

## The Safety and Effectiveness of Telemedicine for Cancer-Related Colostomy Care in Early Stage of Discharge: A Prospective, Randomized, Single-Center Study

Quan H<sup>1#</sup>, Wang H<sup>1#</sup>, Yang Y<sup>2</sup> and Yu H<sup>1\*</sup>

<sup>1</sup>Division of General Surgery, Zhoushan Hospital of Wenzhou Medical University, China

<sup>2</sup>Department of Outpatient, The First Affiliated Hospital of Haerbin Medical University, China

<sup>#</sup>This author's contributed equally to this work

### \*Corresponding author:

Hongwei Yu,

Division of General Surgery, Zhoushan Hospital of Wenzhou Medical University, 739 Dingshen Road,

Qiandao Street, Dinghai District, Zhoushan City

316004, Zhejiang Province, China

Received: 26 Feb 2024

Accepted: 06 Apr 2024

Published: 12 Apr 2024

J Short Name: COO

### Copyright:

©2024 Yu H, This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and build upon your work non-commercially.

### Citation:

Yu H, The Safety and Effectiveness of Telemedicine for Cancer-Related Colostomy Care in Early Stage of Discharge: A Prospective, Randomized, Single-Center Study. Clin Onco. 2024; 7(9): 1-7

### Keywords:

Telemedicine; Cancer-related colostomy; Quality of life; Complications; Self-care ability

### Abbreviations:

NCI-CTCAE: The NCI Common Terminology Criteria for Adverse Events; ESCA: The Exercise of Self-care Agency Scale; COH-QOL-OQ: The City of Hope-Quality of Life-Ostomy Questionnaire; C-COH-QOL-OQ: The Chinese version of City of Hope-Quality of Life-Ostomy Questionnaire

## 1. Abstract

**1.1. Background:** There has been an exponential growth in the use of telemedicine services to provide clinical care. However, the safety and effectiveness of telemedicine in cancer-related colostomy care during the early stages of discharge remains unclear. This study aimed to prove that the safety and effectiveness of telemedicine for cancer-related colostomy care are not inferior to those of outpatient care.

**1.2. Methods:** This was a prospective, randomized, noninferiority study. A total of 76 consecutive patients who underwent cancer-related colostomy stoma were enrolled and randomly divided into a telemedicine group or an outpatient group with an equal allocation ratio (1:1). The outpatient group was provided in-person interview mode colostomy care, whereas the telemedicine group was provided video interview mode colostomy care. Using stoma-related complications, self-care ability and quality of life reflected the safety and effectiveness of colostomy care in the early stages of discharge.

**1.3. Results:** The incidence of stoma-related complications within 2-weeks and 1-month after discharge showed no significant differences between the two groups ( $P_{2\text{-weeks}} = 0.772$  and  $P_{1\text{-month}} = 0.760$ ).

The NCI-CTCAE score for stoma-related complications was less than level 2. Patients with complications need not be hospitalized. The ESCA scores were  $101.4 \pm 13.9$  and  $106.3 \pm 16.5$ , respectively, in the telemedicine group, and  $101.8 \pm 13.5$  and  $103.3 \pm 13.4$ , respectively, in the outpatient group. The C-COH-QOL-OQ scores were  $6.15 \pm 0.91$  and  $6.34 \pm 0.86$ , respectively, in the telemedicine group, and  $6.27 \pm 0.71$  and  $6.38 \pm 0.61$ , respectively, in the outpatient group. The ESCA and C-COH-QOL-OQ scores were not significantly different between the telemedicine and outpatient group in 2-weeks and 1-month after discharge (all  $P > 0.05$ ).

**1.4. Conclusion:** The results of this study revealed that the safety and effectiveness of telemedicine for cancer-related colostomy in the early stages of discharge were not inferior to those of outpatient care. When using telemedicine for cancer-related colostomy care, communication between the medical staff and patients is broken through the restrictions of time and place.

## 2. Contributions to the Literature

1. There is limited evidence regarding the impact of telemedicine. This study proved that the safety and effectiveness of telemedicine for cancer-related colostomy care in the early stage of discharge was not inferior to that of outpatient care.

