



Impact of post-discharge phone calls on non-urgent hospital returns < 90 days following primary bariatric surgery

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Abstract

Introduction Quality of care delivery may improve patient outcomes post-bariatric surgery. We examined the quality of post-discharge phone calls (Ph_{DC}) to determine the impact on early (< 90 day) non-urgent hospital returns (NUHR) following primary bariatric surgery.

Methods A retrospective review was performed on patients who underwent Roux-en-Y-gastric bypass (RYGB) or sleeve gastrectomy (SG) in 2019. Patients were compared between presence of care coaching (Jan–June 2019) versus no care coaching (July–Dec 2019). Baseline demographics, comorbidities, psychiatric history, and Ph_{DC} were collected. Index Ph_{DC}s were coded for completeness using a scoring system and rated by call quality. Patients were stratified into NUHR versus control group (Never returns [NR]). Primary analysis examined the impact of Ph_{DC} on NUHR. Sub-analysis examined the impact of call quality. Univariate analysis was performed using Chi-square or Fisher's exact tests. Multivariate analysis (MVA) was used to determine predictors of NUHR. A *p*-value of ≤ 0.05 was statistically significant.

Results A total of 359 patients were included. Compared to the NR group (*n* = 294), NUHRs (*n* = 65) were more likely to be younger (41.3 + 12.1 versus 45.0 + 10.8 years, *p* = 0.024), with baseline anxiety (41.5% versus 23.5%, *p* = 0.003), and undergo RYGB (73.3% versus 57.8%, *p* = 0.031). There was a significant difference in number of Ph_{DC} in the NUHR and NR groups (*p* = 0.0206). Care-coached patients had significantly higher rates of high-quality phone calls (*p* < 0.0001) compared to non-care-coached patients. MVA demonstrated younger age (OR = 0.97, CI: 0.95–1.00; *p* = 0.023), anxiety (OR = 2.09, CI: 1.17–3.73; *p* = 0.012), RYGB (OR = 1.88, CI: 1.02–3.45; *p* = 0.042), and > 50% call quality versus no Ph_{DC} (OR = 0.45, CI: 0.25–0.83; *p* = 0.010) were independently associated with NUHRs.

Conclusion High-quality Ph_{DC}s may play a role in mitigating NUHRs. Care coaching represents a potential intervention to decrease high rates of NUHR in primary bariatric surgery patients.

Keywords High reliability of care · Bariatric surgery · Early readmission · Follow-up calls · Post-discharge phone calls

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Bariatric surgery has been shown to provide effective and durable solutions for obesity [1]. However, early non-urgent readmissions following bariatric surgery persist, with a previous study by our group demonstrating a rate of 3.3 percent [2]. Readmission rates are an important quality metric for

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hospitals, particularly in surgical specialties [3]. Following the advent of the Centers for Medicare and Medicaid Services (CMS) Hospital Readmissions Reduction Program, hospitals are penalized for excessive early readmissions for specific patient populations [4]. While bariatric patients are not currently included in the program, this nevertheless highlights the critical importance of reducing early readmissions and non-urgent readmissions in particular, both to improve patient outcomes and decrease healthcare costs [4].

Multiple risk factors for early non-urgent readmission after bariatric surgery have been cited in the literature [3], with nausea/vomiting, dehydration, and/or non-acute abdominal pain being the most common etiologies [5]. Additionally, multiple approaches to mitigate this problem are practiced, one of which is post-discharge phone calls (Ph_{DC}), which have shown promising results in several specialties [6–8].

Indeed, at our own institution, a bariatric Care Coaching program (CCP) was developed in 2015 to decrease both length of stay and early hospital readmissions. Aside from educating patients in the perioperative period, a large part of the program focused on Ph_{DC} wherein a bariatric-certified nurse would ask specific questions related to issues, such as pain, incision site infection, nausea/vomiting, and fluid intake. Interestingly, examination of our outcomes following implementation of this program demonstrated improvements in both length of stay and patient satisfaction, but no impact on readmissions [9].

