

Telenursing: How do caregivers treat and prevent pressure injury in bedridden patients during the COVID-19 pandemic in Thailand? Using an embedded approach

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Abstract

Objective: To evaluate telenursing for caregivers (CGs) to treat and prevent pressure injury (PI) in bedridden patients (BPs) during the COVID-19 pandemic in Thailand.

Methods: Purposive sampling of 70 CGs [intervention group (i-group): $n = 35$ and control group (c-group): $n = 35$] using an embedded approach was conducted from August 2020 to February 2021. The QUAN data were concurrently collected via online semi-structured interviews (OSIs) and video in-depth interviews (VII), then analysed using multivariate analysis of variance and thematic analysis.

Results: The QUAN data showed that CGs treating and preventing PI in BPs has a significant and positive effect ($p < 0.01$). The qual data illustrates that telenursing for CGs treating and preventing PI in BPs is associated with training and education, skin cleaning, repositioning, monitoring, and assessment of PI during the COVID-19 pandemic.

Conclusion and implications: Telenursing for CGs treating and preventing PI in BPs is valuable to the professional consultation during the COVID-19 pandemic. Telenursing can reduce the CG burden, instructing them how to visually examine, clean, monitor, and risk assess the skin of BPs to prevent Pls.

Keywords

Telenursing, pressure injury, caregiver, bedridden patients, COVID-19 pandemic, Thailand, telehealth

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Introduction

The coronavirus disease 2019 (COVID-19) pandemic is currently impacting the provision of healthcare in Thailand, hence there have been great advances in telenursing. Bedridden patients (BPs) are at risk of pressure injuries (PIs) and it is now possible for telenursing via phone apps, websites, video conferences, tracking devices, and medical records to help caregivers (CGs) prevent and treat BPs.^{1,2} Telenursing for CGs to prevent PI has changed in-person visits to take-home and hospital medication,³ with telenursing quickly adapting to meet the needs of caring for BPs during the COVID-19 pandemic while adhering to “social distancing”.^{4,5}

BPs with PI are at a higher risk of morbidity due to the COVID-19 pandemic, arising from the difficulty of early diagnosis, delivery of healthcare, telecommunication, and in-person medication. Telenursing is appropriate for teaching CGs how to treat and prevent PI at home during the

pandemic.⁶ The evaluation of PI diagnosis can enhance sensor data stream, online decision-making, medical conditions, monitoring, and risk assessment in palliative care.^{7,8} A few studies focused on the methods that CGs can use to

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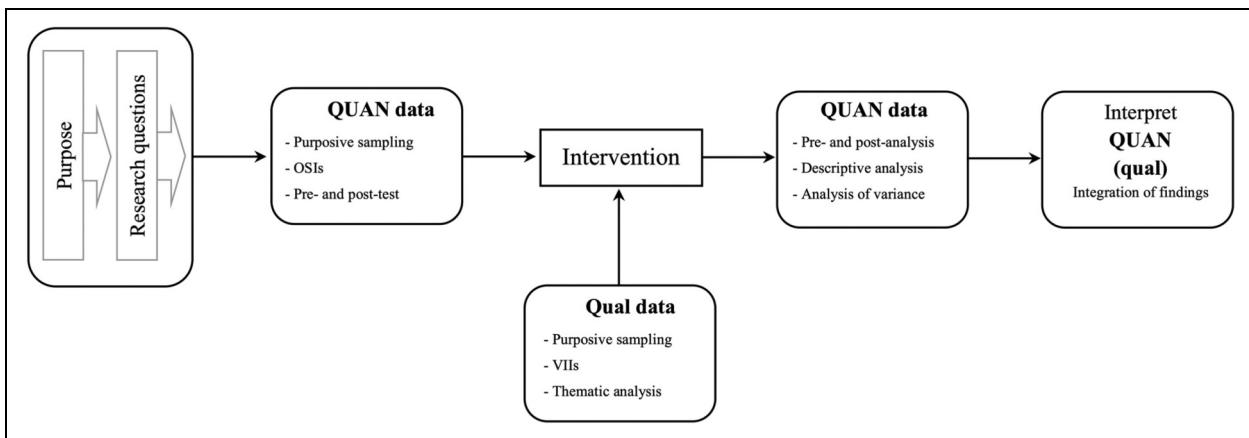


