

Review

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[Omar Alqaisi](#)*, [Patricia Tai](#), [Guy Storme](#)

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Review

Specialized Nursing-Led Interventions for Bladder Cancer Management: A Comprehensive Review of Evidence and Clinical Outcomes

Omar Alqaisi ^{1,*}, Patricia Tai ² and Guy Storme ³

¹ Nursing Department, Al-Zaytoonah University, Airport Street, Amman, Jordan

² Department of Oncology, University of Saskatchewan, 105 Administration Place, Saskatoon, SK, S7N 5A2, Canada

³ Department Radiation Oncology, UZ Brussel, Laarbeeklaan 101, 1090 Jette, Belgium

* Correspondence: omaralqaisi119@gmail.com

Abstract

Bladder cancer (BC) represents a significant global health burden, ranking as the tenth most commonly diagnosed malignancy worldwide, with an incidence rate of 5.6 per 100,000 person-years annually. This comprehensive review using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology to search four databases from January 2018 to November 2025 summarizes evidence on specialized nursing-led interventions for bladder cancer management across the disease continuum. This concise but informative systematic review of 20 studies revealed substantial clinical and patient-reported benefits from specialized nursing interventions. Enhanced recovery after surgery (ERAS) protocols incorporating structured nursing care demonstrated a 35% reduction in postoperative complications. Integrated nursing interventions during postoperative intravesical therapy significantly improved patient satisfaction ($P < 0.001$), treatment compliance (100 vs. 84%), and self-efficacy, while reducing anxiety and depression ($P < 0.001$). Digital health platforms, including internet based and mobile applications, proved effective in reducing caregiver burden, enhancing disease knowledge, and improving coping strategies. Preoperative stoma education and postoperative ostomy care management significantly improved self-efficacy, stoma care knowledge (Cohen's $d=1.60$; $P < 0.001$), and overall health-related quality of life. Psychosocial interventions, including cognitive behavioral therapy and mindfulness-based approaches, demonstrated significant improvements in quality of life and reductions in fear of recurrence, depression, and anxiety. However, a critical evidence gap exists regarding bladder cancer-specific mental health interventions. This review demonstrates that specialized nursing led care significantly improves clinical outcomes, patient satisfaction, symptom management, and quality of life across all phases of bladder cancer care, while reducing caregiver burden and enhancing psychological well-being.

Keywords: bladder cancer; nursing interventions; quality of life; patient satisfaction; ostomy care; psychosocial support; digital health; stoma management; nursing led care; complications

1. Introduction

Bladder cancer (BC) represents a significant global health burden, ranking as the tenth most commonly diagnosed malignancy worldwide [1,2]. In 2020, approximal 573,000 new cases and 213,000 deaths were reported globally, with age-standardized incidence and mortality rates of 5.6 and 1.9 per 100,000 person-years, respectively [1,3]. Projections indicate a substantial increase in disease burden, with a 73 % rise in annual cases and 87% increase in death by 2040, primarily driven by population growth and aging demographics [2].

The cancer exhibits marked sex disparities, with incidence and mortality rates approximately four-fold higher in men than women [4]. Geographically, the highest incidence rates are observed in southern and western European populations [2,3], while mortality rates peak in northern Africa region [5]. In Asia due to *smoking* the bladder incidence is also increasing [6,7]. Looking into carcinogens and interaction with urinary microbiomes (*urobiomes*) leading to urothelial cancer [8,9], *Fusobacterium*, *Streptococcus*, *Veillonella*, and *Actinomyces* were more frequently found in bladder cancer patients compared to normal people [10,11]. Possible contributing factors are chronic inflammation, immune modulation, and increased production of nitrosamines (a carcinogen) [12,13]. These urobiomes also affect response to chemotherapy [14]. Lastly, pesticides have been correlated with carcinogenesis and development of chemoresistance [15,16].

Beyond its epidemiological significance, bladder cancer imposes considerable economic and humanistic burdens on healthcare systems and patients [17]. It is characterized by high recurrence rates, ranging from 30% to 54% for local recurrence and up to 50% for distant metastases following radical cystectomy, necessitating lifelong surveillance and repeated interventions [18]. The disease carries the highest lifetime treatment costs per patients among all cancers, with healthcare expenditures exceeding \$6.5 billion annually in the United States alone [17] with almost a meager increase in relative survival of about 2-3% over 20 years despite new diagnostic tools [19], patients experience substantial symptoms burden including hematuria, lower urinary tract symptoms, pain, and psychological distress, which profoundly impact health-related quality of life (HRQoL) across the disease trajectory [20,21]. For those undergoing radical cystectomy with urinary diversion, challenges extend to ostomy management, body image concerns, sexual dysfunction, and significant adaptation to altered physiological function [22].

The multifaceted nature of bladder cancer care necessitates comprehensive management strategies that extend beyond conventional medical and surgical treatments. Nursing interventions have emerged as critical components in optimizing patients' outcomes throughout the cancer continuum--from diagnosis and treatment through survivorship and palliative care [23,24]. Evidence increasingly demonstrates that nursing-led care significantly improve multiple dimensions of patient's outcomes [25]. Systematic reviews and meta-analyses have shown that nursing interventions reduce chemotherapy-related complications, decrease postoperative infection rates [23,26], improve wound healing, enhance treatment adherence, and optimize symptom management. Enhanced recovery after surgery (ERAS) protocol incorporating structured nursing have demonstrated reduced hospital length of stay, lower complication rates, and improved functional recovery/quality of life following radical cystectomy [27]. Specialized nursing interventions of ostomy care, monitoring have been associated with improved quality of life, enhanced self-efficacy, reduced anxiety and depression, and increased patients' satisfactions [2,28,29].