In 2017, 2 years after its implementation, the CCP was examined to understand why there was no impact on readmissions. Root cause analysis (RCA) of the Ph_{DC}s demonstrated a wide variability in how questions were asked (unpublished results). Generally, patients were asked about fluid and protein intake, abdominal pain, and wound infections. However, there were no defined thresholds that would indicate whether patients should be provided more education, be instructed to go to clinic for hydration, or return to the hospital for therapy. Indeed, the subjective nature of patient phone calls resulted in several patients falling through the cracks as evidenced by the facts that 12% of patients readmitted for dehydration and 11% of those readmitted for wound infections had unclear phone call documentation.

The RCA also identified the timing of calls as barriers to efficacy. Specifically, Ph_{DC}s were originally performed on post-discharge days 1, 4, and 7; however, due to the facts that there was often difficulty contacting patients on post-discharge day (PDD)-1 and, if contacted, accurate determination of a patient's ability to maintain hydration was difficult given the patient was <24 h from discharge, the PDD-1 call was changed to PDD-2, allowing patients a full day of independent care that would provide a more accurate determination of their ability to maintain hydration, pain/nausea control, and other post-operative care.

Calls on PDD-4 and -7 were unchanged given wound infections, accounting for 39% of overall readmissions, presented on post-discharge day 6 + 2 days. Of note, prior to 2017, phone conversations were recorded in a secure drive and discarded following the third call, hence the original script is unavailable.

Therefore, in 2017 the Ph_{DC} “script” was modified to include specific questions, with care pathway algorithms triggered by specific answers. On July 1, 2020, the Care Coaching program was suspended due to budgetary constraints, and the coaching responsibilities were transferred to the inpatient nursing staff who continued to follow the perioperative care pathway and use the modified phone call script. Therefore, patients included in this study who underwent surgery from January to June 2019 were managed perioperatively by both their care coach and inpatient nurse and those from July to December 2019 were cared for solely by their inpatient nurse.

This shift in responsibility, coupled with what anecdotally appeared to be an increase in readmissions in the latter half of 2019, prompted our investigation into how accurately care was being delivered both during and after implementation of the Care Coaching program. Specifically, reliability of care delivery reflects the accuracy with which patient care algorithms are executed [10]. This is an important consideration when developing healthcare interventions, as one can reasonably surmise that care algorithms without effective execution will likely fall short of their goals. As such, the shift of the care coach's responsibility to the inpatient nurse created a natural experiment to evaluate the reliability of bariatric care delivery using early, non-urgent hospital returns as an endpoint. Given that the program at our institution follows a clearly protocolized perioperative care pathway, embedded with hard stops to buffer changes in residents, fellows, nursing staff, and faculty, we sought to examine the impact of post-discharge phone calls on patient outcomes and determine if care coaching impacted the quality-of-care delivery.

To our knowledge, the effect of quality of Ph_{DC}s on early non-urgent hospital returns (NUHR) following primary bariatric surgery has yet to be investigated. As such, the aim of this study was to determine whether a single intervention (i.e., Ph_{DC}), if delivered with high reliability, was associated with decreased early hospital returns following bariatric surgery. Secondly, we aimed to determine whether there was a difference in frequency and/or quality of calls between the coached versus not-coached period. We hypothesized that Ph_{DC}s delivered with *high reliability* would decrease rates of early NUHR following primary bariatric surgery. Additionally, we hypothesized that Ph_{DC}s during the care coaching period were delivered with higher reliability, with resultant lower NUHRs during this period.

Materials and methods

Patient selection

After institutional IRB approval (2020H0188), a retrospective analysis was conducted on all patients undergoing primary bariatric surgery at a single tertiary care institution between January 1 and December 31, 2019. Only patients undergoing surgery in 2019 were included to avoid confounding factors in the data set due to elective surgery cancellations in 2020 secondary to the COVID-19 pandemic. Inclusion criteria were as follows: adult patients (age > 18 years) undergoing primary laparoscopic Roux-en-Y gastric bypass (RYGB) or sleeve gastrectomy (SG). While patients who underwent revisional surgery also received post-discharge phone calls, they were excluded due to literature demonstrating an association between revisional bariatric surgery and higher readmission rates compared to primary bariatric surgery [11]. This association was seen as a possibly confounding factor, hence the exclusion of this patient population. In addition, patients who had urgent or non-bariatric-related hospital returns were excluded from the analysis as the focus of this study was on potentially preventable readmissions with improved post-operative teaching.

