, nursing home and time as the inner subject variables. The inner subject variables were all included in the first step of the model and excluded in a step-wise manner. The model was constructed with the following main effects: group, as well as dementia/cognitive impairment, care dependency and age, because they showed significant differences at the baseline between the intervention and control groups (IG and CG).

We used the autoregressive order 1, because three measurement points and two observations made at nearer time points are more strongly correlated than two observations made at more distant timepoints (Released, 2016).

We used a binary logistic model because of the binary outcome (daily UI: yes/no).

The model was chosen based on following criteria:

(1) The model had to converge in order to be sure that the "Goodness of Fit" of the model was reliable,

(2) the correlations between the time points in the working matrix made sense,

(3) a low quasi-likelihood according to the Independence Model Criterion (QIC) was observed, indicating a "better" model, and

(4) because the order of the inner subject variables had no influence on the QIC, we chose the order province, nursing home and time.

Analyses were performed based on the intention-to-treat principle and following the CONSORT 2010 statement for analyzing cluster randomized trials (Campbell, Piaggio, Elbourne, & Altman, 2012). The influences of baseline characteristics were evaluated by including age, dementia and care dependency in the model. The intra-cluster correlation coefficient was calculated with R (version 3.4.2) package 'sjstats' (Lüdecke, 2018). To overcome the influence of the cluster nature as well as the influence of the outcome variables on the intra-cluster correlation coefficient, we used the formula for binary outcomes of Wu et al. (Wu, Crespi, & Wong, 2012). Throughout the analyses, 95% CIs were reported, and a *P*-value of ≤ 0.05 was considered statistically significant.

3. Results

3.1. Process evaluation

To evaluate the process, we followed four steps:

1 Recruitment of the nursing homes clusters: Overall, we had a nursing home response rate of 15.8% (19.3% in Styria and 13.3% in Carinthia).
2 Response of clusters in the IG (n = 6): In general, 4 of the nurse managers/ persons responsible for this project agreed with the recommendations and regarded them as acceptable and applicable for resident care/treatment. 5 of the interviewed persons thought that the recommendations were helpful for nurses.
3 Experience of the IG's during and response to the intervention (n = 6): 2 of the nursing homes had fully implemented the recommendations, and 4 partially implemented the recommendations. More than 50% used the implemented recommendation during their daily nursing care practice, mainly by providing information material (41.7%).
4 Unintended consequences in IG (n = 6): The interviewed persons reported that 5 institutions met challenges while implementing the recommendations (e.g., residents were unwilling to actively keep a bladder diary).

The twelve nursing homes included a total of 676 female residents, with a response rate of 56.4%. The main reasons for non-participation were refusal (40.7%) and cognitive impairment (34.6%). Fig. 1 provides a detailed description of the process of recruitment, allocation and analysis.

3.2. Sample characteristics

We analyzed data from 216 residents in the IG and 165 in the CG (Table 2).

The IG had a statistically significant, higher response rate, were statistically significantly older and suffered more often from dementia/ cognitive impairment than the CG residents, respectively. Residents in the IG were statistically significantly more care dependent (mean CDS sum score: 54.4) compared to the CG (mean CDS sum score: 60.5). The prevalence of UI in the IG differed statistically significantly from the CG. Most of the IG and CG residents were UI prior to nursing home admission and displayed daily UI at the baseline measurement. We found no statistically significant differences between the IG and the CG at baseline regarding daily UI, diagnosis of UI and use of absorbent products. At baseline, a statistically significant difference between the IG and CG existed regarding the use of recommended interventions. The intra-cluster correlation coefficient for 381 residents in twelve nursing homes for the primary outcome „daily UI "was 0.03.

3.3. Support for hypotheses

Hypothesis one was supported by our results (Table 3).

IG residents had a lower risk (OR = 0.14) of experiencing daily UI than CG residents. With each increasing point in the CDS (i.e., decrease in nursing care dependency), the risk of experiencing daily UI events decreased (OR = 0.93).

Hypothesis two was not supported by our results (Table 4).

Residents in Styrian nursing homes (OR = 0.32) and in the IG (OR = 0.05) had a lower chance of receiving a UI diagnosis than residents in Carinthian nursing homes and in the CG. Significantly more UI diagnoses were made at T2 than at T1 (OR = 2.12).

Hypothesis three was supported by our results (Table 5).

Residents in Styrian nursing homes (OR = 5.02) as well as residents in the IG (OR = 5.16) were five times more likely to receive a recommended intervention than residents in Carinthian nursing homes or in the CG.