Figure 1. Embedded approach.

treat and prevent PI^{9,10} monitoring and skin cleaning rather than supporting CGs caring for BPs.^{11,12} Due to the lack of published studies in telenursing, we aimed to evaluate telenursing for CGs to treat and prevent PI in BPs during the COVID-19 pandemic in Thailand. This study addressed the following research question:

RQ1. To what extent does telenursing help CGs to treat and prevent PI in BPs during the COVID-19 pandemic in Thailand?

Methods

An embedded approach

An embedded approach¹³ was utilised to integrate the QUAN and qual data (see Figure 1), as triangulated to address different research questions regarding the same phenomenon,¹⁴ ensuring the validity of the results.

Study setting

The participants were primarily CGs caring for BPs at home via screening of electronic medical records from three sites, Ayutthaya, Angthong, and Pratumthani province, in central Thailand. To reduce COVID-19 impact, the data was collected online via videoconference. Thailand has experienced three waves of COVID-19 transmission in March 2020, December 2020, and February 2021. The data collection took place between August 2020 and February 2021 when COVID-19 restrictions and national lockdown were in place.

Participants and procedures

The inclusion criteria were CGs aged 60 years and above caring for immobilised elderly patients at risk of bedridden complications with chronic illness. The CGs caring for BPs with dementia, schizophrenia, manic-depressive disorder,

and intellectual disability were excluded. The participants were assigned to two groups, the intervention group (i-group: $n=35$) and control group (c-group: $n=35$) and purposively selected to live in rural ($n=17$) and urban ($n=18$) settings. Online semi-structured interviews (OSIs) and video in-depth interviews (VIIIs) were conducted from August 2020 to February 2021. VIIIs lasted 40–50 min and were conducted online with CGs during the treatment and prevention of PI at home.

Quantitative instruments

The OSIs were conducted online at the participant's home in Thai, then translated into English by the first author. To ensure validity, three professional nurses and Institutional Review Board (IRB) evaluated the OSIs. The OSIs collected information regarding participant demographics, treating PI and preventing PI during the COVID-19 pandemic, with the participants asked to rate answers on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Quantitative measures

The quantitative measures of treating PI were: CGs training and education (CTE), formalising continuing education (FCE), stage of the injury (1–6) (SOI1–6), skin cleaning (SKC) and primary taking medication (PTM). The measures to prevent PI included repositioning (REP), elevating heels (ELH), support surface (SUS), skin protection (SKP), skincare assessment (SCA), protecting tissue prominences (PTP), PI risk and skin assessment (PIA), monitoring patient time (MPT), and nutrition assessment (NUA).¹⁵

Quantitative analyses

The mean scores were computed to determine the overall rating of treating and preventing PI and the OSIs were

Table I. Descriptive analysis.

