

A Quality Improvement Initiative to Decrease the Incidence of Post-operative Wound Complications Following Minor Level Amputations

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Abstract: Patient education is important for improving the ability to manage one's health and optimize clinical outcomes. We identified a paucity in educational materials for patients who undergo a partial foot amputation at our institution (Sunnybrook Health Sciences Centre, Toronto, Canada) and developed an educational brochure to address this deficit as part of a quality improvement initiative. Our aim was to increase the proportion of patients receiving pre-operative education and improve the preparation of vascular surgery patients who will undergo partial foot amputations. We produced an educational brochure to improve patient knowledge and address any preoperative concerns. The effectiveness of this educational material was assessed with a questionnaire in a cohort of patients followed since January 2023. One Plan-Do-Study-Act (PDSA) cycle has been completed thus far. To date, five patients have completed the questionnaire. Three patients provided verbal responses. Sixty-six percent of patients found that the information in the brochure improved their knowledge and that the language of the brochure was easy to understand. Seventy-five percent of patients were confident with caring for their wound in the post-operative period. Educational materials are an important pillar of patient care, particularly in helping to prepare patients for minor amputations where there is a high failure rate and conversion to major amputations. Our brochure was effective in improving patient awareness and knowledge before surgery.

Key words: *amputation, foot care, patient education.*

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Lower extremity amputations (LEA) are a traumatic and often unexpected event in a patient's life that can lead to a loss of function, decline in quality of life and even death.¹ In an effort to spare patients from undergoing an amputation of the entire leg, surgeons will sometimes perform partial foot amputations (PFA), in which only part of the foot is amputated. PFAs are considered limb sparing procedures and are commonly performed to preserve ambulation. However, PFA may result

in complications, such as poor wound healing, and patients may still require a subsequent major amputation below or above the knee. Zhang et al.² highlighted the first two months following a transmetatarsal amputation (TMA) as significant given that 77% of subsequent major amputations occur in that period. This reiterates the importance of vigilant post-operative care and follow-up in patients having undergone a PFA. Kayssi et al.³ showed the rate of re-amputations following foot amputations to be 14% with

an estimated annual rate of LEA above 1000. The study found that the province of Ontario harboured the highest incidence of LEA, as 53% of major amputations in Canada occurred in Ontario.

The impetus for this quality improvement (QI) project was an increased frequency of wound complications following PFA in our cohort of vascular surgery patients. In our gap analysis, we found a paucity of educational material and pre-operative preparation for patients that undergo PFA. Results of a 2020 '*Patient Preparedness for Surgery*' survey, which formed part of an ongoing QI project by co-author A. Derbakova, recommended that patients would benefit from pre-operative information in the form of a pamphlet. A prehabilitation clinic, located at the Sunnybrook Centre for Independent Living (SCIL), has been established, but not all patients have been accessing it to prepare for surgery and receive education. As part of a patient education initiative, our department embarked on creating a patient resource in the form of an 8-panel brochure to improve the knowledge, expectations, and post-operative strategies to optimize patient recovery following PFA.

Our aim statement was to increase the percentage of pre-operative education and preparation given to vascular surgery patients regarding their minor level amputation by 50% by June 2023.

Methods

The QI project was registered with our institution (Sunnybrook Health Sciences Centre, Toronto, Canada) in January, 2023 under the registration number 199. Research ethics review was not required as this was a quality improvement initiative. A grant from our hospital's *Patient & Family Education Fund* was awarded to our team to facilitate this work.

Working in collaboration with the communications and design team, a brochure titled '*What You Need to Know After Partial Foot Amputation*' was developed (Appendix 1). The first draft was submitted to the design team in December 2022. From January 2023, patients

with a PFA who were seen, either at our hospital's prehabilitation clinic or in the ward were provided with a draft of the brochure. They were asked to read it and complete a questionnaire thereafter.

The questionnaire assessed three aspects:

- Preparedness for partial foot amputation prior to surgery
- Effectiveness of the brochure
- Preparedness for recovery following the amputation.

The family of measures: Our outcome measure was the number of patients obtaining the education material prior to their minor level amputation. We had two process measures; the first being the proportion of patients who were confident with their post-operative wound care and follow-up plan. The second process measure was the proportion of patients calling for assistance or presenting to our emergency department with wound infections. The balancing measures were the percentage of patients who did not obtain pre-operative education.

To date, one PDSA cycle has been completed. The patient questionnaire has been useful in obtaining qualitative data on the educational impact of the brochure.

Results

Five patients have completed the questionnaire and there were three verbal discussions. The results are presented in the following categories:

A): *Patient preparedness for surgery:* Three patients completed this portion. Out of those, two said that they felt very well prepared and one felt moderately prepared for what to expect post-amputation. All three patients indicated that they consistently used their special footwear and mobility devices. One patient said he did not use his mobility device as he felt too weak to ambulate with his non-amputated leg.

B) *Effectiveness of the brochure:* Three patients responded to this section. Two patients found that the information and language of the brochure greatly improved their understanding. The one

patient who found the brochure to be ineffective stated that it was because he received the brochure after the surgery.

C) *Post operative care:* Four patients responded to this section. Out of the four, three stated they were confident in their knowledge of the wound care required during the post-operative period. Responses varied with regards to confidence in initiating walking in the post-operative period. Two out of four said they were confident, one was indifferent and one was not confident at all.

Analyzing the results

Overall, patients felt that they were adequately prepared for their PFA as evidenced by the 66% (2/3) who felt very well prepared and the 33% who felt moderately prepared. There was no explanation provided by the patient who felt less prepared.

