Virtual Discharge

Enhancing and Optimizing Care Efficiency for the Bedside Nurse

NCPD 2.0 Contact Hours

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ABSTRACT

Background: Opportunities for care improvement exist within virtual care, which continues to emerge as an increasingly viable heath care option.

Problem: Competing care priorities presented a challenge to nurse leaders, resulting in a modern solution to optimize resources using virtual care.

Methods: A new model of care delivery, the virtual discharge (VDC) protocol, was established as a partnership between bedside nurses and a virtual nurse team.

Interventions: Using existing telehealth technology, virtual nurses delivered remote discharge education to patients on a 30-bed orthopedic unit.

Results: During the pilot, 269 VDC sessions totaled more than 101 hours of discharge education. Patient satisfaction communication scores improved significantly, and patients maintained a low 7-day readmission rate.

Conclusion: This care model using emerging technology to deliver effective discharge education was highly satisfactory for patients and bedside nurses. Nurse leaders should seek opportunities to maximize the benefits of virtual technology in health care.

Keywords: health care delivery, patient discharge, staff workload, telemedicine

Bedside nurse vacancies compounded by the COVID-19 pandemic have created a global nursing workforce shortage.[1] Competing priorities and interruptions for nurses can lead to poor quality or missed care.[2] Higher patient-to-nurse ratios have resulted in the need for innovative solutions to mitigate challenges, optimize resources, and reduce workload for bedside nurses.

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Prior studies have described discharge planning and teaching as a time-consuming process for bedside nurses.[3] Delay of patient discharge due to staffing and workload challenges can have a significant impact on patient throughput. These delays are often a result of the bedside nurse being unavailable due to other nursing care needs.[4]

Effective discharge education, with a standardized discharge process, can reduce potentially adverse outcomes for patients.[5] Discharge education with disease-specific management and focused medication teaching is effective in reducing hospital readmission rates and other quality outcomes.[6] Although telehealth platforms have been used to deliver high-quality health care, the role of telehealth in discharge teaching and its effect on patient outcomes is not well established.

To meet the demands placed on health care providers during the pandemic, virtual care has quickly become an innovative, safe, and feasible option for health care delivery. Virtual platforms have generated numerous opportunities for care improvement, for which nurses and nurse leaders can seek opportunities to maximize its benefits.[7]

Increased patient-to-nurse ratios presented quality and safety concerns on a nursing unit

with a high volume of discharges. Within the organization were telephonic care managers with a focus on condition management and care coordination. This group of remote-working nurses had the capacity to provide virtual discharge (VDC) care to patients in the inpatient setting. Therefore, some workload of the care managers was reallocated to support the nursing unit as a pilot study for the organization. An existing telehealth platform was customized to needs of this program. Additional workforce and available technology presented an innovative solution for staffing and resource challenges with discharge support as the means for improvement.

Despite the growing body of evidence supporting virtual nursing care, to our knowledge, only one study exists utilizing the addition of remote-working virtual nurses to a standard nursing care team.[8] A virtual integrated care model was implemented in a large health system across 2 medical-surgical units that involved incorporation of virtual care capabilities in more than 40 patient beds. Following integration of the program, patient satisfaction related to communication of new medications increased by 17.4%. Other significant findings included increased staff satisfaction and a low incidence of health care–associated infections and deep venous thrombosis. The virtual nurses tracked numerous "good catches" to nursing care, and virtual nurses were able to educate and mentor the bedside nurses.

The purpose of this quality improvement study was to assess the feasibility and impact of a VDC program on nursing workload and patient outcomes, including time saved from the bedside nurse, quality of discharge care, patient satisfaction, and readmissions.

METHODS

Setting

The VDC program was introduced at a 425-bed ANCC Magnet-designated acute care community hospital within a large integrated health system in Pittsburgh, Pennsylvania. The primary stakeholders for the program included organization and hospital nursing leadership, the corporate quality department, virtual nurses, and bedside nurses. This study was reviewed and approved by the institution's quality improvement review committee.

