

Effect of Perioperative Patient Education via Animated Videos in Patients Undergoing Head and Neck Surgery

A Randomized Clinical Trial

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 Supplemental content

IMPORTANCE Patient education and engagement is a pivotal component of surgical recovery. Ensuring proper patient education involves a thorough understanding of one's diagnosis and recovery plan, while reducing language and learning barriers to help patients make informed decisions and improve their hospital experience.

OBJECTIVE To assess whether using an animated surgical guide will help patients who are undergoing head and neck surgery feel more satisfied with their surgery and recovery process.

DESIGN, SETTING, AND PARTICIPANTS A randomized clinical trial was conducted between January and August 2020 at a single tertiary care academic center in Montreal, Canada. A consecutive sample of individuals who were undergoing any of the following surgical procedures was recruited: head and neck cancer resection with or without reconstruction, parotidectomy, thyroidectomy, parathyroidectomy, laryngectomy, or transoral robotic resection. The treating team was masked to group allocation, while study participants in the nonintervention group were unaware of the multimedia platform to avoid introducing bias in their survey responses.

INTERVENTIONS Patients were randomly allocated to either the treatment arm, in which they obtained access to a multimedia patient education platform, or the control arm, in which they received traditional patient education methods via clinical visits.

MAIN OUTCOMES AND MEASURES Primary analysis compared patient satisfaction scores on the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire INFO 25, a validated questionnaire on the perceived quality of information received by patients with cancer (possible scores ranging from 20 to 80).

RESULTS A total of 100 patients (50 in each arm; 63 women [63%]; 6 African American [6%, 12 Hispanic/Latino [12%], 11 Middle Eastern [11%], and 78 White [78%] individuals) completed the preintervention and postintervention questionnaires. In those who received access to the patient education platform, there was an 11.3-point (Cohen $d = 1.02$; control group score, 61.1 of 80; treatment group score, 72.4 of 80) difference of greater postoperative satisfaction scores at 1 month. While both groups felt that they received an adequate amount of information concerning their disease process, patients in the treatment arm had significantly better satisfaction with information concerning their medical tests, treatments, and other services.

CONCLUSIONS AND RELEVANCE This randomized clinical trial of patients undergoing head and neck cancer treatment demonstrates that multimedia patient education platforms may enhance current traditional methods, providing complementary information on patients' treatment plans and recovery process, mental health, family life, and supplementary services. Further research is currently underway to confirm whether this platform will lead to decreased hospital stay, shorter complication rates, and long-term effects.

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Patient education has been recognized as a pivotal component of an integrative surgical care pathway. Enhancing patients' understanding of their disease process and treatment plan has been shown to improve shared decision-making, patient involvement, and health outcomes while also reducing undue anxiety.¹⁻³ Yet information retention following medical appointments remains markedly small, with prior studies reporting that up to 80% of the information relayed by health care clinicians during clinic visits may be forgotten.⁴ Patients consulting with otolaryngology departments are no exception, with multiple studies documenting limited information recall shortly following preoperative consultations.⁵⁻⁸

This observed educational gap stems from numerous patient, clinician, and system factors. Patient factors include cultural or language barriers, variations in patients' health literacy, and poor information assimilation owing to the stress and anxiety from the clinical encounter.^{1,9} From a system and clinician standpoint, the limited amount of time allotted per patient in busy surgical clinics, coupled with the ever-evolving complexity of diagnostic and treatment modalities, has made comprehensive perioperative counselling increasingly challenging.¹⁰

There has been a growing interest within the surgical community in the use of multimedia information technologies to augment standard clinician-led preoperative teaching. Written tools, such as pamphlets or websites, have been extensively described, but were often found to substantially exceed the fourth-grade to sixth-grade reading level recommended by the National Institutes of Health for optimal accessibility and readability.¹¹ Audiovisual platforms may improve patients' comprehension and engagement with the content while facilitating information retention by soliciting additional cognitive channels.¹²

This study aims to assess the feasibility of applying a standardized preoperative multimedia guide for patients who are undergoing head and neck surgical procedures that consists of short evidence-based animated videos that are accessible through a web-based platform. This patient education adjunct offers an overview of the treatment plan, surgical procedure, and expected postoperative recovery across various common head and neck surgeries.