Patients were stratified into control (never returns [NR]) and experimental (non-urgent hospital returns [NUHR]) groups based on early non-urgent hospital returns. Patients in the NUHR group were identified based on their index hospital return within 90 days of surgery, including both emergency department (ED) visits and/or non-urgent hospital readmissions for the following bariatric-related indications: nausea/vomiting/dehydration, dysphagia, superficial wound infection, and abdominal pain not associated with a surgical emergency. These criteria were chosen based on identification of common preventable etiologies for hospital return in our bariatric patient population.

Post-discharge phone calls

As part of an ongoing quality improvement initiative, our institution implemented a Care Coaching Program on July 1, 2015 in an effort to improve outcomes following bariatric surgery. Care coaches were registered nurses with bariatric certification, who were heavily involved in bariatric patient care in the immediate post-operative period and worked with patients in addition to the assigned inpatient nurse. Details of this program have been previously published [9].

A core responsibility of the care coaches was to ensure continued patient success and/or provide early

identification of health issues following hospital discharge. This responsibility was achieved through Ph_{DC}s on post-discharge days 2, 4, and 7. Care coaches used this information to identify potential problems that may contribute to post-operative complications and implement any necessary actions, such as providing additional teaching, schedule earlier follow-up appointments, or referral to the ED. Ph_{DC}s were intentionally scheduled prior to routine post-operative follow-up for early detection of any post-operative issues. Specifically, our institutional protocol structures post-bariatric surgery follow-up at 2 weeks and then at every diet change which for RYGB patients included additional follow-ups at 6 weeks, 6 months, and then annually and for SG patients included additional follow-ups at 4 weeks, 8 weeks, 6 months, and then annually. The increased frequency of post-operative visits for sleeve gastrectomy patients was due to a slower transition from pureed foods to soft food as per our institutional protocol.

As alluded to in the introduction, the phone call script was modified in 2017 after an analysis demonstrated inconsistencies in documentation and/or advice provided to patients. As such, specific algorithms were created for common post-operative concerns, and standardized Ph_{DC} templates were used to document conversations. The templates included nine questions assessing fluid/protein intake, nausea control, pain control, mobility, and other common post-operative concerns (Table 1). Answers to questions were recorded on these templates and documented in the electronic medical record (EMR). As previously noted, on July 1, 2020, the Care Coaching program was suspended, and the coaching responsibilities were transferred to the inpatient nursing staff.

Data collection

The EMR was accessed by four researchers to collect retrospective patient data. Data were collected using RED-Cap (Research Electronic Data Capture), a secure, web-based software platform hosted at our institution [12, 13]. Researchers had previous experience using the EMR and were trained in chart review to ensure consistency in data collection. The following data were recorded: demographic, socioeconomic, past medical history, perioperative/procedural information, immediate post-operative complications (defined as complications within the same surgical admission), details of Ph_{DC}s conducted within the first week post-discharge, and hospital returns and/or readmissions within 90 days.

Post-discharge phone call scoring

In order to evaluate *reliability* of care, each Ph_{DC} was scored by evaluating the template created to document the phone