2. The patient can manage ostomy care independently after discharge. And advances in remote medical technology can provide patients with convenient virtual visits. These are the main reasons why the feasibility of telemedicine for colostomy care was not inferior to that of outpatient care.

3. Telemedicine for colostomy care has many benefits, and its use is confronted with challenges.

### 3. Introduction

In China, there are approximately 100,000 new colostomy patients annually. Rectal cancers are among the most common causes of colostomy [1]. According to statistics, approximately half of the patients with rectal cancer undergo colostomy. Furthermore, approximately 20-25% of patients operated with a primary anastomosis ended up with a stoma because of anastomotic leakage or unsatisfactory anorectal function [2]. Although surgery could improve the survival rate of patients with rectal cancer, colostomy changed the original method of defecation and could not control defecation at will, which could inevitably cause problems and affect their quality of life [3]. Most patients undergoing colostomy were excessively dependent on medical staff, did not know much about colostomy care and complication prevention, and were coupled with maladjustment to colostomy. Patients undergoing colostomy have a high demand for colostomy care in the early stages of discharge. If colostomy care is improper, complications can be easily observed [4]. Effective stoma care can significantly improve outcomes and decrease hospital readmission and emergency surgery rates [5]. The development of surgical techniques has decreased the length of hospital stays. Currently, most patients undergoing colostomy are discharged from the hospital approximately 1 week after the operation [6]. Patients undergoing colostomy mainly adopted the rehabilitation mode of home-based colostomy nursing after discharge. Therefore, health guidance from professionals should improve the quality of colostomy care [7]. Conventional outpatient care was the main route for receiving health guidance before the Covid-19 pandemic.

Unfortunately, Covid-19 has spread worldwide in 2019, resulting in colostomy care postponing routine outpatient care and passively shifting services to a telemedicine mode [8]. The increased availability of telemedicine services can undoubtedly reduce disease exposure for staff members and patients. Meanwhile, when using telemedicine management, the communication between medical staff and patients is broken through the restrictions of time and place. Especially, telemedicine can provide rapid access to colostomy patients who are not immediately available in person. Some studies have reported high levels of satisfaction with telehealth appointments among gastroenterology [9], psychiatric conditions [10], diabetes [11] and liver disease [12]. There has been exponential growth in the use of telemedicine services to provide clinical care currently [13]. The United States 2021 National Health Inter-

view Survey showed that 35.3% of adults had a telemedicine visit with a health care professional in the past 12 months [14]. About the 1800 patients who used telemedicine services between January 2021 and January 2022, the retrospective clinical data from our health center are shown. The practical evidence showed that virtual visits would not only substitute for routine health checks but would also substitute for in-person care.

Although this evidence points to the potential of telemedicine, its use should vary by specialty. The heterogeneity of disease called for the feasibility of telemedicine to require further validation before generalizing telemedicine. However, there is limited practical evidence regarding the impact of telemedicine in patients undergoing colostomy. The safety and effectiveness of telemedicine in cancer-related colostomy care in the early stages of discharge remain unclear. Thus, the safety and efficacy of telemedicine for cancer-related colostomy care in the early stages of discharge have gradually become a major point of interest. The purpose of this study was to prove that the safety and effectiveness of telemedicine for cancer-related colostomy care in the early stages of discharge was not inferior to that of outpatient care.

### 4. Methods

#### 4.1. Study Design

This was a prospective, randomized, noninferiority, single-center study. The study was conducted in accordance with the Declaration of Helsinki and approved by the hospital's Institutional Review Board (Clinical Research Ethics Committee of Zhoushan Hospital). In this study, we aimed to prove that the safety and effectiveness of telemedicine for cancer-related colostomy care in the early stages of discharge were not inferior to those of outpatient care. The sample size was determined using a non-inferiority test. Considering the possibility of cases dropping out, the sample size of each group was set to 38 cases. A total of 76 consecutive patients with cancer who underwent permanent colostomy stoma were enrolled and randomly divided into a telemedicine group or an outpatient group with an equal allocation ratio (1:1). The telemedicine group was given the video interview mode of colostomy care at 2-weeks and 1-month after discharge, while the outpatient group was given in-person interviews with colostomy care. The incidence and severity of stoma-related complications reflected the safety of colostomy care, and the use of self-care abilities and quality of life reflected the effectiveness of colostomy care in this study. Within the early stages of discharge, data on stoma-related complications, self-care ability and quality of life were collected and compared.