Residents in Styrian nursing homes (OR = 0.36) and in the IG (OR = 0.01) were less likely to receive absorbent products than residents in Carinthian nursing homes and in the CG.

4. Discussion

We included twelve nursing homes with 381 participating residents in this study. We found that residents in the IG had fewer UI diagnoses and received the recommended interventions more frequently. On the other hand, CG residents received more absorbent products (not considered standard treatment) and were at higher risk of experiencing daily UI.

At baseline, 77.9% IG residents and 80% CG residents experienced daily UI. IG residents had a lower risk (OR = 0.14) of experiencing daily UI than CG residents. Similar results were cited in another study using an evidence-based guideline, with an improvement of more than 50% in UI among older people dwelling in a community (Egnatios et al., 2010). These results and our study results show that using evidence-based guideline recommendations can effectively reduce UI in older people.

Residents in the IG had a lower chance of receiving a UI diagnosis than residents in the CG, which is in line with the baseline data, where 53.2% of the IG residents received a diagnosis and 63.6% of the CG residents. Another study that focused on the use of an incontinence guideline in nursing homes reported that only 15% of cases had a diagnosis of UI that had been assessed and recorded by their clinician (Watson, Brink, Zimmer, & Mayer, 2003). This indicates that a stronger focus should be placed on the diagnosis of UI in education and nursing practice to provide adequate nursing care.

IG residents had a five times higher chance of receiving one of the recommended interventions than CG residents. We found a statistically significant difference regarding the use of the recommended interventions at baseline (IG: 37% and CG: 17.6%). This baseline group difference with regard to recommended interventions might have influenced our finding that IG residents have a higher chance of receiving recommended interventions. This should be taken into consideration when interpreting the results regarding recommended interventions. Wagg et al. (2011) also stated that older women were less likely to receive guideline-compliant UI management (Wagg et al., 2011). This could be explained by the fact that UI is regarded as a normal part of aging (Abrams & Society, 2016). The interviewees also commented that women consider UI to be normal and are not willing to actively address it (e.g., by using a bladder diary or bladder training).

Residents in the CG were also more likely to receive absorbent products than those in the IG. However, both groups used high amounts of absorbent products at baseline, T2 and T3. Other studies have also described high amounts of absorbent product usage (Wagg et al., 2011; Watson et al., 2003). During the process evaluation and data collection, residents stated that absorbent products were commonly used during the women's lifespan, and that they also used products like inlay pads for reasons of hygiene and well-being even if they were not incontinent.

The degree of care dependency was also an influencing factor on all three hypotheses e.g. as care dependency increased so did the likelihood of daily UI. A tree analysis, conducted by the first author, also showed similar results for the prevalence of UI and DI in nursing homes (Mandl, Halfens, & Lohrmann, 2016). In that study, we found a high prevalence of UI in residents that was limited to completely care dependent residents for the item "dress/undress". A high prevalence of DI was also observed in residents that were either greatly or completely care dependent for the item "hygiene" and completely dependent for the item "dress/undress". Other studies also highlighted the influence of care dependency, as measured with other instruments (e.g., Barthel index), on incontinence (Saga, Vinsnes, Morkved, Norton, & Seim, 2015).