CG characteristics	i-group (<i>n</i> = 35)		c-group (<i>n</i> = 35)		<i>p</i> -value
	<i>n</i> (%)	Mean (SD)	<i>n</i> (%)	Mean (SD)	
Gender					0.23*
Male	16 (22.9)	—	16 (22.9)	—	
Female	19 (27.1)	—	19 (27.1)	—	
Age					0.29*
≤ 50	1 (1.42)	—	—	—	
51–59	3 (4.29)	—	4 (5.71)	—	
≥ 60	31 (44.29)	—	31 (44.29)	—	
Relationship to BPs					0.46*
Spouse	10 (14.3)	—	5 (7.1)	—	
Child/Spouse of child	16 (22.90)	—	19 (27.1)	—	
Father/Mother	2 (2.90)	—	5 (7.10)	—	
Other	7 (10)	—	6 (8.60)	—	
Education level					0.27*
Less than bachelor's degree	31 (44.29)	—	33 (47.14)	—	
Bachelor's degree or higher	4 (5.71)	—	2 (2.86)	—	
Household income					0.21*
≤ 30,000 THB/month	3 (4.3)	—	—	—	
30,000–50,000 THB/month	18 (25.7)	—	19 (27.1)	—	
≥ 50,001 THB/month	14 (20.0)	—	16 (22.9)	—	
Risk group					0.36*
Risk level I	20 (57.14)	—	9 (25.72)	—	
Risk level II	15 (42.86)	—	26 (74.28)	—	
Duration of injury					0.32*
≤ 1 year	14 (40)	—	19 (54.28)	—	
≥ 1 year	21 (60)	—	16 (45.72)	—	
Paralysis level					0.90*
Monoplegia	1 (1.4)	—	2 (2.9)	—	
Hemiplegia	11 (15.7)	—	9 (12.9)	—	
Paraplegia	12 (17.1)	—	12 (17.1)	—	
Quadriplegia	11 (15.7)	—	12 (17.1)	—	
Risk level (Braden scores)					0.80*
At-risk (15–18 scores)	—	—	—	—	
Moderate risk (13–14 scores)	—	—	—	—	
High risk (10–12 scores)	15 (21.4)	—	14 (20.0)	—	
Very high risk (6–9 scores)	20 (28.6)	—	21 (30.0)	—	
Underlying disease					0.35*
With DM	27 (38.6)	—	30 (42.9)	—	
Without DM	8 (11.4)	—	5 (7.1)	—	
Incontinence condition					0.55*
Yes	29 (41.4)	—	27 (38.6)	—	
No	6 (8.6)	—	8 (11.4)	—	
BPs characteristic					0.16*
Weight (kg)	48.48	5.16	50.15	6.25	
Height (cm)	1.57	0.64	1.62	0.78	
Body mass index (kg/m ²)	16.77	1.75	19.04	2.39	

**p*-value stand for χ^2 test.

descriptively analysed. The treatment × time was subjected to multivariate analysis of variance (analysis of variance), with treatment between i-group and c-group as pre- and post-test analysis.

Qualitative analyses

All VII transcripts were analysed using thematic analysis (theme, category, coding, and quotation).¹⁶ The three stages of preparing, organizing, and reporting the results to ensure

Table 2. Measures to treat and prevent PI.

PI	Pre-test (n = 35)				Post-test (n = 35)				<i>p</i> -value	
	i-group		c-group		i-group		c-group			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Treating PI										
CTE	2.63	0.49	2.63	0.49	4.51	0.51	3.20	1.11	0.00*	
FCE	2.51	0.51	2.43	0.50	4.74	0.44	3.29	1.20	0.00*	
SOII-6	2.51	0.51	2.43	0.50	4.74	0.44	3.34	1.21	0.00*	
SKC	2.40	0.50	2.34	0.48	4.26	0.44	3.11	0.99	0.00*	
PTM	2.60	0.50	2.51	0.51	4.60	0.50	3.60	0.81	0.00*	
Preventing PI										
REP	2.89	0.32	2.94	0.24	4.74	0.44	3.51	1.04	0.00*	
ELH	2.20	0.41	2.17	0.38	4.37	0.49	3.29	0.93	0.00*	
SUS	2.86	0.55	2.74	0.56	4.74	0.44	3.49	1.09	0.00*	
SKP	2.80	0.41	2.83	0.38	4.49	0.51	3.60	0.77	0.00*	
SCA	2.60	0.50	2.51	0.51	4.74	0.44	3.49	1.09	0.00*	
PTP	2.54	0.51	2.51	0.51	4.74	0.44	3.49	1.09	0.00*	
PIA	2.66	0.48	2.63	0.49	4.74	0.44	3.46	1.09	0.00*	
MPT	2.49	0.51	2.37	0.49	4.11	0.32	3.11	0.93	0.00*	
NUA	2.63	0.49	2.66	0.48	4.11	0.32	3.09	0.92	0.00*	

**p* < 0.05.

Table 3. Comparison of the two groups.