The pilot unit was a 30-bed orthopedic unit, part of a Center of Excellence for Total Joint Replacement. This unit was chosen because of its high volume of discharges and throughput of both surgical and medical patients, presenting time challenges to manage care priorities during peak discharge times. Prior to implementation of the VDC program, bedside nurses reported through focus groups that the discharge process took approximately 45 minutes to complete, including 15 minutes to review discharge orders for accuracy, ensuring home care setup, and 30 minutes for delivery of discharge education.

Sample

Inclusion criteria for VDC were patients discharged home with or without home care services. The pilot program included surgical and medical cohorts in a phased approach to ensure efficiency on a small scale, with adaptions occurring as VDC volume increased. Phase 1 patient population included patients undergoing total joint replacement only (total knee and hip replacement); phase 2 included additional surgical populations (shoulder arthroplasty, hip and knee revisions, urological procedures); and phase 3 included all patients discharged home regardless of diagnosis (Table 1.) Exclusion criteria included patients with hearing, vision, or cognitive deficits, language barriers, or any other clinical judgment identified by the bedside nurse. Patients also had the option to opt out of VDC and receive a standard in-person discharge.

Intervention

Telehealth platform

The virtual telehealth platform, AnywhereCare (AWC), was previously developed by the organization's health services division and served as a feasible virtual platform. The existing program was customized to meet the needs of VDC, including fields for the bedside nurse to request a VDC session. Three mobile computers with the AWC platform were installed on the nursing unit. Consultation and approval from legal, medical records, risk management, and regulatory teams were required to ensure the electronic medical record (EMR) discharge form could be completed with electronic time stamps by both bedside and virtual nurses.

Training

A total of 9 telephonic care managers were integrated as virtual nurses. Training time was 10 hours per nurse, including 4 hours of didactic

Table 1. VDC Patient Admission Diagnoses/Procedures

Admission Diagnosis/Procedure	Phase 1	Phase 2	Phase 3	Total	%
Total knee replacement	59	28	29	116	43.12%
Total hip replacement	31	25	20	76	28.25%
Knee revision	0	1	2	3	1.12%
Hip revision	0	2	4	6	2.23%
Shoulder arthroplasty	0	12	8	20	7.43%
Hip fracture	0	1	0	1	0.37%
Humorous fracture	0	1	1	3	1.12%
Shoulder revision	0	0	3	3	1.12%
Fracture, other	0	2	2	4	1.49%
Ortho, other	0	1	1	2	0.74%
Orthopedic subtotal	**90**	**73**	**70**	**233**	**86.62%**
Prostatectomy	0	2	0	2	0.74%
Urinary system malignant neoplasm	0	5	0	5	1.86%
Urethral calculi	0	2	0	2	0.74%
Renal calculi	0	2	4	6	2.23%
Hydronephrosis	0	0	2	2	0.74%
TURP	0	3	1	4	1.49%
Urology subtotal	**0**	**14**	**7**	**21**	**7.81%**
Respiratory failure	0	0	3	3	1.12%
Heart failure	0	0	2	2	0.74%
Back pain	0	0	3	3	1.12%
Pain, other	0	0	4	4	1.49%
Gastroenteritis	0	0	1	1	0.37%
Fall	0	0	1	1	0.37%
Urinary tract infection	0	0	1	1	0.37%
Medical subtotal	**0**	**0**	**15**	**15**	**5.58%**
Total VDC	**90**	**87**	**92**	**269**	**100.0%**

Abbreviations: TURP, transurethral resection of the prostate; VDC, virtual discharge.

learning and 6 hours of on-site shadowing. Didactic learning included orientation to the EMR, AWC, and discharge workflow. Virtual nurses shadowed bedside nurses to understand discharge processes, patient population, and unit-specific nuances. Procedure and diagnosis tip sheets were created for virtual nurses to better understand disease-specific nuances not explicitly listed in discharge instructions.

For bedside nurses, a 30-minute super-user training session was attended by 6 individuals (bedside nurses, nurse leaders, and clinical educator) that included a tutorial of the AWC platform and the VDC process. The train-the-trainer approach to orient bedside nurses to the process followed in real time as VDCs occurred. Scripting and patient-focused brochures were created for bedside nurses to use when introducing VDC to patients and families prior to discharge.