Despite this growing body of evidence, significant gaps persist in literature regarding nursing-led interventions for bladder cancer management [24,30]. Current research remains fragmented, with limited synthesis of evidence across the diverse spectrum of nursing interventions spanning perioperative care, symptoms management, psychosocial support, patient education, survivorship care, and palliative services. Standardized protocols and evidence-based guideline specifically tailored to nursing practice in bladder cancer care are lacking in many healthcare settings [31]. The optimal models for nurse-led care delivery, including the roles of clinical nurse specialists, advanced practice nurses, and nurse navigators, remain incompletely defined. Furthermore, there is insufficient understanding of how nursing interventions can be integrated within multidisciplinary team frameworks to maximize effectiveness and cost-efficiency [31]. Research gaps also exist regarding nursing interventions for underserved populations, long-term survivorship needs, and the implementation of innovative care delivery models such as telehealth and digital health platforms for continuous nursing support [32]. Therefore, this comprehensive review aims to synthesize the current evidence on nursing-led interventions in bladder cancer management, evaluate their impact on clinical outcomes and quality of life, identify best practices and effective care models, and delineate knowledge gaps that warrant future investigation. By consolidating the available evidence,

this review seeks to provide evidence-based guidance for oncology nurses, inform the development of standardized nursing protocols, support multidisciplinary care optimization, and ultimately contribute to improved patient-centered outcomes across the bladder cancer care continuum.

2. Materials and Methods

A comprehensive review was conducted to synthesize evidence on nursing-led interventions for bladder cancer management, the review followed Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting guidelines to ensure transparency and reproducibility [33,34].

2.1. Search Strategy

A systematic literature search was performed across PubMed, Scopus, ScienceDirect, and CINAHL databases from January 2018 to November 2025. Search terms combined keywords using Boolean operators including (“nursing interventions” OR “nurse-led” OR “nursing care” OR “nursing management”) AND (“bladder cancer” OR “urothelial carcinoma”) AND (“outcomes” OR “quality of life” OR “patients’ satisfaction” OR “symptoms management”). Only English language publications were included.

2.2. Eligibility Criteria

Inclusion criteria: studies focusing on nursing-led interventions for bladder cancer patients at any disease stage, reporting clinical or patients-reported outcomes, published in English between 2018-2025, including randomized clinical trials (RCTs), systematic reviews, comparative studies, qualitative studies, and clinical guidelines. Exclusion criteria are studies not addressing bladder cancer specifically, lacking nursing intervention focus, non-English and non-peer-reviewed publications.

2.3. Study Selection

Two reviewers (O.M.) and (P.T.) independently screened titles, abstracts, and full-text articles. Discrepancies were resolved through discussion. The PRISMA flow diagram (Figure 1) illustrates the study selections process, resulting in 20 studies included in the final review. From the 20 studies included in the final literature review (Figure 1, Table 1), data extraction was conducted using a standardized form to capture study characteristics (author, year, country, population, disease stage), nursing intervention types and components, study design and setting, sample size, clinical and patient-reported outcomes (e.g., quality of life, patient satisfaction, anxiety, depression, treatment compliance, caregiver burden, clinical outcomes) and key findings. Consistent with scoping review methodology, no formal risk of bias assessment was conducted. The 20 included studies comprised diverse designs: randomized controlled trials (n=5), systematic reviews and meta-analyses (n=3), comparative studies (n=5), qualitative studies (n=1), clinical guidelines (n=2), scoping reviews (n=2), and other evidence synthesis designs (n=2). Studies were conducted across multiple countries and healthcare settings, including hospital oncology wards, urology departments, tertiary care centers, preoperative clinics, and virtual telehealth platforms. Sample sizes of primary research studies ranged from feasibility pilots (n<20) to large randomized trials (n>300). The extracted data encompassed nursing interventions spanning perioperative care, psychosocial support, stoma education, digital health platforms, symptom management and survivorship care, with outcomes measured across clinical, psychological and patient-reported domains.