Population	i-group (n = 35)		c-group (n = 35)		Estimated effects	
	Adjusted M	SD	Adjusted M	SD	Adjusted mean difference	<i>p</i> -value
All CG, n (i-group) = 35, n (c-group) = 35	60.4%	0.479	57.5%	0.503	3.9%	0.24*
Pre-test, n (i-group) = 35, n (c-group) = 35	55.9%	0.603	49.2%	0.619	7.3%	0.05*
Post-test, n (i-group) = 35, n (c-group) = 35	58.4%	0.510	65.8%	0.553	12.5%	0.00**

p* < 0.05, *p* < 0.01.

trustworthiness, validity, transferability, and confirmability were analysed.¹⁷ Data processes were iterative, that is, continuous data analysis with simultaneous fine-tuning while writing. To ensure trustworthiness, we prolonged engagement, triangulation, member check, thick descriptive, audit trial, and internal-external validity of findings.

Integrating QUAN and qual analyses

The QUAN and qual data analyses were integrated to confirm factors affecting treating and preventing PI in BPs. The QUAN (qual) data was repeatedly compared to the meaning of the qual results with relevant quotes.

Results

Quantitative analysis

The CGs' demographics and BPs' characteristics are provided in Table 1, showing that the CGs had an average

age of 54.70 ± 5.16 years with no significant differences between the two groups. Table 2 presents the measures for treating and preventing PI in BPs and Table 3 is a comparison of the i-group and c-group.

The multivariate analysis showed a significant difference between i-group and c-group (Wilks's $\lambda = 0.78$, $F(4, 35) = 3.19$, $p = .01$, $\eta^2 = 0.39$). There was a positive effect time (Wilks's $\lambda = 0.72$, $F(3, 34) = 4.12$, $p = .01$, $\eta^2 = 0.37$) and effect time (i \times c) (Wilks's $\lambda = 0.81$, $F(4, 47) = 3.12$, $p = .01$, $\eta^2 = 0.31$). The significant treatment effects on treating and preventing PI are presented in Table 4.

Qualitative results

VIIIs were conducted to explore the CGs' overall views on how to treat and prevent PI in BPs, and their responses were classified according to two themes, fourteen subcategories and 30 codes. Representative CGs views are presented in Table 5.

Table 4. Comparison of PI between i-group and c-group.

PI	Effect time			Effect time (i × c)		
	F	p-value	η^2	F	p-value	η^2
Treating PI						
CTE	10.57	0.01**	0.30	16.25	0.01**	0.29
FCE	8.67	0.01**	0.21	5.78	0.05*	0.11
SOII–6	12.56	0.01**	0.20	18.06	0.01**	0.26
SKC	16.35	0.01**	0.15	13.43	0.01**	0.46
PTM	3.56	0.05*	0.08	2.18	0.5*	0.19
Preventing PI						
REP	13.22	0.01**	0.01	10.87	0.01**	0.12
ELH	8.80	0.01**	0.10	6.41	0.01**	0.18
SUS	9.57	0.01**	0.09	7.27	0.01**	0.20
SKP	10.18	0.01**	0.05	7.95	0.01**	0.25
SCA	9.77	0.01**	0.07	7.01	0.01**	0.24
PTP	14.56	0.01**	0.02	9.45	0.01**	0.26
PIA	9.89	0.01**	0.05	7.79	0.01**	0.23
MPT	13.60	0.01**	0.09	11.06	0.01**	0.16
NUA	10.35	0.01**	0.12	9.02	0.01**	0.27

** $p < 0.01$.**Integration of results**

The QUAN and qual data were integrated to further assess the ability of CGs to treat and prevent PI in BPs. The QUAN data revealed that telenursing for CGs to treat and prevent PI had a positive effect on their BPs ($p < 0.01$), whereas the qual data shows that telenursing helped CGs to learn treatment methods for preventing PI during the COVID-19 pandemic. Table 6 presents the integration of the QUAN and qual data.