#### 4.2. Patient Selection

The inclusion criteria were as follows: (1) patients willing to conduct follow-up observation, and have signed the informed consent; (2) patients aged 18 to 70, regardless of sex; (3) patients with confirmed rectal adenocarcinoma, irrespective of tumor stage; (4) pa-

tients who underwent permanent colostomy stoma within 10 days, and were in accordance with the criteria for discharging the patient with a new ostomy from home health care; and (5) the life expectancy of patients after operation was > 6 months.

The exclusion criteria were as follows: (1) patients who were currently receiving therapy or case management from a mental health worker; (2) patients with serious heart and lung diseases that restrict their participation in the study; (3) patients who have poor compliance with mental disorders; and (4) patients with disturbances in communication, reading, or comprehension.

#### 4.3. Interventions

All patients were follow-up at 2-weeks and 1 month after discharge. At every follow-up the stoma therapist and fistula nurses viewed the patient's stoma, pouching system and peristomal skin, evaluated the quality of life and self-care ability of patients, documented any stoma-related complications, and educated on colostomy care, mental care, and complication management and prevention (approximately 2 hours). Colostomy care refers to the clinical practice guidelines for nursing care for adult patients with stoma (NCA). The outpatient group was given in-person interview mode colostomy care, whereas the telemedicine group was given video interview mode colostomy care. In the telemedicine group, video interviews were conducted between the stoma therapist and fistula nurses utilizing the hospital's remote medical platform and with patients using smartphones. Meanwhile, a WeChat applet called "virtual colostomy care clinic" built by a network engineer can provide physician-patient interactions.

#### 4.4. Observation index

(1) The incidence and severity of stoma-related complications were assessed to evaluate the safety of colostomy care. Common early ostomy adverse events included stomal bleeding, stomal necrosis, separation of the skin and mucosa, stomal retraction, stomal prolapse, stomal stenosis, and peristomal dermatitis. The NCI Common Terminology Criteria for Adverse Events (NCI-CTCAE) was used to evaluate the severity of the complications. The NCI-CTCAE was classified into levels 1-5 based on their severity. Higher levels indicate more serious complications.

(2) The Exercise of Self-care Agency Scale (ESCA) was used to

evaluate patients' self-care ability. The ESCA was developed by Kearney in 1979 and focused on individuals' self-assessment of their interest in self-care activities [15]. The ESCA Scale includes four dimensions: self-care knowledge, self-care responsibility, self-care skills, and self-concept, with an aggregate score of 172 [16]. Higher scores indicate stronger self-care ability.

(3) The Chinese version of City of Hope was used to evaluate quality of life. The City of Hope-Quality of Life-Ostomy Questionnaire (COH-QOL-OQ) was originally developed by Grant to assess QOL in persons living with an ostomy [17]. The Chinese version of City of Hope-Quality of Life-Ostomy Questionnaire (C-COH-QOL-OQ) was developed by Gao and colleagues [18]. The C-COH-QOL-OQ includes four dimensions: physical health, psychological health, social health, and mental health. The domain scores range from 0 to 10, with higher scores indicating better quality of life.

#### 4.5. Data Collection and Statistical Analysis

All continuous variables were expressed as median values and categorical variables were expressed as numbers with percentages. Comparisons of continuous variables between groups were performed using Student's t-test. Categorical variables were compared using the  $\chi^2$  test or Fisher's exact test as appropriate.

Statistical significance was set at  $P < 0.05$ . SPSS Statistics (version 20.0; IBM Corp., Armonk, NY, USA) was used to for the analysis.