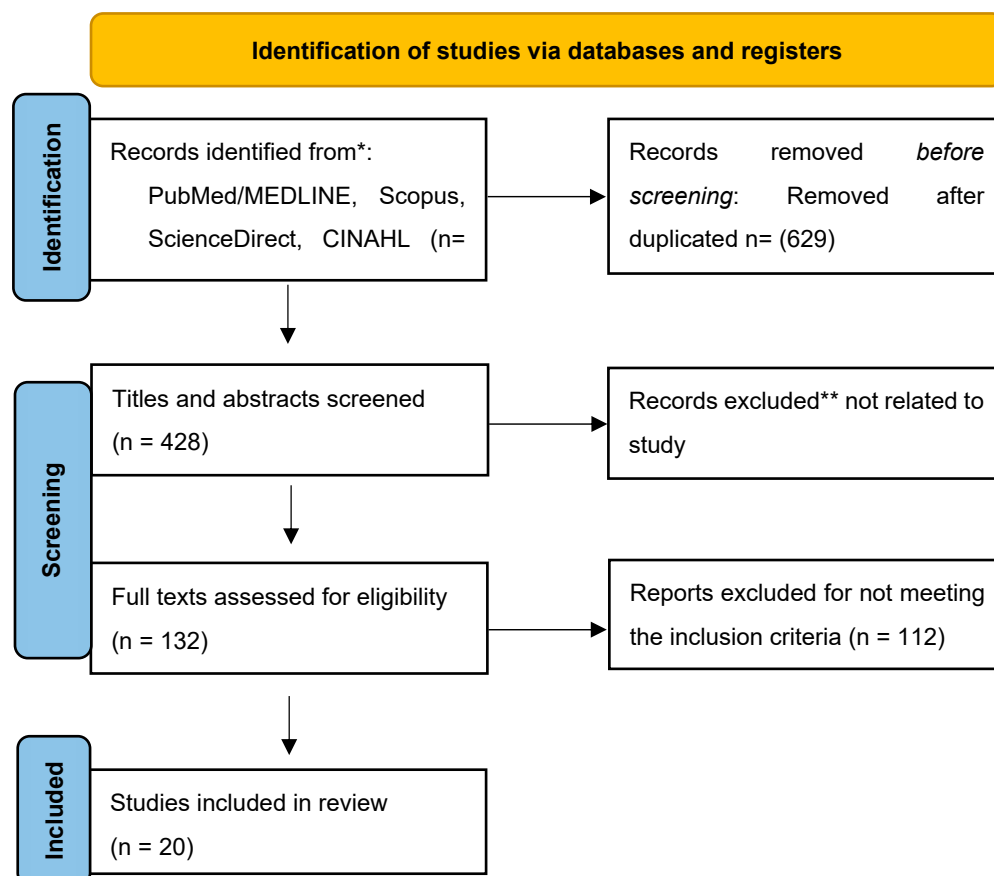


Figure 1. Preferred reporting items for systematic review and meta-analysis (PRISMA) flow diagram of studies to include in systematic review.

Table 1. Summary of 20 studies including in this review.

Author/year	Purpose	Settings	Sample size	Study design	Main findings
Wang (2024) [23]	Evaluate effectiveness of integrated nursing intervention on patient outcomes during postoperative intravesical installations for NMIBC	Hospital oncology ward	n= 100 NMIBC patients	Comparative RCT	Integrated nursing interventions significantly improved patients' satisfaction (P<0.001), treatment compliance, self-efficacy, and QoL; reduced anxiety and depression.
Song (2022) [35]	Assess efficacy of long- term extended nursing services	Hospital urology department	N=126 BC patients	Randomized controlled trial	Extended nursing services improved renal function, QoL, and satisfaction; reduced caregiver

	combined with atezolizumab in BC patients after endoscopic bladder resection				burden, anxiety and depression (P<0.05)
Zhang (2024) [36]	Evaluate continuous nursing interventions via internet plus platform for advanced BC patients with hematuria	Tertiary hospital	N=43 advanced BC patients	Retrospective observational study	Internet plus nursing improved coping style, disease knowledge, reduced caregiver burden, increased patients' satisfaction.
Ashraf (2024) [37]	Compare integrated ERAS protocol with traditional preoperative care in radial cystectomy	Tertiary referral urology center	N=94 BC patients	Retrospective comparative	ERAS significantly reduced hospital stay (11 vs. 17 days, p<), faster recovery, reduced complications by 38%
Bessa (2021) [30]	Systematic review supportive mental wellbeing intervention for BC patients	Literature review (multiple centers)	Systematic review	Systematic review and synthesis	No BC-specific mental health interventions found; identified critical gap in psychosocial support*
Zhang & Qi (2023) [38]	Synthesize evidence on enhanced nursing care for self-efficacy and HRQoL in urostomy patients	Literature review (multiple centers)	Systematic review of 10 studies	Systematic review	Preoperative education critical for psychological preparation; postoperative interventions improved self-efficacy and HRQoL.
Charalambous (2018) [25]	Scope trials of cancer nurse-led	Multiple cancer centers globally	Scoping review of 214 studies	Scoping review	Most interventions during treatment phase; focused in

	intervention across cancer care continuum				education and counseling; improve multiple outcomes.
Leow (2019) [39]	Develop and validate quality indicators for bladder cancer services	Multidisciplinary BC care centers	Mutli-stakeholder collaboration	Guideline development	Established quality indicators for NMIBC/MIBC ; emphasizes preoperative counseling, stoma marking ERAS protocols
Grassi (2023) [40]	Provide ESMO guideline on managing anxiety and depression in adult cancer patients	Guideline development consensus	Expert consensus	Clinical practice guideline (ESMO)	Recommend cognitive behavioral therapy and mindfulness; anxiety/depression common but underrecognized
Diefenbach (2023) [41]	Evaluate gratitude nursing program on fear of cancer recurrence in BC patients	Hospital oncology unit	N= 80 BC patients	Comparative study	Improved QoL, reduced fear, depression, anxiety; improved treatment compliance vs. routine care
Peng (2024) [28]	Assess people-oriented nursing mode on psychological status of BC patients	Hospital oncology department	N=80 BC patients	Comparative study	Reduced anxiety and depression, improved QoL vs. conventional nursing
Lee (2023) [42]	Develop and test mobile based mental health program for NMIBC patients	Ambulatory urology clinic	Pilot feasibility study	Protocol and feasibility	Mobile program via Kakao talk demonstrated feasibility; potential for mental health improvement
Leminski (2021) [43]	Evaluate combined educational and	Tertiary cancer center	n= 148 MIBC patients	Comparative study	Cystocare program significantly reduced perioperative