Discussion

Our embedded approach evaluated telenursing for CGs to treat and prevent PI in BPs during the COVID-19 pandemic. The QUAN data shows that telenursing for CGs to treat and prevent PI had a positive effect on BPs ($p < 0.01$). The qual data illustrates that telenursing for CGs to treat and prevent BPs is associated with training and education, skin cleaning, repositioning, monitoring, and assessment, enhancing the prevention of PI during the COVID-19 pandemic. These results differ from previous findings, as studies by Kordestani

Table 5. Themes, categories, coding and quotations.

Theme	Categories	Codes	Example quotes
Treating PI	CGs training and education	<ul style="list-style-type: none"> • Training during treatment of BPs • Using CG manual documents 	I have trained to prevent PI in my father during the COVID-19 pandemic with expertise in preventing PI. Professional nurses taught me how to treat, she explained in-depth the stage of injury and caring for my patient
		<ul style="list-style-type: none"> • Continuing knowledge and practical skills • Follow-up and implementation 	I gained the knowledge and practical skills to protect my husband over the course of 3 consecutive weeks, giving me the confidence to take care of him myself because I can take care of my husband without any scars like my nursing care
	Stage of injury (I–6)	<ul style="list-style-type: none"> • Stage of injury principles • Appropriate treating methods 	I have gained knowledge of PI that is divided into six stages. When my father was discharged from the hospital, I could not distinguish which stage. This knowledge made me believe that it would help me to protect against PI.
		<ul style="list-style-type: none"> • Cleaning strategies • Proper tools for cleaning 	I was able to wipe the skin after defecation and urination were easier to clean. It makes my mother's buttock not dermatitis at all unlike before.
	Skin cleaning	<ul style="list-style-type: none"> • Medical treatment 	Caring for BPs at home is like I was a doctor. I had to take care of nursing medication on time. Telenursing reminds me to prepare medications. It's like I take care of my pills without any mistakes.
			Repositioning to prevent PI is turning because it relieves pressure on the skin as well as I can. Repositioning is very difficult for me, but I was lucky to get this telenursing from a professional nurse.
	Prevention methods	<ul style="list-style-type: none"> • Optimal frequency and strategies • Shear strain management 	I met the uncle next door who was a BP, he had a very dark wound on his heel and healed slowly. I was afraid that my father would have this wound. Telenursing taught me techniques to raise the heels which are very easy to take care of my father with PI.
		<ul style="list-style-type: none"> • Special area treatments • Elevating at-risk area • Lifting body parts clear 	The professional nurse said that I had to buy an air mattress. I also bought it because I was afraid that my brother would be
	Support surface	<ul style="list-style-type: none"> • Specific pressure-relieving support surfaces • Increased contact area 	

(continued)

Table 5. Continued

Theme	Categories	Codes	Example quotes
	Skin protection	<ul style="list-style-type: none"> Reactive support surface Skincare and protective barriers Provide offloading 	at a high risk of PI, it gave me confidence and no PI which I had to turn the patient every 2 h. I noticed that when my mother's skin was dry, it was easily wounded. I had tried to find a cream for moisturising, especially around the buttocks and back because the expert nurse said it was the site of the wound.
	Skincare assessment	<ul style="list-style-type: none"> Skin assessment Promote skin integrity 	I noticed that red marks were often present on my buttocks, heels, and back. Telenursing by an expert nurse taught me to assess the colour and temperature of the skin to prevent tissue injury. So, I was confident that my mother wouldn't have a wound.
	Protecting tissue prominences	<ul style="list-style-type: none"> Relief of mechanical loading Vulnerable area protection 	Non-balance erythema occurs on the bony prominence around the heel, hips, and shoulders. Telenursing forbade me to massage the bony prominence but taught me to find the right equipment to support it to improve circulation. My father didn't get PI at all.
	PI risk and skin assessment	<ul style="list-style-type: none"> Risk assessment Skin monitoring 	My mother is very high-risk of PI but telenursing by an expert nurse taught me to be aware and careful and take care that my mother has not been wounded in the past month
	Monitoring patient time	<ul style="list-style-type: none"> Risk assessment Monitoring schedule Raise awareness 	BPs need close supervision, especially skincare. Telenursing by an expert nurse taught me to be aware and vigilant about wound formation. Turning and assessing the skin at least every two hours to prevent pressure ulcers effectively.
	Nutrition assessment	<ul style="list-style-type: none"> Ultimate nutrition Dietary needs 	Telenursing by an expert nurse taught me to prepare food that improves nutrition and nutritious food. It gave my father more muscles and kept the skin hydrated, I noticed that the old wounds healed faster, early erythema skin disappeared.