### 5. Results

#### 5.1. Background Characteristics

A total of 76 consecutive patients who underwent cancer-related colostomy between November 1, 2022, and February 28, 2023, were enrolled and randomly divided into a telemedicine group or an outpatient group with an equal allocation ratio (1:1). A of 38 patients who underwent telemedicine care, dropped out of the study because of acute mechanical intestinal obstruction within 2-weeks after discharge. A of 38 patients who underwent outpatient care, dropped out of the study because of failure to follow up as required. Detailed background characteristics of the patients in the outpatient and telemedicine groups are summarized in Table 1. No significant differences were observed in the background characteristics between the two groups ( $P > 0.05$ ), illustrated in Table 1.

**Table 1:** Baseline demographic of the study sample by groups

Demographics	Outpatient group (n=37)	Telemedicine group (n=37)	p-values
Age; (mean $\pm$ SD)	61.71 $\pm$ 10.26	63.56 $\pm$ 9.66	P = 0.084
Gender; n (%)			
Male	24 (64.9%)	26 (70.3%)	P = 0.619
Female	13 (35.1%)	11 (29.7%)	
Marital status; n (%)			
Single	2 (5.4%)	1 (2.7%)	P = 0.556
Married	35 (94.6%)	36 (97.3%)	

Living status; n (%)			
Living alone	4 (10.8%)	6 (16.2%)	P = 0.496
Living with family	33 (89.2%)	31(83.8%)	
Education; n (%)			
Elementary school	19 (51.4%)	22 (59.5%)	P = 0.710
High school	16 (43.2%)	14 (37.8%)	
College/university	2 (5.4%)	1 (2.7%)	
Residence; n (%)			
City	23 (62.2%)	20 (54.1%)	P = 0.480
Rural areas	14 (37.8%)	17 (45.9%)	
Income; n (%)			
≤ 25,000 (CNY/y)	31 (83.8%)	34 (91.9%)	P = 0.286
> 25,000 (CNY/y)	6 (16.2%)	3 (8.1%)	
Neoadjuvant treatment; n (%)	30 (81.1%)	29 (78.4%)	P = 0.772
Postoperative chemotherapy; n (%)	31 (83.8%)	32 (86.5%)	P = 0.761
Surgical approach; n (%)			
Laparotomy	6 (16.2%)	5 (13.5%)	P = 0.744
Laparoscopy	31 (83.8%)	32 (86.5%)	

SD = standard deviation;

## 5.2. Safety of Telemedicine for Colostomy Care

Within 2-weeks after discharge, the stoma-related complications were peristomal irritant dermatitis (4, 10.8%), separation of skin and mucosa (1, 2.7%), stomal retraction (1, 2.7%), stomal stenosis (1, 2.7%), and stomal ischemia (1, 2.7%) in the outpatient group. In the telemedicine group, the complications were peristomal irritant dermatitis (4, 10.8%), separation of skin and mucosa (1, 2.7%), stomal retraction (1, 2.7%), and stomal ischemia (1, 2.7%). The incidence of stoma-related complications between groups showed insignificant differences within 2-weeks after discharge (21.6% vs. 18.9%;  $P = 0.772$ ), as illustrated in Table 2. The NCI-CTCAE of stoma-related complications was less than level 2 within 2-weeks of discharge. Patients with complications need not be hospitalized again.

Within 1-month after discharge, the stoma-related complications were peristomal irritant dermatitis (3, 8.1%), separation of the skin and mucosa (1, 2.7%) and stomal retraction (2, 5.4%) in the outpatient group, whereas in the telemedicine group, the complica-

tions were peristomal irritant dermatitis (3, 8.1%), separation of the skin and mucosa (1, 2.7%), stomal retraction (2, 5.4%) and stomal hernia (1, 2.7%). The incidence of stoma-related complications between the groups showed insignificant differences within 1-month after discharge (16.2% vs. 18.9%;  $P = 0.760$ ), as illustrated in Table 2. The NCI-CTCAE of stoma-related complications was less than level 2 within 1-month of discharge. Patients with complications need not be hospitalized again.