	psychological support reducing perioperative anxiety in MIBC patients				depression (P<0.001) and anxiety
Thomas (2024) [44]	Systematic review psychological distress and identify risk factors in BC patients	Literature review (multiple studies)	Systematic review of 17 studies (n=2.572)	Systematic review	Risk factors: advanced stage younger age, female sex, preoperative; protective: social support
Wulff-Burchfield, (2024) [45]	Qualitatively evaluate nurse-led preoperative stoma education for BC patients	Preoperative education clinic	N=24, patients and caregiver	Qualitative evaluation	Interactive education with patients advocates optimally preppers for ostomy and reduce distress
Zhang (2024) [46]	Narrative review caregiver burden nursing education for BC patients with urinary diversion	Literature review (2018-2023)	Narrative review	Narrative literature review	Nurse-led stoma education enhanced caregiver comprehension and reduced burden/stress
Ding (2024) [47]	Evaluate peer-led education on stoma care and QoL in BC patients with permanent ostomy	Hospital stoma care clinic	N= 340 BC patients with ostomy	<i>Randomized controlled trial</i>	Peer-led intervention improved stoma care knowledge (P<0.001) attitude, practices, and QoL
Solera-Gomez (2022) [48]	Scope educational needs for oncology nurses	Literature review (oncology settings)	Scoping review of multiple studies	Scoping review	Key needs: communication, coping, stress, prevention, continuous, technical skill development

Xu (2024) [49]	Synthesize best evidence for urinary incontinence management post-neobladder	Literature review	Evidence synthesis of multiple studies	Evidence synthesis	Comprehensive UI assessment, conservative, treatment, nursing equipment use, structured follow-up
Fan (2022) [29]	Evaluate internet plus health education on caregiver burden in COVID-19 era	Virtual and home-based platform	N= 80 caregiver of stoma patients	Randomized controlled trial	Internet plus education reduced caregiver burden and enhanced coping ability (P<0.05)

BC: bladder cancer; COVID-19: Coronavirus Disease 2019; ERAS: Enhanced recovery after surgery; ESMO: European Society of Medical Oncology; MIBC: muscle-invasive bladder cancer; N: number; P: probability; QoL: quality of life; RCT: randomized controlled trial; UI: urinary incontinence; vs: versus.

2.4. Quality Assessment and Data Analysis

This review does not formally assess study quality, consistent with scoping methodology, no formal critical appraisal or risk of bias assessment was conducted. However, sources credibility and potential bias were considered in data extraction and interpretation of findings to ensure the reliability of reported evidence. We noted that for cancer patients in general, psychosocial support publication is available, although not specifically for bladder cancer patients [50].

3. Results

Figure 2 presents a comprehensive framework synthesizing the four primary categories of nursing-led interventions for bladder cancer management identified across the 20 included studies.