Methods

Study Design and Population

A randomized clinical trial was conducted between January and August 2020 at 1 tertiary care academic hospital in Montreal, Canada (Supplement 1). This study was approved by the institutional review board and the local ethics office of the Centre Intégré Universitaire de Santé et Services Sociaux West-Central Montreal, and participants provided written informed consent. The inclusion criteria for study participation were: (1) adult patients (18 years or older) and (2) undergoing any of the following surgical procedures: head and neck cancer resection with or without reconstruction, parotidectomy, thyroidectomy, parathyroidectomy, laryngectomy, or transoral robotic resection. Patients were excluded if they were un-

Key Points

Question Does using an animated surgical guide help patients who are undergoing head and neck surgery feel more satisfied with their surgery and recovery process?

Findings In this randomized clinical trial that included 100 patients who underwent head and neck surgery, those who received access to the multimedia patient education platform had increased postoperative satisfaction scores as assessed by the validated European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire INFO 25 questionnaire.

Meaning The results of this randomized trial suggest that multimedia patient education platforms increase patient satisfaction and involvement in their surgical recovery by providing complementary information to traditional surgeon-led counseling in a clinical setting.

dergoing a surgical procedure not included in the previously described list, revision surgery, or had previously undergone any other surgery in the otolaryngology head and neck surgery department.

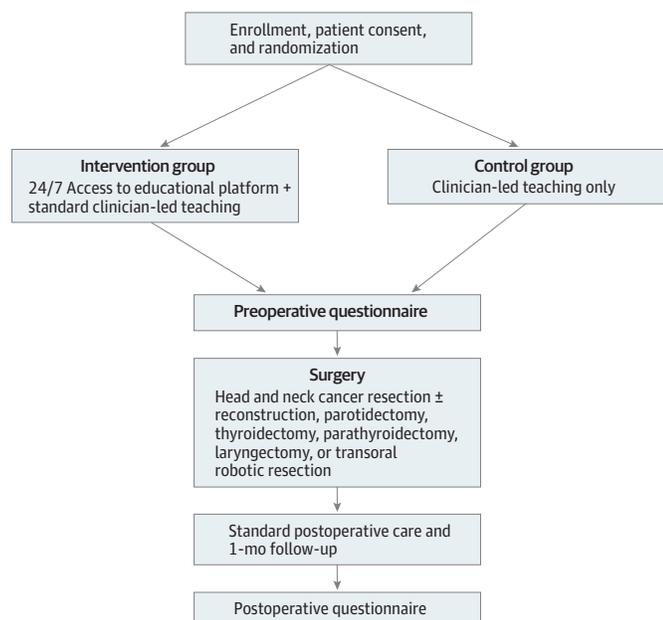
Recruitment Strategy, Randomization, and Masking

Patients were recruited in the outpatient head and neck surgery clinic by the surgeon, resident, or oncology nurse who was treating the patient at their preoperative clinical visit. After confirming eligibility, patients were given the option to enroll. Interested patients were redirected to the oncology liaison nurse, who was in charge of randomizing patients using an a priori computer-generated randomized list to receiving either the test intervention (obtaining access to the patient education platform) or the control arm (traditional patient education methods via clinical visits). Other than the nurse liaison, who had access to the randomization list, the entire treating team was masked to the study. The surgical team, including staff and residents involved in data collection and analysis, were not aware of which arm patients were allocated to, unless the patients mentioned the videos during their hospital stay. Although there was no way to double blind the study, patients in the standard arm were not made aware of the platform as to not introduce bias in the way that they answered the questionnaires.

Test Intervention

Patients in the intervention arm were given access to an educational platform called Precare. This platform is designed to provide individuals with a concise, animated video explaining the details of their diagnosis, how to adequately prepare for their upcoming surgery, what to expect during their hospital stay, and what steps they can take to help the recovery process at the hospital and on discharge home (eAppendix 1 to 3 in Supplement 2). To decrease the limitations of health literacy and language barriers, videos were created using a 6th-grade literacy level and were available in both official Canadian languages (English and French). Subtitles were created with professional translations in the most commonly spoken 20 languages in Canada. A multidisciplinary approach was

Figure 1. Timeline From Patient Recruitment Until Study End Point Including the Postoperative Questionnaire



24/7 indicates 24 hours/7 days.

taken, and the content was reviewed by participating otolaryngologists in our department, along with ancillary health care clinicians, including a nurse, nutritionist, speech language pathologist, respiratory therapist, physiotherapist, oncology-focused psychologist, and radiation oncologist. This allowed the videos on the platform to not only contain medical and surgical information concerning the diagnosis and treatment, but also expand on psychosocial elements, such as mental health and family life, in the recovery process.