VDC protocol

The VDC pilot occurred Monday through Friday between the hours of 10:00 AM and 5:00 PM, excluding holidays. Virtual nurses reviewed

daily patient census and clinical notes remotely to identify potential discharges to organize daily workflow. In preparation for VDC, the bedside nurse ensured discharge instructions were accurate, prescriptions were ordered, and home care was set up, if applicable. The bedside nurse also determined eligibility for VDC. If the patient did not meet inclusion criteria or opted out of VDC, the bedside nurse proceeded with a standard in-person discharge.

Once the discharge order was entered, the bedside nurse requested a VDC session in real time through the AWC portal. Information required for the visit included patient name, date of birth, bedside nurse phone number, and any special requests for the virtual nurse, such as a specific disease process or new medication needing emphasized. If a patient requested to the bedside nurse that their caregiver be present virtually during discharge, the caregiver was emailed a secure message with a unique meeting invitation to ensure privacy.

Once VDC was requested, the bedside nurse brought the mobile computer into the patient's room. At the same time, the virtual nurse prepared by reviewing discharge instructions. Occasionally, the patient had to wait in queue for the virtual nurse to finish a prior session. The average wait time was 6 minutes. The bedside nurse ensured the patient, caregivers, and the virtual nurse were connected, troubleshooting the connection if necessary. The virtual nurse then proceeded with the VDC process. The patient's discharge instructions and the face of the virtual nurse were visible to the patient on the computer screen. The patient was provided with discharge instructions in paper format to follow along with and to take home. The methods of education delivery were return demonstration and teach back. Starting during phase 2 of the pilot, virtual nurses offered to assist scheduling follow-up appointments at the end of the visit.

Upon completion of VDC, the virtual nurse called the bedside nurse to confirm discharge was complete and handed off follow-up items as necessary, including medication or other order discrepancies. Finally, the virtual nurse retrieved the discharge form from the patient's EMR and completed the discharge education field. This form was later accessed by the bedside nurse who finalized the form, including time of discharge, accompanying caregiver, and mode of transportation. In the weeks following discharge, an existing practice by the organization included discharge follow-up phone calls. Patients receiving VDC participated in these phone calls the same as standard discharge patients. See Supplemental Digital Content Figure (available at: http://links.lww.com/JNCQ/B70) for the VDC protocol.

Measures

Feasibility was measured by evaluating the number of VDC sessions, time spent by virtual nurses performing VDC, training required, and cost. Quality of care was measured with 7-day readmissions, VDC patient survey, patient satisfaction, and staff satisfaction. All-cause 7-day hospital readmissions compared VDC with standard discharge. Readmission rates for both groups were reported monthly and for each phase as a percentage per 1000 patient-days. The VDC patient survey contained 2 patient rating questions given to patients at the end of the session. The 2 questions were to rate the online care and rate the provider, which in this case was the virtual nurse. Both questions were measured on a 5-point Likert scale, with a higher score indicating higher satisfaction.

Patient satisfaction was measured in aggregate for the nursing unit using Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey items: Overall Rating of Care, Communication with Nursing, Communication about Medications, and Care Transition. These were measured monthly, 5 months prior to, and 5 months following VDC implementation. HACHPS[9] measures nursing unit patient surveys compared to national hospital survey data based on similar hospital characteristics and are expressed as a percentile ranking and top box score. Bedside nurse satisfaction was measured using a 5-item satisfaction survey indicating the nurses' perception on ease of use, degree of helpfulness, overall satisfaction, and preference of VDC to standard discharge.

Analysis

Data were analyzed using IBM SPSS version 28 for Windows (Armonk, New York). Descriptive statistics were used to characterize the sample, including mean age and frequency of gender of patients receiving VDC. The number of VDC sessions, average weekly number of sessions, average session duration, the ratio of VDC to eligible patients, and staff satisfaction were also expressed using descriptive statistics. Patient

ratings for provider and online care were expressed as mean and SD. Patient satisfaction surveys and 7-day readmissions were analyzed using a paired *t* test.

RESULTS

Patient demographics

Over the pilot period, 414 patients were eligible for VDC based on appropriate diagnoses and home discharge disposition; 145 patients either did not meet inclusion criteria or refused VDC (specific reasons for exclusion/refusal were not observed). A total of 269 eligible patients (65%) participated in VDC (Table 2). The mean patient age was 69 years (SD = 12.09), and 53% (n = 142) of patients were female. Patients were admitted to orthopedic surgery (86.62%), urology (7.81%), and general medicine (5.58%). See Table 1 for all diagnoses and procedures.