## 5.3. Effectiveness of Telemedicine for Colostomy Care

The ESCA scores were  $101.4 \pm 13.9$  and  $106.3 \pm 16.5$ , respectively, in the telemedicine group, and  $101.8 \pm 13.5$  and  $103.3 \pm 13.4$ , respectively, in the outpatient group at 2-weeks and 1-month after discharge. The C-COH-QOL-OQ scores were  $6.15 \pm 0.91$  and  $6.34 \pm 0.86$ , respectively, in the telemedicine group, and  $6.27 \pm 0.71$  and  $6.38 \pm 0.61$ , respectively, in the outpatient group at 2-weeks and 1-month after discharge. The ESCA and C-COH-QOL-OQ scores were not significantly different between the telemedicine and outpatient groups (all  $P > 0.05$ ), as shown in Table 3.

**Table 2:** Comparison of ostomy-related complications between two groups

Complications; n (%)	2-weeks after discharge		1-month after discharge	
	Outpatient group	Telemedicine group	Outpatient group	Telemedicine group
Peristomal irritant dermatitis				
erythema	1(2.7%)	1(2.7%)	1(2.7%)	1(2.7%)
papules	1(2.7%)	1(2.7%)	1(2.7%)	0
skin erosions	1(2.7%)	1(2.7%)	1(2.7%)	1(2.7%)
ulcers	0	0	0	0
vesicles	1(2.7%)	1(2.7%)	0	1(2.7%)
Stomal bleeding	0	0	0	0
Stomal necrosi	0	0	0	0
Separation of skin and mucosa	1(2.7%)	1(2.7%)	1(2.7%)	1(2.7%)
Stomal retraction	1(2.7%)	1(2.7%)	2(5.4%)	2(5.4%)
Stomal prolapse	0	0	0	0
Stomal stenosis	1(2.7%)	0	0	0
Stomal ischemia	1(2.7%)	1(2.7%)	0	0
Stomal hernia	0	0	0	1(2.7%)
Total; n (%)	8(21.6%)	7(18.9%)	6(16.2%)	7(18.9%)
p-values	P=0.772		P=0.760	

**Table 3:** Comparison of effectiveness between two groups

Subgroup	Outpatient group	Telemedicine group	p-values
ESCA Scale (mean ± SD)			
2-weeks after discharge	101.8 ± 13.5	101.4 ± 13.9	P = 0.897
1-month after discharge	103.3 ± 13.4	106.3 ± 16.5	P = 0.399
C-COH-QOL-OQ Scale (mean ± SD)			
2-weeks after discharge	6.27 ± 0.71	6.15 ± 0.91	P = 0.543
1-month after discharge	6.38 ± 0.61	6.34 ± 0.86	P = 0.840

SD = standard deviation; ESCA= Exercise of Self-care Agency Scale; C-COH-QOL-OQ = Chinese version of City of Hope-Quality of Life-Ostomy Questionnaire (average score).

## 6. Discussion

Telemedicine is the use of real-time two-way telecommunications technologies to provide clinical healthcare [19]. Before the Covid-19 pandemic, poor workflow configuration led to slow adoption and use of telemedicine services. Only approximately 2% of ambulatory encounters occurred via telemedicine before the Covid-19 pandemic. The Covid-19 public health emergency has forced the acceleration of telemedicine services to reduce the risk of SARS-CoV-2 transmission. Along with the exponential growth in the use of telemedicine to provide clinical care, the safety and efficacy of telemedicine has gradually become a major point of interest. However, there is limited practical evidence regarding the impact of telemedicine in patients undergoing colostomy. The safety and effectiveness of telemedicine in cancer-related colostomy care in the early stages of discharge remain unclear.

This research showed that the safety and effectiveness of telemedicine for cancer-related colostomy care were not inferior to those of outpatient care in the early stages of discharge. During the early United Prime Publications., <https://clinicosononcology.org/>

stage of discharge, some patients with ostomy experience ostomy-related complications. Hospital readmission and emergency visits often involve ostomy-related complications. Thus, the safety of colostomy management is reflected in stoma-related complications. The study showed that the incidence of stoma-related complications between the telemedicine and outpatient groups was not significantly different in the early stage of discharge. The NCI-CTCAE scores for stoma-related complications were all less than level 2. Patients with complications need not be hospitalized. Persons living with an ostomy must bear the burden of self-care after discharge. Quality of self-care is closely related to the quality of life of people undergoing an ostomy. Currently, the ESCA is considered an effective method for measuring and valuing self-care ability in adults, and the C-COH-QOL-OQ scale is considered an effective method for measuring and evaluating quality of life related to population health in China. Thus, the use of the ESCA and C-COH-QOL-OQ scale reflects the effectiveness of colostomy care in this study. The research showed that the ESCA and

C-COH-QOL-OQ scores were not significantly different between the telemedicine and outpatient groups in the early stage of discharge.