Sixty six percent (66%) of patients found that the information in the brochure improved their knowledge, and that the language was easy to understand. The patient who did not find the brochure effective said that it was because he received it after his amputation.

Seventy five percent (75%) of patients were confident with how to care for their wounds in the post-operative period. However, only one patient (25%) was confident with initiating walking after the partial foot amputation.

One patient recommended that a dedicated chiropodist at the institution would be of great assistance and another suggested information on phantom pain should be included in the brochure.

Discussion

Health literacy is defined as the capacity to seek, understand and act on health information.⁴

Patient education and engagement are important in improving their ability to manage their health and improve their health outcomes. Studies have shown how education enhances health seeking behaviour and understanding. A publication by Paterick et al. places the primary responsibility of this literacy on physicians as they determine the parameters of the health interaction.⁵ Our

results demonstrate the appreciation patients have when they are armed with information. The single patient who did not find the brochure as useful was nonetheless satisfied with the pre-operative counselling obtained during his consultation. A challenge we encountered in early phases of the QI was reaching our intended targeted cohort as we have been encountering patients in the post-operative period. Having completed the editing process of the brochure, we now have a printed version that we aim to distribute with the assistance of our administrative staff.

In our next PDSA, we will develop separate questionnaires to include patients encountered either pre-operatively or post operatively.

Another significant finding in our study related to patients' lack of understanding of the timing of initiating mobilization following the PFA. Some research demonstrated that 35% of patients regain pre-illness mobility after one year of having undergone a PFA. In the effort of minimizing this in our population, we endeavour to interrogate this uncertainty.

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Conclusion

Lower limb preservation is an important hospital and health-care system priority. We have found that patient education remains an invaluable tool and we will continue to optimize our printed resources for patient benefit.

Potential conflicts of interest: None ■

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What you need to know After Partial Foot Amputation



How to Take Care of Your Wound

The look of your incision will get better over time. You may have swelling, redness, bruising or itching during the first few weeks after your surgery. The wound can take many months to heal completely.



Use bandages or dressings.

Follow the instructions from your doctor and community care nurse about when to take off your bandages. When you need to change your bandages, clean your hands and wear sterile gloves to help prevent an infection.

Keep your bandages dry. You may shower but **do not** take baths or soak your foot until the incisions are fully healed. Use unscented soaps to make sure you do not irritate the incision. After you shower, gently pat your incisions dry with a clean towel. Do not scrub the incision.



Check your foot daily.

Use a hand mirror to look at areas that are difficult for reach. Contact your doctor if you notice your wounds are getting worse or do not heal.



Get your stitches removed.

Your surgeon will tell you when your stitches can be taken out. Stitches are usually taken out by your doctor or nurse in 3-4 weeks after surgery.

Introduction

During partial foot amputation surgery, your toes or parts of your foot were removed. You may have needed an amputation because of gangrene, serious wounds, infection, or injury. The level of amputation was determined by the cause and severity of your condition. Our goal was to remove the part of your foot that was affected and keep as much function in your foot and ankle as possible.

We know this may be a stressful time for you and you will get a lot of information about your health. Use this booklet to help you keep track of what you need to do after your surgery.

When should I get medical help?



Contact your family doctor or go to the nearest emergency department right away if you notice any of these symptoms:

- Your wound bleeds, separates, or you see yellow or green pus
- You have a fever of 39 degrees Celsius (100 degrees Fahrenheit) or higher for more than 24 hours
- You have flu-like symptoms, such as nausea, vomiting, and chills
- Your foot turns pale or blue in colour and is cold to touch
- Your pain does not get better, and your medication is not helping
- You have sudden severe pain in your chest, calf or back of the knee
- It is difficult to breathe

Walking

It is very important to move after surgery. This can help prevent pneumonia, blood clots in the legs, and muscle weakness or stiffness.

After your amputation, your balance, strength and stability may be weaker. This is normal and will get better with time and exercise. Your health-care team will work with you to improve your mobility after your surgery.

Footwear and Walking Aids

You may need crutches, a walker, and special footwear like an off-loading sandal or aircast boot to help you during your recovery. **Wear your special footwear every time you stand or walk and whenever your foot touches the ground.**

After your wound heals, you may also need custom footwear or orthotics. Your health-care team will talk to you about the right footwear to help prevent new wounds or damage to your feet in the future.

Swelling

Some swelling in your affected foot is normal as you heal. When you sit in a chair or in bed, use pillows or a footstool to raise your leg to help reduce swelling. If your swelling does not go away in a few months, speak to your doctor.

A member of your health-care team will review your medications with you before you go home. You will get a prescription for pain medication that you will use for a short time after your surgery. Pain after a partial foot amputation usually gets better within 6-8 weeks. If the medication is not helping, speak with your doctor so they can adjust your medication or give you other solutions.

It is common to feel sad, depressed or more emotional after any major surgery. This is often due to anesthesia, medications, lack or loss of sleep, and stress. Your loved ones may also feel many emotions. They may feel helpless, scared, and overprotective. These feelings may come and go and usually pass in 6-12 weeks. If these feelings continue for several months after your surgery, please speak with your family doctor.

Smoking can affect how you heal and increase your chances of getting an infection. Speak to your doctor or pharmacist if you would like to quit smoking or need help with withdrawal symptoms. You may also visit smokershelpline.ca or call **Health Connect Smoking Cessation Program** at 1-866-797-0000 (press 3).



The same lifestyle factors that may have caused your partial foot amputation in the first place can affect your feet again. It is important to take care of your feet.



See a foot specialist (chiroprapist) to help you take care of corns and calluses. Ask your doctor for a referral.

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper has a slight shadow on the right side, suggesting it's resting on a surface.

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