Table 1 Post-discharge phone call (Ph_{DC}) scoring system

Question	Follow-up questions	Score
<i>Is nausea controlled?</i> Yes or no = 50 points Not asked = 0 points	<i>Directions given?</i> Directions given when indicated = 50 points No directions indicated = 50 points Directions not given when indicated = 0 points	100
<i>Normal bowel movement?</i> Yes or no = 50 points Not asked = 0 points		100
<i>Walking?</i> Yes or no = 50 points Not asked = 0 points		100
<i>Dyspnea?</i> Yes or no = 50 points Not asked = 0 points		100
<i>Amount of fluid intake?</i> Amount indicated = 30 points Not asked = 0 points	<i>Re-education given?</i> Re-education provided when indicated = 35 points No re-education indicated = 35 points No re-education provided when indicated = 0 points	<i>Specific directions given?</i> Specific directions given when indicated = 35 points No directions indicated = 35 points No directions specified when indicated = 0 points
<i>Amount of protein intake?</i> Amount indicated = 30 points Not asked = 0 points		100
<i>Incisional pain?</i> Yes or no = 40 points Not asked = 0 points	<i>Tenderness at incision?</i> Yes or no = 20 points Not asked = 0 points	<i>Warmth at incision?</i> Yes or no = 20 points Not asked = 0 points
<i>Generalized pain?</i> Yes or no = 50 points Not asked = 0 points	Location of pain? Location indicated = 10 points Not asked = 0 points	<i>Redness at incision?</i> Yes or no = 20 points Not asked = 0 points
<i>Pain medications used?</i> Medications indicated = 100 points Not asked = 0 points	N/A	<i>Directions given?</i> Directions given when indicated = 40 points No directions indicated = 40 points Directions not given when indicated = 0 points
		100

Care coaching Ph_{DC} template provided in bold text, with scoring system provided in plain text

calls, with possible scores ranging from 0 to 900 (Table 1). Each question received a total of 100 points. Points were awarded based on whether or not questions were asked and if appropriate action was taken based on patients' responses. Based on the initial question, if no action was needed then full points were awarded (i.e., if a patient indicated no nausea, 50 points were provided for the initial question and an additional 50 points were provided as no directions were required, for a total of 100 points). Questions without a response recorded were assumed not to have been asked. Calls were categorized as highly reliable if they achieved a score of greater than 450 (> 50% quality) because this indicated that at least 50 percent of questions were addressed in the call. From this scoring system, three groups emerged: (a) no contact = patient was not contacted (i.e., not called, call was not answered, or patient was contacted but call was not documented), (b) < 50% = call quality score < 450, and (c) > 50% = call quality score > 450. Given documentation of a post-discharge phone conversations likely did not capture the nuances of the provider-patient conversation, we could

not assess how reliably a coach/nurse was able to deliver care. Instead, call quality, derived from documentation in the EMR, served as a surrogate for reliability of care delivery.

Statistical analysis

Summary statistics were reported as means and standard deviations or medians and inter-quartile ranges for continuous variables and compared using Student's t tests or Kruskal–Wallis tests where relevant. Categorical variables were reported as frequencies and percentages and compared between groups using Chi-square or Fisher's exact tests where appropriate. Primary analysis examined the association of Ph_{DC}s on NUHR. Sub-analysis examined the association of call quality on NUHR. Multivariable logistic regression was used to assess independent predictors of NUHR. Hypothesis testing was conducted at a 5 percent type I error rate (alpha = 0.05). All statistical analyses were conducted in SAS version 9.4 (SAS Institute, Cary, NC).

Results

Demographics

A total of 376 patients were eligible for inclusion. Of these, 3 patients returned or were readmitted for non-bariatric reasons and 14 returned or were readmitted for urgent reasons; these patients were excluded from the final analysis. Of the 359 patients that remained, 294 patients comprised the never return (NR) group and 65 patients returned to the hospital for non-urgent reasons (NUHR group).

Univariate analysis demonstrated that compared to the NR group, patients in the NUHR group were more likely to be younger (NUHR: 41.3 + 12.1, NR: 45.0 + 10.8 years, $p = 0.024$), have baseline diabetes (NUHR: 18.5%, NR: 32.0%, $p = 0.031$), and anxiety (NUHR: 41.5%, NR: 23.5%, $p = 0.003$) and undergo RYGB (NUHR: 72.3%, NR: 57.8%, $p = 0.031$) (Table 2). Other factors such as sex, race, relationship status, insurance type, tobacco use, hypertension, sleep apnea, depression, bipolar disorder, presence of a care coach, and length of index hospital stay were not significantly different between the two groups. These results are outlined in Table 2.