In general, telemedicine visits may be better suited for chronic stable conditions. Although the early stage of discharge of patients undergoing colostomy has a high demand for colostomy care, ideally, the patient should be able to manage all aspects of ostomy care independently after discharge. Thus, the management of colostomy care is suitable for telemedicine. This is one of the main reasons why the safety and effectiveness of telemedicine for colostomy care was not inferior to that of outpatient care in the early stage of discharge. Additionally, advances in remote medical technology can provide patients with convenient virtual visits and connect them to care. Advances in remote medical technology are a prerequisite for convenient telemedicine. Lv Q et al. have shown huge mobile phone and high network coverage among the Chinese national population [20]. At present, hospitals are universally equipped with remote medical platforms, and smartphones have been widely used. Advances in remote medical technology have enabled patients to enjoy professional colostomy at home. To further increase accessibility to telemedicine, the public service constantly strengthened telemedicine equipment, waived the relevant requirement of telemedicine, and encouraged health care professionals to care for patients using telemedicine.

It should be mentioned that there are advantages of using telemedicine in colostomy care. When using telemedicine management, communication between medical staff and patients breaks through the restrictions of time and place. In particular, telemedicine could provide rapid access to colostomy patients who are not immediately available in person or live in remote locations. When the safety and effectiveness of telemedicine for colostomy care are not inferior to those of outpatient care, these advantages increase the levels of satisfaction with telemedicine.

The present study was not devoid of limitations. Telemedicine for cancer-related colostomy care has many benefits for patients, clinicians, and the health system, and its use is confronted with challenges. For example, the feasibility of telemedicine for colostomy care strongly depends on the internet proficiency of clinicians and patients. Some patients have limited access to Internet-based services owing to their insufficient Internet skills and acceptance of technology. These challenges can result in digital inequality. Therefore, digital inequality should be considered and overcome while encouraging the application of telemedicine. As the telemedicine mode was transformed from an aspirational goal to a de facto standard, the digital inequality for patients in the telemedicine mode would be studied.

## 7. Conclusion

The results of this study revealed that the safety and effectiveness of telemedicine for cancer-related colostomy care in the early stages of discharge were not those of inferior to outpatient care. The implementation of telemedicine was feasible in patients receiving cancer-related colostomy care in the early stages of discharge.

## 8. Declarations

### 8.1. Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki and approved by the hospital's Institutional Review Board (Clinical Research Ethics Committee of Zhoushan Hospital).

### 8.2. Consent for publication

The authors confirm that written consent for submission and publication has been obtained from the patient.

### 8.3. Availability of data and materials

Data included in article/supp. material/referenced in article.

### 8.4. Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this study.

### 8.5. Authors' contributions

All the authors listed have significantly contributed to the investigation, development and writing of this article. Quan HZ and Wang HQ contributed to manuscript writing, editing, and data collection; Yang Y contributed to data analysis; Yu HW contributed to conceptualization and supervision; all authors have read and approved the final manuscript.

### 8.6. Acknowledgements

The authors thank the patients for their consent to participate in the study and for publication of this report.

## References

1. Yuge K, Miwa K, Fujita F, Murotani K, Shigaki T, Yoshida N, et al. Comparison of long-term quality of life based on surgical procedure in patients with rectal cancer. *Front Oncol.* 2023; 13: 1197131.
2. Garfinkle R, Boutros M. Low Anterior Resection Syndrome: Predisposing Factors and Treatment. *Surg Oncol.* 2022; 43: 101691.
3. Robitaille S, Maalouf MF, Penta R, Joshua TG, Liberman AS, Fiore JF Jr, et al. The impact of restorative proctectomy versus permanent colostomy on health-related quality of life after rectal cancer surgery using the patient-generated index. *Surgery.* 2023; 174(4): 813-8.
4. Maglio A, Malvone AP, Scaduto V, Brambilla D, Denti FC. The frequency of early stomal, peristomal and skin complications. *Br. J. Nurs.* 2021; 30: 1272-6.