Duration of VDC

Concerning time of the VDC process, a total of 101 hours 21 minutes of time was spent by the virtual nurse performing VDC. Using time estimated by bedside nurses to complete a discharge (45 minutes), 269 standard discharges would have required 202 hours by the bedside nurse. Instead, the bedside nurse only spent about 15 minutes per patient preparing for VDC, an approximate total of 67 hours throughout the pilot. The average VDC session time was 23 minutes 57 seconds, allowing the bedside nurse this time to tend to other needs within their patient assignment during the VDC process. With an average count of 15 VDC sessions per week or 3 per shift, the bedside nurse saved anywhere between 24 and 72 minutes per shift depending on the number of discharges in the patient assignment.

Readmissions

From January to May 2022, the average monthly 7-day readmission rate for standard discharge patients was 3.23% (n = 19). Although not statistically significant, patients receiving VDC had an average monthly 7-day readmission rate of 1.12% (n = 3) for the same time frame ($P = .47$).

Quality of online care

VDC rating surveys were completed by 85.55% (n = 230) of all patients receiving VDC. Online care rating mean score was 4.78 (SD = 0.60) and provider rating mean score was 4.91 (SD = 0.38) across all 3 phases of the pilot.

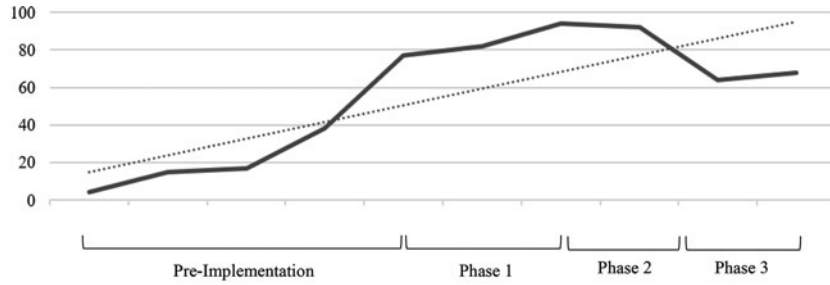
Patient satisfaction

Patient satisfaction top box scores and percentile rankings for the nursing unit improved following VDC implementation. The Communication about Medications domain achieved a statistically significant ($P = .02$) top box score increase from 56.11 to 66.56 and a 49.80% increase in percentile ranking (Figure). There was also a

Table 2. VDC Results

Results	Phase 1	Phase 2	Phase 3	Total
Timeframe	12/21/21 – 2/25/22	2/28/22 – 4/1/22	4/4/22 – 5/6/22	
VDC eligibility				
Patients eligible	112	127	175	414
Refused/excluded	22	40	83	145
N(%) VDC	90 (80%)	87 (69%)	92 (53%)	269 (65%)
VDC characteristics				
Average weekly VDC	9	18	19	15
Total visit duration, h:min:sec	35:22:28	37:06:14	28:52:08	101:20:50
Average visit duration, min:sec	24:58	25:21	18:46	23:57
Quality of care				
Provider rating	4.90	4.87	4.98	4.91
Online care rating	4.75	4.71	4.92	4.78
7-day readmission rate	0%	0%	3.26%	1.12%

Abbreviations: VDC, virtual discharge.



	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22
Percentile Ranking	4	15	17	38	77	82	94	92	64	68
N	22	24	25	26	17	11	12	16	16	12

Figure. HCAHPS Percentile Ranking—Communication about Medications. HCAHPS indicates Hospital Consumer Assessment of Healthcare Providers and Systems.

statistically significant increase ($P = .03$) in average top box score for the Communication with Nursing domain from 79.43 to 87.82 (Table 3). Although study design limited the ability to determine cause and effect and these results were measured in aggregate, no additional measures or events were known to have an effect on patient satisfaction scores.