et al.,⁷ Somsiri et al.¹⁰ and Newman et al.¹¹ indicate that training CGs to treat and prevent PI focused on the online translating stage of injury and self-adaptive treatment. We found that telenursing during the COVID-19 pandemic is associated with training and education for skin cleaning, repositioning, monitoring, and PI risk and skin assessment.

Integration of the QUAN and the qual data provided more detailed information regarding CGs to treat and prevent PI that could be used to enhance care assessment, skin protection, and tissue prominences. This aligns with the existing research on telenursing for skin cleaning, repositioning, and protecting tissue prominences during social distancing.^{18,19} Interestingly, participants' views on the consistent use of the skin cleaning PI handbook and telecare consultation with a professional nurse as a challenge to treat and prevent PI. However, previous research specific to PI exudates from COVID-19 patients,²⁰ we found that CGs training and formalising continuing education with telenursing can reduce skin cleaning PI at home.

Theoretical and practical contributions

We attempted to bridge the gap between theory and practice that currently exists within telenursing research,^{21,22} as most

studies have focused on in-person medication²³ and paid caregivers.²⁴ The study showed that there is no ideal context for COVID-19 patients, as the previous studies used a qualitative study,²⁵ systematic literature review^{26–28} and quantitative study.²⁹ Our study focused on telenursing for treating and preventing PI in BPs to fill the gap between care needs and CGs' capacity during the COVID-19 pandemic. Telenursing can enhance CGs training and learning, strategically advising, and medical records for treating and preventing PI. This study suggests that telenursing can reduce the CG burden, allowing visual examination and a professional nurse consultation via videoconference.

Strengths and limitations

The strength of this article includes the use of the embedded approach to telenursing during the COVID-19 pandemic. This study integrated the QUAN and qual data, showing a positive effect on CGs treating and preventing PI in BPs. However, there are some limitations. The non-randomised design and small sample size may not have accurately represented all groups. The fixed-format set of both OSIs and VIIIs questions may have resulted in biases during the interviews. The results are the participants' views so may not be

Table 6. Integration of the QUAN and qual data.

PI	QUAN data	qual data
Treating PI	Effect time ($i \times c$) has a significant and positive association with CTE, FCE, SOII-6, SKC, and PTM on the PI	Telenursing for training and education is important for CGs to care for BPs to prevent PI, such as skin cleaning and taking medication associated with PI
Preventing PI	There was a positive effect on the REP, ELH, SUS, SKP, SCA, PTP, PIA, MPT and NUA associated with PI ($p < 0.01$), respectively	Telenursing for CGs to treat and prevent BPs during the COVID-19 pandemic is intended to support the skin surface, repositioning, skincare assessment, and monitoring

generalised to other contexts. Future research should include theoretical background, hypothesis testing, large sample size, difference group, and validity scales so that findings can be generalised with an empirical model. Moreover, a further study provides to support CGs access and use of telecommunication for telenursing could be an effective treatment for the prevention of PI during the COVID-19 pandemic.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethical approval

This study was approved by the IRB at the Thammasat University and was conducted according to the Declaration of Helsinki, the Belmon Report, CIOMS Guidelines, and International Practice (ICH-GCP) (COA No. 117/2562: Project No. 065/2562).

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