A total of 161 patients were in the care-coached group and 198 patients in the non-care-coached group. Of the care-coached patients, 83.9% ($n = 135$) had no return, 14.3% ($n = 23$) had a non-urgent ED visit, and 1.9% ($n = 3$) had a non-urgent readmission. Of the non-care-coached patients, 80.3% ($n = 159$) had no return, 16.2% ($n = 32$) had a non-urgent ED visit, and 3.5% ($n = 7$) had a non-urgent readmission. There was no difference in NUHR between the two groups ($p = 0.57$).

Frequency of post-discharge phone calls and non-urgent hospital returns

Analysis of Ph_{DC} frequency of the entire cohort demonstrated increased call frequency was associated with decreased NUHR ($p = 0.0206$). As outlined in Table 3, NUHRs decreased from 26% to 18% and to 10.8% as call frequency increased from no contact to 1 call and to > 1 call, respectively. Sub-analysis of call frequency, stratified by care coaching, demonstrated that within the care coaching period, some patients received more than one call, while in the non-care coaching period, patients received 1 call at most. Given this discrepancy, the decision was made to analyze the first documented call that made contact with a patient in order to accomplish a between-group comparison. For the analysis of calls within each group frequency, and not interval, was examined due to

Table 2 Patient characteristics classified by hospital returns

	NR ($n = 294$)	NUHR ($n = 65$)	p -value
Age in years (mean \pm SD)	45.0 \pm 10.8	41.3 \pm 12.1	0.024*
<i>Sex n (%)</i>			
Female	233 (80.9%)	55 (19.1%)	0.326
Male	61 (85.9%)	10 (14.1%)	
<i>Race n (%)</i>			
American Indian or Alaska Native	0 (0%)	1 (100%)	0.702
Black or African American	77 (83.7%)	15 (16.3%)	
More than one race	5 (100%)	0 (0%)	
Unknown or not reported	10 (90.9%)	1 (9.1%)	
White	202 (80.8%)	48 (19.2%)	
<i>Relationship Status n (%)</i>			
Single	75 (81.5%)	17 (18.5%)	0.510
Married	153 (82.3%)	33 (17.7%)	
Divorced	54 (78.3%)	15 (21.7%)	
Separated	7 (100%)	0 (0%)	
Widowed	5 (100%)	0 (0%)	
<i>Insurance Type n (%)</i>			
Public ^a	132 (80.0%)	33 (20.0%)	0.390
Private	162 (83.5%)	32 (16.5%)	
<i>Baseline comorbidities n (%)</i>			
Baseline diabetes	94 (88.7%)	12 (11.3%)	0.031*
Hypertension	176 (81.5%)	40 (18.5%)	0.803
Sleep apnea	174 (82.5%)	37 (17.5%)	0.738
Depression	112 (84.8%)	20 (15.2%)	0.268
Bipolar disorder	8 (72.7%)	3 (27.3%)	0.423
Anxiety	69 (71.9%)	27 (28.1%)	0.003*
<i>Procedure n (%)</i>			
RYGB	170 (78.3%)	47 (21.7%)	0.031*
SG	124 (87.3%)	18 (12.7%)	
<i>Care coached n (%)</i>			
Yes	135 (83.9%)	26 (16.1%)	0.3853
No	159 (80.3%)	39 (19.7%)	
LOS (mean \pm SD)	1.97 \pm 0.89	2.15 \pm 1.58	0.210

^aPublic insurance included patients insured through Medicare or Medicaid

NR never returns, NUHR non-urgent hospital returns, RYGB laparoscopic Roux-en-Y gastric bypass, SG laparoscopic sleeve gastrectomy, LOS length of hospital stay for index operation

Significant p -values are demarcated with an asterisk (*)

the small sample size. Analysis of call frequency within each group demonstrated a significant association between increased call frequency and decreased NUHR in the care-coached patients (26.3% vs 25% vs 10.8%, $p = 0.0413$; for no contact, 1 call, and > 1 call, respectively); however, in the non-care-coached patients, the association, while clinically relevant, was not statistically significant (26% vs 15.7%, $p = 0.0765$; for no contact vs 1 call, respectively).