Staff satisfaction

A voluntary staff satisfaction survey was distributed to bedside nurses after pilot completion. All nurses completing the survey (n = 7) indicated they were highly satisfied with the VDC program and found the program very helpful to manage daily tasks. The majority of nurses (85.71%, n = 6) found VDC very easy to use. While VDC occurred for their patients, all nurses (n = 7) reported using this time caring for other patients, 85.71% (n = 6) reported additionally using this time to catch up on documentation, and 28.57% (n = 2) reported using this time to take a meal break. The majority of nurses (57.14%, n = 4) preferred VDC to standard discharge; 42.86% (n = 3) had equal preference between VDC and standard discharge.

Cost

The organization had an existing telehealth provider contract; therefore, there were no incurred start-up costs for the platform in this project. For organizations that have yet to purchase telehealth platforms, start-up costs begin at $50 000 and increase as more complex tools and features are added. Mobile computer configurations, including a laptop, mouse, speaker, and cart, were $1838.11 each. With 3 mobile computers, the start-up cost for these configurations was $5514.33. Existing technological infrastructure within the nursing unit may mitigate these costs. Virtual nurse training time was 10 hours per nurse. With an average nurse salary[10] of $37.31 per hour, the training cost for 9 virtual nurses was $3357.90. Bedside nurses

Table 3. Patient Satisfaction Percentile Ranking and Top Box Score

	Percentile Ranking			Top Box Score			
HCAHPS Domain	Pre	Post	% Change	Pre (SD)	Post (SD)	*t*	*P*
Overall Rating of Care	65.60	73.0	7.40%	76.13 (10.18)	77.91 (10.37)	−0.27	.79
Communication with Nursing	54.0	91.80	37.80%	79.43 (4.47)	87.82 (5.20)	−2.73	.03
Communication about Medications	30.20	80.0	49.80%	56.11 (5.52)	66.56 (5.56)	−2.98	.02
Care Transition	55.60	73.40	17.80%	54.00 (8.68)	58.08 (8.60)	−0.75	.48

Abbreviation: HCAHPS, Hospital Consumer Assessment of Healthcare Providers and Systems.

were trained during scheduled work time, requiring no additional time to be spent on training for telehealth software. Preparation of education materials were completed by a clinical educator on the project team at no additional cost. The total start-up cost of a VDC program would depend upon existing technological infrastructure but could start anywhere between $8872.23 and $58 872.23 and increase on the basis of scope of need and size of the organization.

DISCUSSION

The purpose of this project was to evaluate the effect of a VDC program on nursing workload and patient outcomes. The VDC program saved bedside nurses between 24 and 72 minutes per shift, allowing time to complete other patient care tasks or seek respite. It was also perceived as a valued addition to their daily workflow based on the voluntary staff survey.

Quality of care was maintained or improved as evidenced by quality metrics. Patient satisfaction improved in each domain evaluated, and patient ratings following each VDC session showed favorable results indicating satisfaction with the program. Significant improvement in communication survey domains provides evidence of the efficacy of discharge teaching provided by the virtual nurses. The virtual nurses' ability to deliver discharge instructions without interruption likely contributed to increased satisfaction among VDC participants. Increases in communication-related patient satisfaction survey items were consistent with prior virtual nursing care studies.[8]

Starting week 14 of the pilot, virtual nurses documented "good catches" that occurred during VDCs. A "good catch" was defined as an error in patient instructions that was avoided because of clinical judgment by the virtual nurse. In 6 weeks of logging good catches, 5 potentially inappropriate medication orders were addressed, 1 missing prescription was resolved, and 3 incorrect discharge instructions were rectified. The virtual nurse served as a second review to ensure accuracy of discharge information compared with single-nurse review with standard discharge. These findings add to previous studies showing the impact of this model on increasing good catches and reducing missed care.[11]

Patients receiving VDC maintained a low readmission rate. During the first 2 phases, monthly 7-day readmission rates were 0% for patients receiving VDC. Three 7-day readmissions occurred in April 2022, for a rate of 4% during that month. Of the 3 patients who received VDC instructions and were readmitted, 1 patient was admitted to urology (transurethral resection of the prostate) and 2 patients to orthopedic surgery (total joint replacement). Although the reduced readmission rate in patients receiving VDC was not statistically significant, the VDC program proved to maintain the same low readmission rate as the standard discharge patient population. As a bridge to prevent readmission, virtual nurses added follow-up appointment concierge service to the VDC protocol during phase 2 of the pilot.