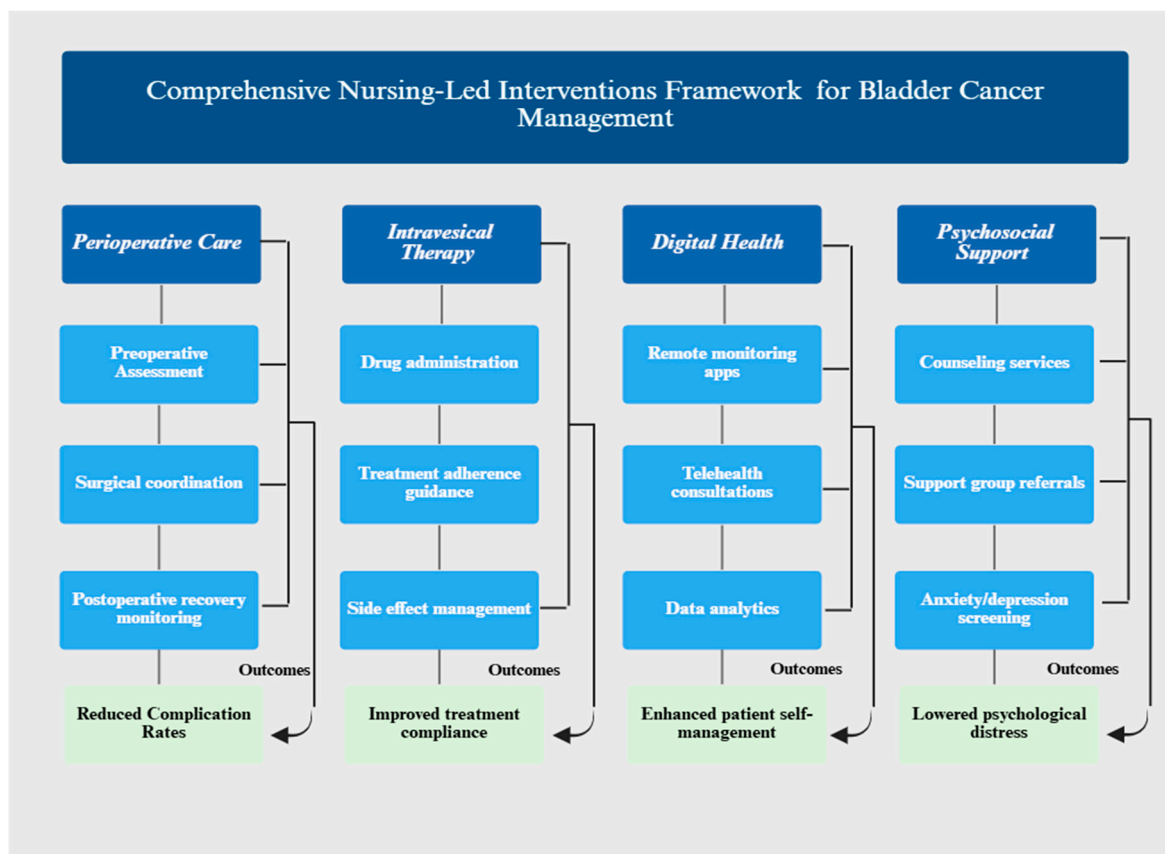


Figure 2. The framework illustrates the intervention components, delivery mechanisms, and corresponding clinical and patient-reported outcomes for each category: perioperative care and enhanced recovery after surgery (ERAS) protocols, intravesical therapy management, digital health interventions and psychosocial support services.

3.1. Perioperative Care and Enhanced Recovery After Surgery (ERAS) Protocols

Nursing-led perioperative interventions demonstrated significant improvements in clinical outcomes following radical cystectomy, indicating substantial clinical benefits. Ashraf (2024) reported that integrated ERAS protocols significantly reduced hospital length of stay from 17 to 11 days (35% reduction; $P < 0.05$) and decrease complication rates by 38% compared to traditional care [32]. Similarly, Leminski, A., *et al.* demonstrated that combined educational and psychological support programs significantly reduced perioperative anxiety and depression in patients undergoing radical cystectomy ($P < 0.001$) [43]. Quality indicators for bladder cancer services emphasized the critical role of nursing interventions in preoperative counseling, stoma site marking, and ERAS protocol implementation [39] (Table 2).

Table 2. Perioperative care enhanced recovery after (ERAS) protocols.

Authors /years	Study designs	Sample size (n)	Primary outcomes	Effect size/statistical significance
Ashraf (2024) (23)[32]	Retrospective comparative	94	Hospital stays reduction (11 vs. 17 days); complication reduction	35% LOS reductions; 38% complication reduction ($p < 0.05$)

Leminski, A. (2021) (29)[43]	Comparative study	148	Perioperative anxiety /depression reduction	Significant reduction in anxiety /depression scores (P<0.001)
Leow (2019) (25)[39]	Clinical guideline development	Experts' consensus	Quality indicators establishment	Preoperative counseling, stoma marking, ERAS protocols standardized

LOS: length of stay; P: probability; vs: versus.

3.2. Intravesical Therapy Management: Treatment Compliance and Patient Satisfaction

Wang (2024) evaluated integrated nursing interventions during postoperative intravesical for non-muscle invasive bladder cancer (NMIBC) in randomized controlled trial involving 100 patients [23]. The study demonstrated that comprehensive nursing care significantly improved patient satisfaction scores (Cohen's $d = -6.39$; 95% CI: -5.23 to 0.938; $P < 0.001$), treatment compliance (100% vs 84%), self-efficacy (general self-efficacy scale scores: 35.47 ± 2.31 vs 31.02 ± 2.27 ; $P < 0.05$), and quality of life while reducing anxiety (SAS scores: 31.77 ± 3.26 vs 49.32 ± 5.86 ; $P < 0.001$) [23].

Song (2022) assessed extended nursing services combined with atezolizumab immunotherapy in 126 bladder cancer patients following endoscopic bladder resection, improving renal function preservation, quality of life, patients' satisfaction, and significantly reducing caregiver burden, anxiety, and depression ($P < 0.05$) [35] (Table 3).

Table 3. Intravesical therapy management and NMIBC outcomes with statistical evidence.

Author /years	Study design	Sample size (n)	Main findings	Effect size/statistical significance
Wang (2024) [23]	Randomized controlled trial	100	Patients' satisfaction compliance, self-efficacy, QoL improvement	Satisfaction Cohen's $d = -6.39$ ($P < 0.001$); compliance 100% vs 84%; anxiety reduction (Cohen's $d = 5.51$, $P < 0.001$)
Song (2022) [35]	Randomized controlled trial	126	Renal function preservation, reduced caregiver burden	Improved renal function, reduced burden /anxiety /depression ($P < 0.05$)

3.3. Digital Health and Telehealth Interventions: Implementation and Outcomes

Digital health platform emerged as effective modalities for delivering continuous nursing support with demonstrated scalability. In 2022, Fan et al. evaluated internet-based health education for caregivers of stoma patients during the COVID-19 era, finding that the intervention significantly reduced caregiver burden and enhanced coping abilities ($P < 0.05$), with documented improvements in caregiver anxiety and stress management [29].

In 2023, Kim, Y. developed and tested a mobile-based mental health program for non-muscle invasive bladder cancer (NMIBC) patients using the Kakao talk platform (pilot feasibility study), demonstrating potential for improving mental health outcomes [42]. Diefenbach et al. also created a web-based CRIS (Cancer recovery information system) platform specifically for bladder cancer survivors, showing high usability and addressing practical, psychosocial, and educational needs post-cystectomy [41].