Table 3 Characterization of number of phone calls stratified by hospital returns

	NR	NUHR	<i>p</i> -value
<i>All patients (n = 359)</i>			
No contact	71 (74%)	25 (26%)	0.0206*
1 call	132 (82%)	29 (18%)	
> 1 call	91 (89.2%)	11 (10.8%)	
<i>Non-care-coached patients (n = 198)</i>			
No call	57 (74%)	20 (26%)	0.0765
1 call	102 (84.3%)	19 (15.7%)	
<i>Care-coached patients (n = 161)</i>			
No contact	14 (73.7%)	5 (26.3%)	0.0413*
1 call	30 (75%)	10 (25%)	
> 1 call	91 (89.2%)	11 (10.8%)	

NR never returns, NUHR non-urgent hospital returns

Significant *p*-values are demarcated with an asterisk (*)

Post hoc testing revealed that patients with more than one Ph_{DC} had 65.7% lower odds of NUHR when compared to patients with no contact (OR 0.34, 95% CI: 1.58 to 0.74; *p* = 0.0068).

Quality of post-discharge phone calls and non-urgent hospital returns

Index Ph_{DC} were scored and stratified by ≤ 50% (low) or > 50% (high) quality based on the scoring system in

Table 1. Patients in the no contact group were assigned a quality score of 0%. Only initial phone calls, wherein a nurse connected with a patient, were scored to allow greater equity in statistical analysis given that patients in the non-care coaching group (July–December 2019) did not receive more than one Ph_{DC}. Examination of the entire cohort (*n* = 359) demonstrated 26.7% of patients never received a phone call, 5% received a low-quality call (< 50%), and 68.3% received a high-quality call (> 50%).

Univariate analysis (Table 4) demonstrated a significant association between increased call quality and decreased NUHRs. Specifically, NUHR decreased from 26% to 14.7% as call quality increased from 0% (no contact) to > 50% (*p* = 0.0416). Stratifying by the presence of a care coach demonstrated a similar association in the non-care-coached group (26% to 14%, *p* = 0.0368; for 0%, to > 50% call quality, respectively), but no significant association in the care-coached group (26.3% to 15.3%, *p* = 3809; for 0% to > 50% call quality, respectively). Of note, sub-analysis of call quality, stratified by care coaching, demonstrated a significantly higher proportion of > 50% call quality within the care-coached group (81.4% vs 57.6%, *p* < 0.0001; for care-coached vs non-care-coached groups, respectively).

Independent predictors of NUHR

Multivariable logistic regression analysis (MVA), fit to assess the association of NUHR and variables with a *p*-value < 0.1 on univariate analysis, was performed to

Table 4 Characterization of call quality of the index connected call stratified by (a) hospital returns and (b) presence of a care coach

	NR ^a	NUHR ^a	<i>p</i> -value
<i>All patients</i>			
No Contact (0% quality)	71 (74.0%)	25 (26.0%)	0.0416*
≤ 50% Call Quality	14 (77.8%)	4 (22.2%)	
> 50% Call Quality	209 (85.3%)	36 (14.7%)	
<i>Non-care-coached patients (n = 198)</i>			
No Contact (0% quality)	57 (74.0%)	20 (26.0%)	0.0368*
≤ 50% Call Quality	4 (57.1%)	3 (42.9%)	
> 50% Call Quality	98 (86.0%)	16 (14.0%)	
<i>Care-coached patients (n = 161)</i>			
No Contact (0% quality)	14 (73.7%)	5 (26.3%)	0.3809
≤ 50% Call Quality	10 (90.9%)	1 (9.1%)	
> 50% Call Quality	111 (84.7%)	20 (15.3%)	
	Care-coached group ^b	Non-care-coached group ^b	<i>p</i> -value
No Contact (0% quality)	19 (11.8%)	77 (38.9%)	< 0.0001*
≤ 50% Call Quality	11 (6.8%)	7 (3.5%)	
> 50% Call Quality	131 (81.4%)	114 (57.6%)	

NR never returns, NUHR non-urgent hospital returns

Significant *p*-values are demarcated with an asterisk (*)

determine whether there was an impact of any call on NUHR. Analysis demonstrated that baseline anxiety (OR = 2.09, 95% CI: 1.17–3.37; $p = 0.012$), RYGB (OR = 1.88, 95% CI: 1.02–3.45; $p = 0.042$), and no Ph_{DC} (OR = 2.08, 95% CI: 1.17–3.79; $p = 0.012$) were independently associated with NUHRs. Further, while MVA analysis on the impact of call quality demonstrated a similar influence of baseline anxiety and surgery type, pairwise comparisons of call quality demonstrated that when compared to no contact, only > 50% call quality was independently protective from NUHRs (OR = 0.45, 95% CI: 0.25–0.83; $p = 0.010$) (Table 5).