VDC also proved financially feasible. In the case of our VDC program, start-up costs were $8872.23. However without an existing telehealth platform, these costs begin around $58 872.23. The average cost per hospital readmission in 2018 was $15 200.[12] Based on the average cost to implement a VDC program, cost savings can begin for the organization after as few as one prevented readmission. This potential financial impact may mitigate costs associated with initiation of a VDC program.

As the patient population expanded throughout the 3 phases, additional measures were necessary to prevent increased wait time when multiple discharges occurred simultaneously. Workflow challenges through the AWC platform were identified and resolved throughout the pilot. For example, some patients became disconnected from the virtual nurse during their session; resolution was met with assessment of the network bandwidth. Virtual nurse workforce was expanded in the second phase, and a fourth mobile cart was added to account for increased patient volume.

Future plans include assessing for expansion to other departments with surgical service lines within the hospital. Virtual care continues to be explored by the organization, with this pilot serving as a model for future practice. As volume of patients and scope of nursing departments expand, the need for additional nursing workforce and technology should be assessed. A future state may include a dedicated VDC department with full-time employees devoted to VDC and other virtual care tasks such as hourly rounding, admission assessments, and medication reconciliation. Although more costly, utilization of integrated video monitoring in patient rooms

found in the literature[8] could mitigate some constraints associated with times of high discharge volume.

Nursing implications

This study supports existing literature regarding the impact of a virtual nurse workforce integrated to an existing care team.[8] Health systems are facing an unknown future of staffing and resources. Unique opportunities exist within virtual care for innovative care models to mitigate these challenges. The virtual care described in this article related specifically to discharge; however, virtual nursing has the potential to expand to a much broader scope based on individual organizational needs.

Limitations

This study had some limitations. Fluctuations in surgical volume due to surgeon scheduling and holidays led to VDC volume variation in the first phase. The pilot occurred Monday through Friday, 10:00 AM-5:00 PM, excluding holidays. Patients on the unit may have been discharged as early as 9:00 AM and as late as 7:00 PM. A future state of this program should include weekend and holiday coverage and expanded daylight hours when necessary.

While patients participating in VDC maintained a low 7-day readmission rate, it should be acknowledged that the medical patient population was not incorporated until phase 3. In addition, patients with hearing, sensory, or cognitive deficits, or language barriers who did not meet inclusion criteria may have posed a higher risk for readmission. Although none of the readmitted patients who received VDC were admitted to general medicine, 68.4% (n = 13) of all 19 traditional discharge patients were admitted to this service.

Some patients opted out of VDC due to comfort with standard in-person discharge. However, as today's aging population seeks medical care, virtual care may prove to be more feasible for more tech-savvy future generations, although barriers in access to this technology may be evident in rural and low-income regions. The overall proportion of VDC to standard discharge decreased to 53% in phase 3. This may have been due to increased exclusion criteria among general medicine patients not present in orthopedic or urology patients.

Patient satisfaction surveys were analyzed in aggregate to include all patients discharged from the nursing unit. To our knowledge, there were no additional events or initiatives aside from VDC that would have contributed to the increase in satisfaction scores and percentile rankings. The overall ratio of patients receiving VDC was about 65%, which may have limited impact on the overall nursing unit patient population.

VDC became an accepted practice change as evidenced by the nurse satisfaction survey. However, it should be mentioned that along with this practice change comes a change in culture from the comfort of usual care. The nurses' acceptance of practice change was evident when realizing VDC gave them opportunity for a lunch break or time to catch up with other care tasks.

CONCLUSION

While there is an ever-growing body of literature to support virtual health care, this is the first study of its kind to evaluate the feasibility and efficacy of a virtual program focused solely on patient discharge. The study showed the impact of a collaborative effort between business units within a large health care organization to improve outcomes for patients and nurses. The VDC program provides a feasible protocol that could also be applied to different health care settings, such as outpatient surgery, emergency medicine, or urgent care. Results indicate this program was effective in reducing bedside nurse workload, satisfactory for patients and nurses, and maintained quality care when compared with standard discharge. Future studies may include direct comparison of VDC with standard discharge on quality and safety outcomes.

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