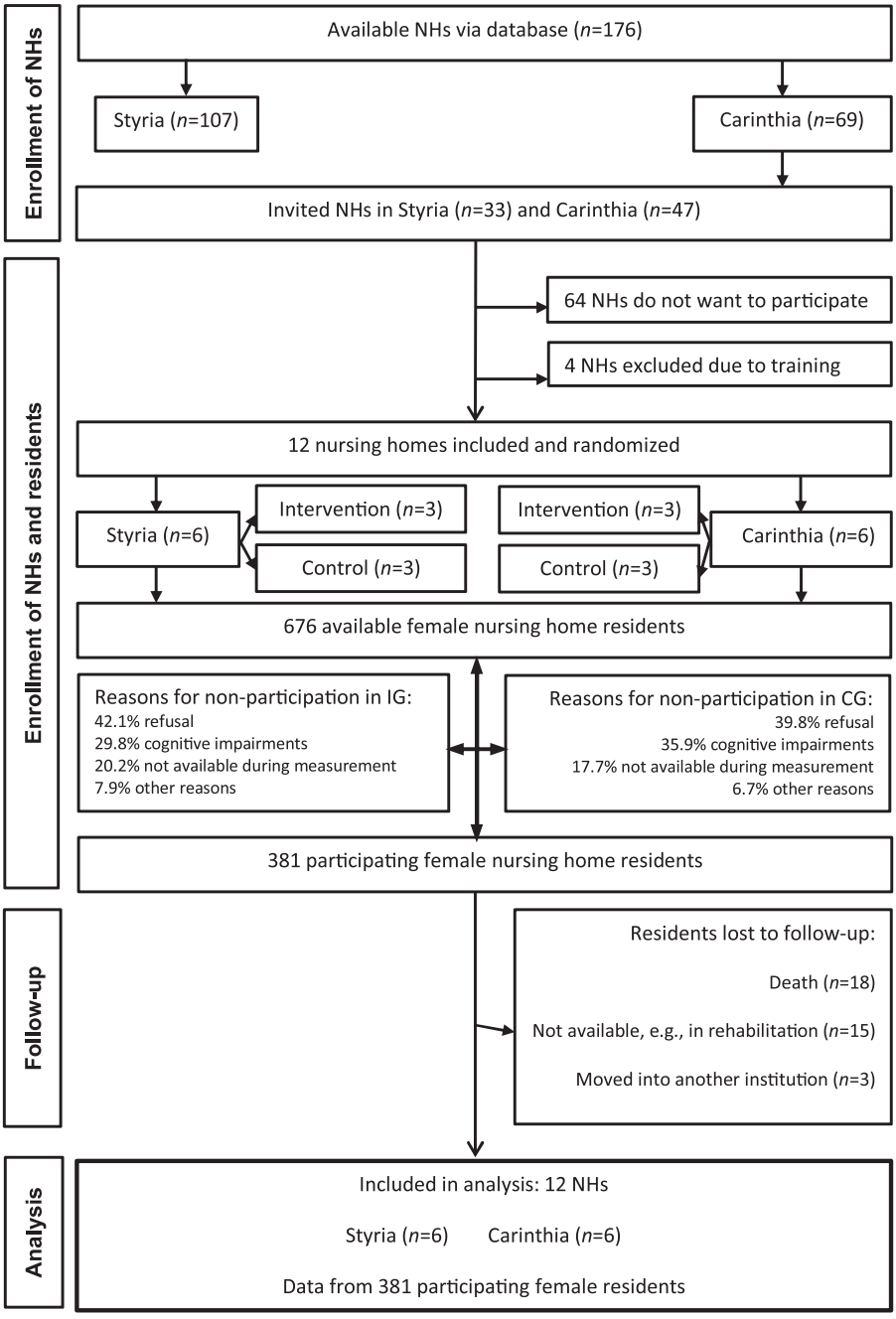

Fig. 1. Description of the process of recruitment, allocation and analysis.

Table 2
Sample characteristics at baseline (T1).

	IG (n = 216)	CG (n = 165)	p values
Response rate %	65.5	47.7	0.000
Mean age in years	86.0	82.3	0.037
Dementia %	54.2	38.2	0.002
Mean CDS sum score	54.4	60.5	0.017
Prevalence of UI (%)	71.3	66.7	0.018
UI prior to nursing home admission (%)	57.8	63.6	0.339
Daily UI (%)	77.9	80	0.249
Documented UI diagnosis (%)	53.2	63.6	0.092
Recommended interventions (%)	37	17.6	0.000
Absorbent products (%)	88.4	90.9	0.433

5. Limitations

One challenge in cluster randomized trials is the selection bias at cluster level, which can occur when an institution declines to participate, which happened in this study and might influence the generalizability of the results.

We asked all at the baseline measurement available female residents whether they wanted to participate in the study (n = 676). This number was much lower than the assumed pool of potential female residents (n = 950), based on national database numbers. This may be due to the fact that in two nursing homes only specific wards participated and that some of the nursing homes, especially in Carinthia, were not fully booked during the study period. These aspects may influence the interpretation of our results. At the end, we could include 381 residents in the analysis, which leads to a reduced power. A reduced power can

Table 3
Generalized estimating equation model for daily UI.

	Odds ratio	*p*-value	95% CI
Province			
Carinthia (reference)	1		
Styria	0.80	0.21	0.56-1.14
Group[a]			
CG (reference)	1		
IG	**0.14**	**0.02**	**0.03-0.70**
Time			
T1 (reference)	1		
T2	1.09	0.48	0.85-1.40
T3	1.00	0.98	0.76-1.32
Dementia/Cognitive impairment			
No (reference)	1		
Yes	1.33	0.15	0.91-1.94
CDS-sum score[a]	**0.93**	**0.00**	**0.91-0.95**
Age	1.00	0.76	0.99-1.02
Interaction: Group X CDS-sum score[a]			
CG X CDS-sum score (reference)	1		
IG X CDS-sum score	**1.03**	**0.03**	**1.00-1.06**

CG = Control group; IG = Intervention group.
[a] $p \leq 0.05$.