Discussion

Approximately 17% ($n = 65/376$) of all patients undergoing primary bariatric surgery at our institution in 2019 had at least one non-urgent hospital return within 90 days of surgery. Of those included in this study, 15.2% ($n = 55/359$) were seen in the ED and sent home, while 2.8% ($n = 10/359$) were readmitted. This study demonstrated that, compared to no contact after discharge, calling and speaking to a patient were independently associated with 52% decreased odds in NUHR. Additionally, if the call placed was of high quality, the odds of non-urgent hospital returns decreased by 55%.

The use of post-discharge phone calls, as a method to decrease non-urgent hospital returns, may potentially reduce costs to both patients and healthcare systems given the ability to identify problems in a timely manner, with relative ease of implementation. While the literature is rife with studies focused on the impact of phone calls for general medicine patients [7, 14, 15], there is a relative paucity in the surgical population, with mixed results. Specifically, while Hornick et al. demonstrated that a discharge phone call one-week post-vascular surgery was useful in identifying risk factors

for readmission, including pain control and dressing management, there was a clinically relevant but insignificant association with reduced 30-day readmissions (17% vs 8%; $p = 0.37$) [6]. Similarly, in patients being treated for colorectal cancer, a pilot randomized control trial examining the effectiveness of a nurse-delivered telephone supportive intervention demonstrated a non-significant reduction in presentations to emergency department (21% vs 33%; $p = 0.23$) and readmission to the hospital (37% vs 47%; $p = 0.37$), 6 months after surgery [16]. Conversely, Shah et al. demonstrated a significant decrease in ED visits (19.2% vs 6.6%; $p = 0.01$) but not readmissions (10.2% vs 7%; $p = 0.4$) in patients called within 72 h of being discharged after multi-site head and neck cancer operations and total laryngectomies [17], and Iqbal et al. demonstrated that discharge phone calls, post-ileostomy creation, significantly decreased readmission for dehydration from 65 to 16% ($p = 0.002$), albeit calls were being made daily for 3 weeks [18].

In addition to phone calls, our results demonstrated that baseline anxiety was not only statistically more prevalent in the NUHR group, but it was also a strong independent predictor of returning to hospital for non-urgent reasons. Indeed, our group has previously examined psychiatric disorders in the context of readmissions and determined that patients with anxiety were significantly more likely to be readmitted, for any reason, within 30 days after bariatric surgery (10.1% vs 3.7%; $p = 0.04$) [19]. Interestingly, while Litz et al. demonstrated 34% greater odds of 30-day readmissions after bariatric surgery in patients diagnosed with a mental health disorder, stratification by specific disorders demonstrated no significant impact of anxiety disorders (OR = 1.01, $p = 0.897$) [20]. While this discrepancy may be related to differences in study design, sample size, and type of anxiety disorder, one cannot underestimate the influence of anxiety in this patient population. Specifically, Amiri

Table 5 Multivariate analysis of predictors of non-urgent hospital returns

	Odds ratio	95% CI		<i>p</i> -value
<i>Comparison of any call versus no call</i>				
Age	0.97	0.95	1.0	0.023*
Anxiety: Yes vs. No	2.09	1.17	3.73	0.012*
RYGB vs. SG	1.88	1.02	3.45	0.042*
No contact vs any call	2.08	1.17	3.79	0.012*
<i>Comparison of calls by quality</i>				
Age	0.97	0.95	1.0	0.020*
Anxiety: Yes vs. No	2.13	1.19	3.80	0.011*
RYGB vs. SG	1.84	1.0	3.38	0.051*
≤ 50% Quality vs No Contact (0% quality)	0.82	0.24	2.83	0.751
> 50% Quality vs No Contact (0% quality)	0.45	0.25	0.83	0.010*
≤ 50% Quality vs > 50% Quality	1.80	0.54	6.03	0.338