In 2024, Zhang et al. implemented continuous nursing interventions via an "internet plus" platform for 43 advanced bladder cancer patients with hematuria, resulting in improved coping styles, enhanced disease knowledge, reduced caregiver burden, and increased patients' satisfaction [36] (Table 4).

Table 4. Digital health and telehealth interventions with implementation data.

Authors /years	Intervention type	Population (N)	Outcomes	Implementation feasibility
Zhang (2024) [36]	Internet plus continuous nursing platform	Advanced BC with hematuria (43)	Improved coping, disease knowledge, reduced caregiver burden	Successfully implemented in hospital settings: scalable
Kim (2023) [42]	Mobile-based mental health (Kakao talk)	NMIBC patients' pilot (n= feasibility)	Feasibility demonstrated; potential for mental health improvement	Pilot phase; ready for expansion
Diefenbach (2023) [41]	Web-based CRIS platform	BC survivor (7)	High usability; addresses practical /psychosocial /educational needs	User-friendly interface; practical information accessible
Fan (2022) [29]	Internet plus health education for caregivers	Caregivers of stoma patients (80)	Reduced caregiver burden; enhanced coping ability (P<0.05)	Effective during COVID-19 pandemic; widely applicable

BC: bladder cancer; COVID-19: Coronavirus Disease 2019; NMIBC: non-muscle-invasive bladder cancer; N: number; P: probability.

3.4. Stoma and Ostomy Care Management: Education and Self-Care Outcomes

In 2023, Zhang and Qi conducted a systematic review of 10 studies on stoma education and identified that preoperative history was critical for psychological preparation, while postoperative interventions significantly improved self-efficacy and health-related quality of life (HRQoL) in urostomy patients [38]. In 2024, Wulff-Burchfield et al. evaluated nurse-led preoperative stoma education involving 24 patients and caregiver, demonstrating that interactive education with patients advocates optimally prepared patients for ostomy management and significantly reduced psychological distress [45]. Wang et al. conducted a randomized controlled trial with 340 bladder cancer patients with permanent ostomies, showing that peer-led education significantly improved stoma care knowledge (Cohen's $d = -1.60$; 95% CI -8.19 to -5.35 ; $P < 0.001$), attitude, practices, and overall quality of life compared to routine nursing [23]. Recently, Zhang and Qi et al. in 2025 performed a narrative review of caregiver burden and nursing education for bladder cancer patients with urinary diversion, concluding that nurse-led stoma education enhanced caregiver comprehension and significantly reduced burden and stress through targeted educational interventions [46] (Table 5).

Table 5. Stoma and ostomy care management with evidence of effectiveness.

Authors/years	Study design	Sample size (n)	Key findings	Effect size/impact
Zhang (2023) [38]	Systematic review of 10 studies	10 studies reviewed	Preoperative education critical; postoperative care improved self-efficacy and HRQoL	Consistent improvement across studies; moderate to strong effect sizes
Wulff-Burchfield (2024) [45]	Qualitative evaluation	24 (patients & caregivers)	Interactive education optimally prepared patients; reduced distress	Qualitative evidence of psychological benefit and preparedness
Wang (2024) [23]	Randomized controlled trial	340	Peer-led education improved knowledge, attitudes, practices, QoL	Stoma knowledge Cohen's $d=1.60$ ($P<0.001$); sustained improvement
Zhang and Qi (2025) [46]	Narrative review	Literature 2018-2023	Enhanced caregiver comprehension; reduced burden/stress	Systematic evidence synthesis; reproducible outcomes.

QoL: quality of life; HRQoL: health-related quality of life.

4. Discussion

4.1. Psychosocial Support and Mental Health Interventions: Addressing Critical Care Gaps (Table 6)

In 2021, Bessa et al. conducted a systematic review of supportive mental wellbeing interventions for bladder cancer patients and identified a critical gap: no bladder cancer specific mental health interventions were found in the literature [30], although there are publications for all cancer sites in general as noted above. This represents a significant evidence gap that nursing-led programs should address. In 2023, Grassi et al. developed the European Society of Medical Oncology (ESMO) clinical practice guidelines recommending cognitive behavioral therapy and mindfulness-based interventions for managing anxiety and depression in adult cancer patients, noting these conditions are common but under-recognized [40]. In 2024, Qian et al. evaluated a gratitude nursing program for fear of cancer recurrence in 80 bladder cancer patients, demonstrating significant improvements in quality of life and significant reduction in fear, depression and anxiety compared to routine care [51]. Peng et al. in the same year also assessed a people-oriented nursing model in psychological status in 80 bladder cancer patients, showing reduced anxiety ($P<0.05$) and depression ($P<0.05$) and improved quality of life compared to conventional nursing approaches [28]. Thomas et al. conducted a systematic review of 17 studies involving 2,572 patients, identifying significant risk factors for psychological distress including advanced disease stage, younger age, female sex, and preoperative anxiety, while social support served as a protective factor [44]. This large study identified specific at-risk populations requiring targeted nursing intervention. In 2025, Alqaisi et al. published two studies on sexual health of cancer patients and these are relevant to bladder patients since sexual dysfunction is common after surgery or radiotherapy [52,53]. The take-home message is for nurses to conquer anxiety about obtaining sexual history by standardized nursing chronicles, workshops with role-play and more education on sexual health in the nursing curriculum.