5. Rojanasart S. The impact of early involvement in a postdischarge support program for ostomy surgery patients on preventable health-care utilization. *J Wound Ostomy Cont Nurs.* 2017.
6. Joshua G, Ken B, Eldho P, Rebecca FC, Tristan L, Stephen B. Study on the time taken for patients to achieve the ability to self-care their new stoma. *ANZ J Surg.* 2018; 88(6): E503-E506.
7. Nicolò P, Riccardo M, Alessandro S, Aurora DL, Laura I, Fabrizio P, Emanuele DS. Competence and skills in the care pathway. A scoping review, *J Clin Nurs.* 2023; 00: 1-15.
8. Hans C. COVID-19: organoids go viral. *Nat Rev Mol Cell Biol.* 2020; 21(7): 355-6.
9. Dobrusin A, Hawa F, Gladshetyn M, Corsello P, Harlen K, Walsh CX, et al. Gastroenterologists and patients report high satisfaction rates with telehealth services during the novel coronavirus 2019 pandemic. *Clin Gastroenterol Hepatol.* 2020; 18: 2393-7.e2.
10. Mansour O, Tajanlangit M, Heyward J, Mojtabai R, Alexander GC. Telemedicine and Office-Based Care for Behavioral and Psychiatric Conditions During the COVID-19 Pandemic in the United States. *Ann Intern Med.* 2020; 174(3).
11. Lin S, Ma Y, Xu Y, Lu L. Artificial Intelligence in Community-Based Diabetic Retinopathy Telemedicine Screening in Urban China: Cost-effectiveness and Cost-Utility Analyses with Real-world Data. *JMIR Public Health Surveill.* 2023, 9: e41624.
12. Serper M, Cubell AW, Deleener ME, Casher TK, Rosenberg DJ. Telemedicine in Liver Disease and Beyond: Can the COVID-19 Crisis Lead to Action? *Hepatology.* 2020; 72(2); 723-8.
13. Qaseem A, MacLean CH, Tierney S, Cross JT Jr, MacDonald ST. Performance Measures for Physicians Providing Clinical Care Using Telemedicine: A Position Paper from the American College of Physicians. *Ann Intern Med.* 2023; 176(5); 694-8.
14. Percentage of Adults Aged 18–64 Years Who Used Telemedicine in the Past 12 Months, by Sex and Health Insurance Coverage - National Health Interview Survey, United States 2021, *MMWR Morb Mortal Wkly Rep.* 2023; 72(9): 244.
15. Kearney BY, Fleischer BJ. Development of an instrument to measure exercise of self care agency. *Res Nurs Health.* 1979; 2: 25-34.
16. Wang YB, Xu LY, Yang LS, Yang LM, Yang HY. Reliability and validity of Chinese version of the exercise of self-care agency scale in schizophrenia Patients. *J Clin Psychiatry.* 2014; 2: 104-7.
17. Grant M, Ferrell B, Dean G, Uman G, Chu D, Krouse R, et al. Revision and psychometric testing of the City of Hope Quality of Life-Ostomy Questionnaire. *Qual Life Res.* 2004; 13(8): 1445-57.
18. Gao W, Yuan C, Wang J. A Chinese Version of the City of Hope Quality of Life-Ostomy Questionnaire. *Cancer Nurs.* 2013; 36(1): 41-51.
19. Gellad ZF, Diamond S, Crockett SD, Cross RK. AGA Clinical Practice Update on Telemedicine in Gastroenterology: Commentary *Gastroenterology.* 2023; 164(4); 690-695.
20. Lv Q, Jiang Y, Qi J, Zhang Y, Zhang X, Fang L, et al. Using mobile apps for health management: a new health care mode in China. *JMIR Mhealth Uhealth.* 2019; 7(6): e10299.