The oncology nurse assisted patients in first accessing the platform, guiding them to the video that was specific to their surgery and providing them with written information on how to access the video for future reference if needed. To facilitate access for patients for whom navigating web-based platforms was more challenging, patients were additionally given the option to view the video in the clinic on an iPad (Apple) that was available for their use. Patients in the control arm did not gain access to the educational platform.

Regardless of their study arm, all patients received standard in-person preoperative teaching by the health care staff and were given the opportunity to discuss any questions or concerns regarding their surgical care with their attending surgeon. All patients underwent surgery as per routine and had follow-up at 1 week and 1 month postoperatively.

Timeline and Outcomes

The surgical timeline and data collection points are illustrated in Figure 1. All patients were asked to complete preoperative questionnaires available in English and French at the end of the first preoperative visit or after watching the educational video if randomized to the treatment arm. Postoperative questionnaires were then completed at the 1-month postoperative visit (eAppendix 3 in Supplement 2).

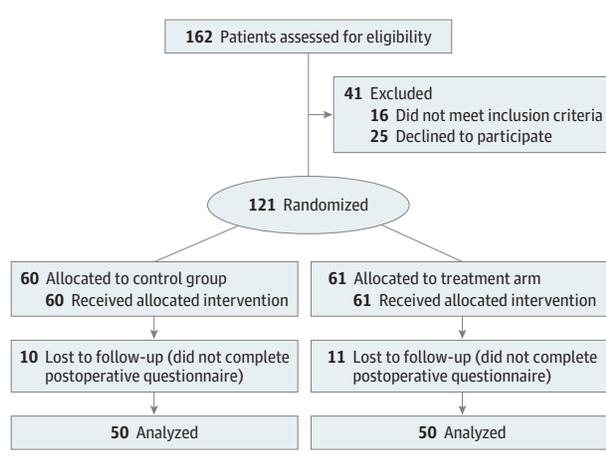
The preoperative questionnaire was a 14-item survey that included questions pertaining to: (1) patient demographic characteristics (self-reported age, sex, race and ethnicity, primary spoken language, marital status, level of education and employment status), (2) internet access, and (3) planned surgery. Patients in the treatment arm were additionally surveyed on general reaction and engagement with the content of the video, as well as its perceived usefulness, understandability, length, and their willingness to share the content with family and friends. Additional free text boxes allowed for open-ended commentary on the strengths and weaknesses of the content and perceived information gaps.

Postoperatively, all randomized patients completed the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ) INFO 25 questionnaire. This comprises a validated 25-item questionnaire that assessed the perceived quality of the information given to patients with cancer, including information about the disease, medical tests, treatment, and other services.¹³ The response format consists of a 4-point Likert scale (1, not at all; 2, a little; 3, quite a bit; 4, very much).

Statistical Analysis

Descriptive statistics were used to detail the demographic characteristics of the study population using *t* tests for linear variables and Fisher exact tests for categorical variables. Significance was set at .05. For follow-up participants, mean satisfaction scores were calculated and compared using individual *t* tests. Categorical items in the questionnaire were reported as η^2 , with the following values used for interpretation: value of 0.01 indicated a small effect, 0.06 a medium effect, and 0.14 a large effect. Cohen *d* was used as an effect size measure of the difference between 2 groups with values

Figure 2. CONSORT Flow Diagram Representing Recruitment Process



of a *d* of 0.2 considered a small effect, 0.5 a medium effect, and 0.8 a large effect. Lastly, multivariate analysis was performed to test whether certain characteristics could be risk factors for patient dissatisfaction. This included analysis by demographic characteristics, the type of surgery performed, and surgeries by each individual surgeon. Sample size calculation was performed using a 2-sample means test with 80% power and an α of .05 to render approximately 100 patients to detect a 5% mean difference in satisfaction scores. All analyses were performed using the Stata (version 15.2; StataCorp).