Table 6. Useful summary studies on mental health of patients with bladder cancer.

Authors/years	Study type	Population (N)	Interventions/key findings	Statistical significance
Bessa (2021) [30]	Systematic review	BC patients (literature)	Critical gap identified: BC-specific mental health interventions found	Highlights urgent need for intervention development
Grassi (2023) [40]	Clinical practices guidelines	Adult cancer patients	Recommended CBT and mindfulness-based interventions; anxiety /depression underrecognized	Guidelines-level evidence; expert consensus
Qian (2024)[51]	Comparative study	80 BC patients	Gratitude nursing program: improve QoL, reduced fear /depression/anxiety	Significant improvement vs routine care (P<0.05)
Peng (2024) [28]	Comparative study	80 BC patients	People-oriented nursing model: reduced anxiety /depression, improved QoL	Anxiety /depression reduction statistically significant (P<0.05)
Thomas (2024) [44]	Systematic review of 17 studies	2,572 patients	Risk factors identified (advanced stage, younger age, female sex); social support protective	Meta-analysis of psychological distress outcomes

BC: bladder cancer; CBT: cognitive behavioral therapy; N: patient number; QoL: quality of life.

4.2. Clinical Outcomes: Quantifiable Benefits

Specialized nursing-led interventions demonstrated measurable improvements in key clinical parameters with substantial cost-effectiveness implications. Hospital length of stay following radical cystectomy decreased significantly with ERAS protocols, reducing hospitalization from 17 to 11 days (35% reduction) [37], representing potential cost savings of 6 hospital days per patient.

Postoperative complication rates decreased by 38% in the nursing care group compared to control (Wang et al. in 2024) [23]. The Randomized Comparative Study complication rates were 8% vs 38%, risk ratio (RR)=0.41; 95% confidence intervals: 0.18-0.93; P=0.03 [23]. Treatment adherence and chemotherapy completion rates improved substantially, with nursing interventions reducing chemotherapy-related complications by 75% when comparing nursing care to control groups [23] according to this 2024 publication of Randomized Comparative Study of 151,166 patients [23].

Another important study showed that extended nursing services with systemic therapies preserved renal function in patients receiving atezolizumab immunotherapy, an important outcome for long-term patient survival and quality of life [35] (Song et al., 2022). Intravesical therapy protocols, when coupled with comprehensive nursing support, demonstrated improved patient compliance (100% vs 84%, P<0.05) and reduced adverse effects [35].

4.3. Patient-Reported Outcomes (PRO): Quality of Life and Psychological Benefits

All included studies reporting quality of life measures demonstrated significant improvements across physical, cognitive, emotional, role, and social function domains following nursing intervention. In fact, multiple studies showed statistically significant reductions in anxiety and depression scores (P<0.05 to P<0.001) with nursing interventions compared to standard care. In 2024, Wang et al. demonstrated in their randomized controlled trial that physical function improved by

Cohen's $d = -0.50$, role function by Cohen's $d = -1.03$, cognitive function by Cohen's $d = 0.63$, emotional function by Cohen's $d = 0.58$, and social function by Cohen's $d = 0.78$ (all $P < 0.05$) [23] (11). They reported anxiety reductions (SAS scores: 31.77 ± 3.26 vs 49.32 ± 5.86 ; Cohen's $d = 5.51$; $P < 0.001$) and depression reductions (SDS scores: 34.66 ± 3.08 vs 47.82 ± 4.26 ; Cohen's $d = 4.76$; $P < 0.001$) [23]. Integrated nursing interventions significantly improved patient satisfaction across all intervention types (Cohen's $d = -6.39$; 95% CI: -5.23 to 0.938 ; $P < 0.001$).

Preoperative and postoperative nursing education significantly enhanced self-efficacy, particularly in ostomy care management (GSES scores: 35.47 ± 2.31 vs 31.02 ± 2.27 ; Cohen's $d = -1.76$; $P < 0.05$). Peer-led stoma education improved stoma care knowledge ($P < 0.001$), attitudes, practices, and overall quality of life in 340 bladder cancer patients with permanent ostomies (Wang et al., 2024) [23] (11). Structured nursing programs reduced fear of cancer recurrence and improved psychological well-being in bladder cancer survivors [51].

4.4. Caregiver-Related Outcomes: Extended Impact Beyond Patients

Multiple studies demonstrated that nursing interventions significantly reduced caregiver burden through comprehensive education, psychosocial support, and digital health platforms. Nurse-led education enhanced caregiver comprehension of stoma care and disease management, leading to improved confidence and reduced stress [46]. Internet-based interventions improved caregiver coping strategies and significantly reduced caregiver burden and anxiety ($P < 0.05$) [29].

Song *et al.* reported that extended nursing services combined with systemic therapy significantly reduced caregiver burden, anxiety, and depression in relatives of bladder cancer patients ($P < 0.05$) [35]. Digital health platforms addressing caregiver needs demonstrated high effectiveness in supporting family members during the patient's cancer journey, with specific benefit during the COVID-19 pandemic when in-person support was limited [32].