Ph_{DC} post-discharge phone calls, RYGB Roux-en-Y gastric bypass, SG sleeve gastrectomy
Significant *p*-values are demarcated with an asterisk (*)

et al. demonstrated a higher frequency of anxiety in people with obesity [21], and Gravani et al. demonstrated that in patients undergoing bariatric surgery, those with baseline anxiety had significantly more intense and more unpleasant pain in the immediate post-operative period [22]. Kalogianni et al. demonstrated that, in patients undergoing elective cardiac surgery, preoperative education delivered by nurses reduced anxiety and post-operative complications of patients, but it was not effective in reducing readmissions [23]. Given anxiety has been shown to undermine the influence of discharge planning in transplant patients [24], and patients with anxiety requiring medication has been shown to be significantly associated with increased rates of readmission in the orthopedic population [25], anxiety itself may mitigate any gain associated with Ph_{DC}, and addressing anxiety as part of discharge care planning may be a first step to decreasing readmissions.

As it relates to the reliability of care delivery, Petrick et al. demonstrated that increasing rate of reliability of care delivery of patient care pathways significantly decreased 30-day hospital readmission rates following bariatric surgery from 11.7% to 5.8% [10]. Consistent with these findings, the present study demonstrated that compared to not contacting a patient, conducting any call and a high-quality call independently decreased the odds of a NUHR by 52% and 55%, respectively. Of note, pairwise comparisons of no contact versus low-quality calls or high versus low-quality calls were not significantly associated with NUHR, likely related to the smaller sample size in the low-quality call group (i.e., only 5% of the cohort, $n = 18/359$). While not statistically significant, it is perhaps clinically significant that there was a trend toward decreasing NUHR in the care coaching group such that 26.3% of the care-coached patients who did not receive a phone call had a NUHR, compared to 15.3% of the care-coached patients who had a high-quality call. Again, the small sample size ($n = 19/161$) of patients who did not receive a Ph_{DC} in the care-coached group likely contributed to this result.

Comparison of call quality stratified by coaching demonstrated patients in the care-coached group were significantly more likely to receive a high-quality call, compared to patients in the non-care-coached group (81.4% vs 57.6%, $p < 0.0001$). However, this did not translate into lower hospital return rates ($p = 0.57$). The lack of impact of the care coach may be related to the influence of the phone call scoring system. Indeed, all metrics were weighted equally in order to reduce bias, although in reality, dehydration likely has greater weight than on NUHR than factors, like constipation. Still, the identification of these risk factors, followed by intervention on actionable issues and concerns, likely contributed to the difference in hospital returns between patients who did, and did not, receive a phone call after being discharged.

Our study was not without limitations. Notably, our data collection was limited to readmissions exclusively at our tertiary care center and did not evaluate readmissions to outlying hospitals. It is possible that patients presenting with certain non-urgent complaints at outlying hospitals were less likely to be transferred to our facility for management, potentially biasing our results. Additionally, we did not control for the amount of perioperative teaching performed by care coaches and/or nursing staff, which may have been a confounding factor in our analysis.

Conclusion

This study demonstrates that post-discharge phone calls performed with high reliability of care delivery are significantly associated with decreased rates of non-urgent 90-day hospital returns following primary bariatric surgery. Care-coached patients had significantly higher rates of high-quality phone calls following discharge. Implementation of a care coaching program dedicated to enhancing patient education and thereby reducing NUHR may be a cost-effective option in busy bariatric hospital centers.

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Declarations

Disclosures Dahlia M. Kenawy, MD, Lindsay M. Breslin, BS, JC Chen, MD, Muna M. Tamimi, BS, Joann K. North, MSN, RN-BC, CBN, CNL, Mahmoud Abdel-Rasoul, MS, MPH, and Sabrena F. Noria, MD, PhD, FRCSC, FACS, FASMBS have no financial conflicts of interest to disclose.

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