Results

A total of 121 patients were recruited for the study and completed all baseline evaluations (Figure 2). Of these, 100 (50 in the treatment arm and 50 in the control arm) patients also completed the postoperative questionnaire at approximately 1 month postoperatively and were included in the statistical analysis. The demographic data with results of the *t* tests and χ^2 tests are presented in Table 1, which show similar baseline characteristics in both groups. The only statistically significant difference in the 2 groups were the type of surgery, with the control arm having fewer patients undergoing thyroidectomy and parathyroidectomy. Both groups contained several individuals who were elderly, of a different culture, spoke a first language other than English or French, and had a low level of education.

The responses to the preoperative questionnaire in the treatment group are presented in Table 2. Feedback concerning the platform was extremely positive. For example, 100% of individuals using the platform claimed that the videos were easy to understand, were an appropriate length, and would recommend the video to family members or friends who have a similar diagnosis. Most individuals also found the videos interesting, useful, and an effective way of communicating medical information.

The results of the postoperative satisfaction survey using items on the EORTC QLQ-INFO25 are presented in Table 3.

Table 1. Patient Demographic Characteristics

Characteristic	No. (%)	
	Control group (n = 60)	Treatment arm (n = 61)
Age, y		
18-39	6 (10)	5 (8.2)
40-59	23 (38.3)	23 (37.7)
60-79	22 (36.7)	26 (42.6)
≥80	9 (15)	7 (11.5)
Sex		
Female	33 (55)	30 (49.2)
Male	27 (45)	31 (50.8)
Race and ethnicity		
African American	3 (5)	3 (4.9)
Middle Eastern	5 (8.3)	6 (9.8)
Hispanic/Latino	7 (11.7)	5 (8.2)
White	39 (65)	39 (63.9)
Prefer not to answer	6 (10)	8 (13.1)
Language		
English	29 (48.3)	36 (59)
French	25 (41.7)	18 (29.5)
Other ^a	6 (10)	7 (11.5)
Marital status		
Partnership	8 (13.3)	7 (11.5)
Single	22 (36.7)	26 (42.6)
Married	30 (50)	28 (45.9)
Education		
High school/college	30 (50)	28 (45.9)
University degree	30 (50)	33 (54.1)
Employment		
Employed	37 (61.7)	38 (62.3)
Unemployed	9 (15)	10 (16.4)
Retired	14 (23.3)	13 (21.3)
Access to internet		
Computer	58 (96.7)	52 (85.2)
Tablet	12 (20)	14 (23)
Smartphone	52 (86.7)	56 (91.8)
None of the above	2 (3.3)	5 (8.2)
Surgery		
Thyroidectomy	34 (56.6)	26 (42.6)
Parathyroidectomy	6 (10)	2 (3.3)
Parotidectomy	3 (5)	9 (14.8)
Laryngectomy	1 (1.7)	2 (3.3)
TORS	2 (3.3)	5 (8.2)
H&N free flap	15 (25)	17 (27.9)

Abbreviations: H&N, head and neck; TORS, transoral robotic surgery.

^a Any first language that was neither English nor French.

Patient satisfaction scores in the treatment arm ranked higher across all domains. The largest difference between the 2 intervention arms was noted in the amount of information received about accessible services (196 vs 131), with a 64-point cumulative difference (95% CI, 60.2-68.9 points; Cohen *d* = 1.28). Similar differences were also seen in information received about the treatment (195 vs 143), with a 52-point cumulative difference (95% CI, 44.5-59.2 points; Cohen *d* = 1.05),

Table 2. General Feedback Concerning the Educational Platform From Those Enrolled in the Treatment Arm of the Study

Feedback	Treatment group, No. (%) (n = 60)
What is your general reaction to the video?	
Acceptable	60 (100)
Somewhat acceptable	0
Not acceptable	0
Does this video get your attention?	
Yes	60 (100)
No	0
Is the video interesting?	
Yes	55 (92)
No	5 (8)
Is the video useful?	
Yes	58 (97)
No	2 (3)
Is the video easy to understand?	
Yes	60 (100)
No	0
How would you rate the length of the video?	
Just right	60 (100)
Too long	0
Too short	0
After watching the video, rate your confidence in managing your diagnosis	
Much more confident	45 (75)
Somewhat confident	12 (20)
No more confident	3 (5)
Would you share this video with family members or friends who have a similar diagnosis?	
Yes	60 (100)
No	0
Do you think 2-dimensional animation is an effective way for conveying medical information?	
Yes	57 (95)
No	3 (5)