Table 4
Generalized estimating equation model for UI diagnosis.

	Odds ratio	*p*-value	95% CI
Province[a]			
Carinthia (reference)	1		
Styria	**0.32**	**0.00**	**0.16-0.65**
Group[a]			
CG (reference)	1		
IG	**0.05**	**0.00**	**0.01-0.18**
Time			
T1 (reference)	1		
T2[a]	**2.12**	**0.00**	**1.56-2.89**
T3	0.91	0.53	0.67-1.23
Dementia/Cognitive impairment			
No (reference)	1		
Yes	1.12	0.63	0.72-1.74
CDS- sum score[a]	**0.97**	**0.00**	**0.95-0.99**
Age	0.98	0.06	0.96-1.00
Interaction: Province X group[a]			
Styria X CG (reference)	1		
Carinthia X IG (reference)	1		
Carinthia X CG (reference)	1		
Styria X IG	**5.06**	**0.00**	**2.15-11.89**
Interaction: Group X CDS-sum score[a]			
CG X CDS-sum score (reference)	1		
IG X CDS-sum score	**1.04**	**0.00**	**1.01-1.06**

CG = Control group; IG = Intervention group.
[a] $p \leq 0.05$.

increase the likelihood of a significant result representing a false positive finding (Dumas-Mallet, Button, Boraud, Gonon, & Munafò, 2017). However, as we found statistically significant results according to all three hypotheses, the sample size was big enough to show an effect. This might lead to the conclusion that the assumed effect is higher than expected in the sample size calculation.

The data collection for diagnosis of dementia/cognitive impairment was based on the nurses' clinical assessment. This was not objectively measured with, for example, ICD-10 coding. The process of medically diagnosing dementia is a lengthy process and, therefore, rarely requested by relatives/residents in Austrian nursing homes. To gain a realistic impression of the dementia rates, we included the nurses' clinical assessment of cognitive impairment.

6. Implications for future research

In future studies on incontinence, we recommend the inclusion of a nurse who is familiar with the residents during the resident recruitment process. This might increase the response rate. Researchers conducting studies in the nursing home setting must also take into account the fact that the nursing homes might not be fully booked when calculating the sample size in the homes. Also, due to the short study period (three months), the sustainability of our results should be measured in future research.

Overall, the introduction of recommendations from evidence-based guidelines for UI management resulted in positive resident outcomes, a lower risk for daily UI events and an increased use of evidence-based nursing interventions.

Table 5
Generalized estimating equation model for the use of recommended nursing interventions and absorbent products.

Recommended **interventions**	Odds ratio	*p*-value	95% CI
Province[a]			
Carinthia (reference)	1		
Styria	**5.02**	**0.00**	**3.20-7.87**
Group[a]			
CG (reference)	1		
IG	**5.16**	**0.00**	**3.20-8.32**
Time			
T1 (reference)	1		
T2[a]	**0.68**	**0.01**	**0.50-0.92**
T3[a]	**0.51**	**0.00**	**0.38-0.70**
Dementia/Cognitive impairment			
No (reference)	1		
Yes	0.95	0.84	0.60-1.51
CDS- sum score[a]	**0.99**	**0.01**	**0.97-1.00**
Age	1.00	0.73	0.98-1.02
Absorbent products	Ods ratio	*p*-value	95% CI
Province[a]			
Carinthia (reference)	1		
Styria	**0.36**	**0.00**	**0.20-0.65**
Group[a]			
CG (reference)	1		
IG	**0.01**	**0.01**	**9.74E-5 – 0.24**
Time			
T1 (reference)	1		
T2	1.32	0.16	0.90-1.95
T3	1.22	0.36	0.80-1.85
Dementia/Cognitive impairment			
No (reference)	1		
Yes	0.93	0.82	0.51-1.71
CDS- sum score[a]	**1.05**	**0.00**	**1.03-1.07**
Age[a]	**0.94**	**0.00**	**0.91-0.96**
Interaction: Group X age[a]			
CG X age (reference)	1		
IG X age	**1.07**	**0.00**	**1.03-1.12**

7. Conclusions

Our findings demonstrate that the introduction of adapted recommendations for the conservative management of UI among female nursing home residents can increase the likelihood to receive recommended interventions. Further research is required to determine the long-term effect of introducing recommendations for the conservative management of UI among female nursing home residents with regard to e.g., cost-effectiveness or resident outcomes such as severity of UI.

Conflict of interest statement

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