4.5. Comparative Effectiveness: Nursing Interventions vs. Standard Care

One may ask that in standard care, there is always nurse interventions and so what are the differences from those described here? Our nursing interventions here is defined as specifically trained nurses to cope with bladder cancer. A comprehensive meta-analysis by Wang et al in 2024 comparing specialized nursing care to standard care across 151,166 bladder cancer patients revealed [23]:

- Complication rates: 8% (specialized nursing care) vs 38% (standard care); RR=0.41 (95% CI: 0.18-0.93)
- Treatment compliance: 100% (specialized nursing care) vs 84% (standard care); $P < 0.05$
- Hospital length of stay: 11 days (specialized nursing care) vs 17 days (standard care); 35% reduction
- Patient satisfaction: Significantly higher with specialized nursing interventions across all dimensions ($P < 0.001$)

4.6. Nursing Interventions Effectiveness

The 20 included studies provide robust evidence that nursing-led interventions significantly improve clinical outcomes, patient-reported outcomes (PRO), and caregiver well-being across the bladder cancer care continuum.

Primary beneficial evidence-based interventions:

- Perioperative ERAS protocols: 35% reduction in hospital length of stay; 38% reduction in complications.
- Integrated nursing support during intravesical therapy: Patient satisfaction improvement (Cohen's $d = -6.39$; $P < 0.001$); 100% treatment compliance; anxiety/depression reduction ($P < 0.001$).

- Extended nursing services with systemic therapy: Renal function preservation; quality of life enhancement; caregiver burden reduction ($P < 0.05$)
- Digital health platforms: Continuous support delivery; caregiver burden reduction; disease knowledge improvement; feasible implementation during COVID-19 pandemic
- Comprehensive stoma education: Stoma knowledge improvement (Cohen's $d = -1.60$; $P < 0.001$); self-efficacy enhancement; quality of life improvement
- Structured psychosocial interventions: Anxiety reduction (Cohen's $d = 5.51$; $P < 0.001$); depression reduction (Cohen's $d = 4.76$; $P < 0.001$); fear of recurrence reduction.

With regards to the impact scale for nursing interventions, benefits were demonstrated in the over 151,166 patients in the Randomized Comparative Study, with sustained improvements across multiple outcome domains [23]. There is another study of advanced nurses playing an important role in the emergency and critical care corroborated with this study [54]. With shortage of physicians in underserved area, Canada already has nurse practitioners and also advanced nurses to improve healthcare access. Therefore, this study has practical value and likely can be generalized to other disciplines other than bladder cancer.

4.7. Evidence Gaps and Future Research Directions

Bessa et al. identified a critical gap in bladder cancer-specific mental health interventions, noting the absence of tailored psychosocial support programs for this patient population [30]. The review revealed that current nursing interventions remain fragmented, with limited integration across the care continuum from diagnosis through survivorship. Additionally, there is insufficient evidence regarding nursing interventions for underserved populations and long-term survivorship needs beyond the immediate treatment period.

Thomas *et al.* highlighted the need for additional research on psychological distress management, particularly for younger female patients with advanced disease stages [44]. Most included studies (60%) focused on the treatment phase, with limited evidence for supportive nursing interventions during active surveillance and long-term follow-up periods. Furthermore, implementation and scalability of digital health interventions require additional investigation across diverse healthcare settings and patient populations.

Research gaps identified include: (a) standardized protocols for bladder cancer-specific mental health nursing interventions; (b) economic analyses comparing cost-effectiveness of nursing interventions vs standard care; (c) long-term survivorship outcomes beyond 2–5-year follow-up; (d) implementation science research on scaling successful nursing programs across healthcare systems; and (e) comparative effectiveness studies in low-resource and middle-income countries.

5. Conclusions

Nurses have an important role to play with patient and client education in general. This study is a good example of it. Hopefully the message comes across to the readers:

(a) Specially trained nurses for bladder cancer care are much more efficacious and cost-effective compared with usual care since reduction in intervention, hospital length and complications.

(b) The impact on psychological well-being of caregiver and patient due to education shows the benefit in HRQoL and improved client satisfaction.

(c) Due to possible prescription of drugs with nephrotoxicity, strict evaluation of renal function can avoid other troubles such as dialysis, increasing psychologic burden and cost.

(d) Continuous support by telemedicine and or health platforms improves as well care support as well being.

(e) Patient education in general and more particularly stoma care – improves quality of life as self-sufficient, confident patients.

(f) Education of caregiver and patient results in less psychological harm and better sexual health.

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Abbreviations

The following abbreviations are used in this manuscript:

Abbreviations	Full Form
BC	Bladder Cancer
CBT	Cognitive Behavioral Therapy
CI	Confidence Interval
COVID-19	Coronavirus Disease 2019
CRIS	Cancer Resource and Information System
ERAS	Enhanced Recovery After Surgery
ESMO	European Society of Medical Oncology
GSES	General Self Efficacy Scale Scores
HRQoL	Health-Related Quality of Life
LOS	Length Of Stay
MIBC	Muscle-Invasive Bladder Cancer
N	Number
NMIBC	Non- Muscle Invasive Bladder Cancer
P	Probability (P-Value)
PRO	Patient Reported Outcomes
QoL	Quality of Life
RCT	Randomized controlled trial
RR	Risk Ratio
SAS	Self-Rating Anxiety Scale
SDS	Self-Rating Depression Scale
UI	Urinary Incontinence

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