and medical tests (174 vs 129), with a 45-point cumulative difference (95% CI, 40.1-49.0 points; Cohen $d = 0.81$). The smallest difference between the intervention arms was seen with the question “How much information have you received about the diagnosis of your disease?” for which both groups claimed very much (93% in the standard group vs 100% in the test group). The remaining items on the satisfaction scale revealed that while both groups felt that they received an adequate amount of information concerning their disease process, current traditional methods do not adequately teach patients about their treatment, mental health, family life, supplementary services, and recovery process at home.

When looking at the cumulative scores on the postoperative questionnaire, there was an 11.3-point mean difference between the 2 groups (95% CI, 10.1-12.5 points; Cohen $d = 1.02$). The possible scores ranged from 20 (completely dissatisfied) to 80 (completely satisfied across all domains). The control

group had a mean raw score of 61.1 vs the intervention group, which had a mean raw score of 72.4. A multivariate analysis failed to identify characteristics that are independent risk factors for patient dissatisfaction. This secondary analysis also included assessment by each baseline demographic variable, the type of surgery performed, and each individual surgeon. Lastly, patient feedback was also collected at the end of each questionnaire to continually improve the platform for future use. Participants commented positively on the ability to understand the video and watch it over again, level of information, quality of the animation, and short length, with some recommending it for other patients with access to the internet.

Discussion

This randomized clinical trial found that use of a multimedia patient education platform increased patient satisfaction in individuals who were undergoing head and neck surgery. Leveraging novel information technologies during the perioperative period is a feasible, accessible, and effective intervention to address existing inadequacies in traditional, clinician-led surgical counseling.

Prior studies have detailed numerous unmet information needs in otolaryngology patients, with many reporting feeling underprepared for the surgery and associated functional limitations encountered during the recovery process.^{14,15} Patient information in the form of pamphlets or web-based resources has historically been limited in this patient population.¹⁶ Disproportionally low education levels, socioeconomic status, and reading skills in patients with head and neck cancer, combined with the inherent complexity of their pathologies and surgical care plan, limit the accessibility and usefulness of written resources.^{16,17}

Additionally, *health literacy*, defined as an individual's ability to access, understand, and apply information to act on issues pertaining to their health, has been reported to be limited in 10% to 30% of otolaryngology patients.^{10,12,17} Audiovisual information technologies may help overcome these communication barriers, enhance patient compliance with care, and strengthen information recall.^{12,18} Our institutional experience has demonstrated several benefits to the supplemental web-based patient education platform, which have been corroborated in the literature.

First, the data showed a large increase in patient satisfaction with access to the multimodal platform, strengthening their understanding of the surgical pathway and the psychosocial effect of the treatment on their social and family life. Similarly, D'Souza et al^{19,20} reported increased cancer knowledge, satisfaction, and lower levels of anxiety and depression in patients with late-stage head and neck cancer who were offered a comprehensive information package including computer animations and videos. Additional small-sample studies have also shown enhanced information retention and risk recall when audiovisual content was added to routine informed consent discussions in various otolaryngology surgeries, such as endoscopic sinus surgery and rhinoplasty.^{12,21,22}

Table 3. EORTC QLQ-INFO25 Satisfaction Scores

Patients (n = 100; test, 50; control, 50)	No. (%)				η^2
	Very much	Quite a bit	A little	Not at all	
Satisfaction with the amount of information about disease					
Test	25 (50)	20 (40)	3 (6)	2 (4)	0.89
Control	23 (46)	19 (38)	3 (6)	5 (10)	
Satisfaction with the amount of information about medical tests					
Test	30 (60)	16 (32)	2 (4)	2 (4)	0.67
Control	4 (8)	31 (62)	5 (10)	10 (20)	
Satisfaction with the amount of information about treatment					
Test	45 (90)	5 (10)	0	0	0.44
Control	12 (24)	22 (44)	13 (26)	3 (6)	
Satisfaction with the amount of information about other services					
Test	46 (92)	4 (8)	0	0	0.35
Control	8 (16)	25 (50)	7 (14)	10 (20)	
Were you satisfied with the amount of information you received?					
Test	43 (86)	6 (12)	1 (2)	0	0.91
Control	26 (52)	17 (34)	7 (14)	0	
Overall, has the information you have received been helpful?					
Test	42 (84)	6 (12)	2 (4)	0	0.80
Control	28 (56)	16 (32)	3 (6)	3 (6)	
Do you wish that you had received more information?					
	Yes	No	NA		Effect size, % (95% CI)
Test	13 (26)	37 (74)	NA		26 (21-31)
Control	23 (46)	27 (54)			
Do you wish that you had received less information?					
Test	2 (4)	48 (96)	NA		4 (0.04-8.20)
Control	0	50 (100)			

Abbreviations:
EORTC QLQ, European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire; NA, not available.

Second, the web-based format allowed patients to access the information at any point during their surgical care. This flexibility in timing and setting gave patients the opportunity to receive the information in a more relaxed home environment that was removed from previous potentially stressful discussions on diagnosis and disease prognosis.⁴ Additionally, the ability to refer back to the educational content may prove greatly beneficial. This is particularly relevant if a long period elapses between the original preoperative consultation and the day of surgery, which is not uncommon in publicly funded health care systems with lengthy waiting lists.^{7,22} Moreover, of special interest in recent months is the ability to share the content freely with family, friends, and caregivers, whose attendance to in-person appointments may be limited by the COVID-19 pandemic restrictions.²³ Our recent publication further details the development and use of the web-based patient education modules during the COVID-19 era.²⁴

Despite these demonstrated benefits, there remain challenges to the widespread use of information technologies in perioperative education. For example, accessing web-based resources may be an arduous task for some, with a recent survey of 597 patients with head and neck cancer in Australia revealing that nearly a third did not have internet access.²⁵ Furthermore, patients with head and neck cancer reported the least online access among all otolaryngology subspecialties in

a 2018 US-based survey.²⁶ Although our study included the option to view the video in the clinic, this mitigates one's ability to review the content on multiple occasions in a more familiar setting.

Finally, D'Souza et al¹⁹ reported substantial personnel and material costs associated with a multimedia information intervention, including booklets, interactive computer animations, take-home digital video disks, and a collaborative database. In contrast, the streamlined and freely accessible animated videos described in our study were found to be readily implemented in the regular clinic workflow, with a minimal upfront cost for content generation, personnel training, and device acquisition. Although to our knowledge this has yet to be studied in a formal cost-analysis study, we hypothesize this initial time and resource investment may be mitigated by decreased surgeon-led and nursing-led counseling time and avoidance of unnecessary health care resource utilization because of common patient misunderstandings.

Strengths and Limitations

The study has many strengths. First of all, the platform was created using a multidisciplinary approach, ensuring that the patients have content that encompasses not only their medical and surgical care, but also ancillary information concerning their nutrition, speech and swallow, and physiotherapy re-

quirements. Second, the randomization process and use of the standard EORTC QLQ-INFO25 questionnaires, which do not require interpretation by the oncology nurse for scoring, minimized the potential bias in the education, care provided, and outcome assessment.

Despite these strengths, this study is not without limitations. First, our study may be subject to a volunteer bias in which interested patients may at baseline be more involved and engaged with their health and surgical trajectory. Nonetheless, the effect of a volunteer bias, if present, would be expected to be equal across both treatment arms and should have no bearing on comparative data analysis. Second, this study was performed at a single academic center; thus, the generalizability of results may be limited.

Conclusions

This randomized clinical trial showed a large increase in patient satisfaction with the use of a novel multimedia platform to enhance perioperative patient education across various common head and neck surgeries. This study also found that traditional clinical methods are inadequate for teaching patients about certain aspects of their surgical treatments and recovery process. Further research is required to assess whether use of the multimodal patient education platform may translate to improved short-term and long-term outcomes, such as hospital length of stay, pain management on discharge, and return to regular activities.

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Concept and design: Turkdogan, Chartier, Payne, Mlynarek, Hier.

Acquisition, analysis, or interpretation of data: Turkdogan, Roy, Mlynarek, Forest.

Drafting of the manuscript: Turkdogan, Roy.

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: Turkdogan, Roy.

Administrative, technical, or material support: Turkdogan, Chartier.

Supervision: Payne, Mlynarek, Hier.

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