

Management of common elective paediatric orthopaedic conditions during the COVID-19 pandemic: the Montreal experience

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Abstract

Purpose To explore safe delays for the treatment of common paediatric orthopaedic conditions when faced with a life-threatening pandemic, COVID-19, and to propose a categorization system to address this question.

Methods Review of the literature related to acceptable delays for treatment of common orthopaedic conditions, experience of healthcare professionals from low resource communities and expertise of experienced surgeons.

Results Guidelines for the management of cancellations of elective surgeries during a period of resource reallocation are proposed. Elective cases must not be postponed indefinitely as adverse outcomes may result. Triage of waiting lists should include continuous monitoring of the patient and close communication with families despite social distancing and travel restrictions. Telehealth becomes a necessity. Common orthopaedic conditions are triaged into four groups according to urgency and safe and acceptable delay. Categories proposed are Emergent (life and limb threatening conditions), Urgent (within seven days), Semi-elective (postponed for three months) and Elective (postponed for three to 12 months). In total, 25 common orthopaedic conditions are reviewed and categorized.

Conclusion Given the uncertainty within healthcare during a pandemic, it is necessary to determine acceptable delays for

elective conditions. We report our experience in developing guidelines and propose categorizing elective cases into four categories, based on the length of delay. Telemedicine plays a key role in determining the gravity of each situation and hence the amount of delay. These guidelines will assist others dealing with elective cases in the midst of a crisis. This paper initiates a coordinated effort to develop a consensus statement on safe delays.

Published without peer review.

Cite this article: Keshet D, Bernstein M, Dahan-Oliel N, Ouellet J, Pauyo T, Rabau O, Saran N, Hamdy R. Management of common elective paediatric orthopaedic conditions during the COVID-19 pandemic: the Montreal experience. *J Child Orthop* 2020;14:161-166. DOI: 10.1302/1863-2548.14.200107

Keywords: prioritization; acceptable delays; pandemic; elective paediatric orthopaedic conditions

Introduction

Timely access to medical care is the aspiration of both patients and healthcare professionals. This is a top priority of all countries. It is well known that in many musculoskeletal conditions, prolonged delays before initiation of treatment, specifically in the growing child, may lead to serious sequelae and long-term detrimental effects on function and quality of life. Ideally, there should be no or minimal delay from the time a musculoskeletal problem is identified to the time the affected child is medically or surgically treated. In order to keep this delay before treatment to an acceptable minimum, standards of practice have been developed in many institutions in order to ensure adequate and timely delivery of healthcare. For example, a newborn with a hip click should be evaluated six weeks after birth or a newborn with a clubfoot should have the Ponseti technique started immediately after birth. These standards can be adhered to and followed as long as 'normal conditions of life' prevail and resources are available. However, these 'normal conditions' are being challenged right now as we confront the global medical crisis; the COVID-19 pandemic. In the face of life-threatening crises; wars, natural disasters and economic collapse, priorities must change.

We are obligated to respond to the new reality, and the safety and survival of every individual takes top priority.

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Timely access to elective and semi-elective orthopaedic care becomes a secondary priority. The COVID-19 pandemic is forcing us and all other surgical specialties to cancel our outpatient clinics and postpone most of our elective surgeries, in order to reallocate all available resources to face COVID-19 needs. However, at the same time, 'elective' does not mean that these cases are optional, unimportant or can be cancelled altogether. Ultimately, all elective cases will become semi-urgent (due to impaired function, pain, deformities, etc) as a significant delay can incur a risk for adverse outcomes.¹ The situation of a neuromuscular hip dislocation, scheduled for reconstruction surgery, which after a prolonged and unplanned delay is eventually treated with a salvage procedure, is a compelling example.

It is our responsibility as orthopaedic surgeons and healthcare professionals to face this new challenge and re-evaluate these standards of practice in view of changing healthcare delivery. We must decide which conditions are considered truly urgent *versus* those that are not at this moment and for which treatment could safely be postponed or wait until this present crisis resolves. We have to evolve with the changing landscape of healthcare delivery; for example, what is the acceptable delay before the newborn with hip click is seen or the baby with clubfoot has casting initiated?

Purpose

The aim of this paper is to explore what is considered a safe and appropriate delay for the treatment of common paediatric orthopaedic conditions, in the context of a life-threatening pandemic, COVID-19 and to present a categorization system to address this question. However, in many instances there are no absolute answers. No doubt, it may raise more questions and even controversy. Therefore, this work can be considered a scaffold or starting point for a more detailed algorithm for this topic that could be useful for any large-scale emergency that would be forthcoming.

Materials and methods

In order to meet this objective, a team of orthopaedic surgeons and fellows consulted three sources (listed below) and drafted five guidelines.

Experience of orthopaedic surgeons and healthcare professionals working in middle- and low-income countries (MLICs)

This specifically refers to orthopaedic surgeons who have been involved in global orthopaedics where the 'resource scarce environment' in which they have been working has many similarities with the current 'resource limitation' of the temporary environment of the COVID-19 pandemic. In many MLICs, delay in access to medical care is the norm rather the exception. For all of us facing this brutal and unexpected COVID-19 pandemic, the experience and work done in these MLICs can be of invaluable help in deciding what is an acceptable and safe delay for common orthopaedic conditions and what is not.

Published reports in the English literature

Reports describing the impact of delayed treatment on the long-term outcome of specific common conditions and more specifically, studies where the functional outcome of treatments started at various ages were evaluated and compared.

Experience of paediatric orthopaedic surgeons

Experience gained from years of treating children from all over the world with neglected and untreated conditions was the final source used.

Results

To rapidly and efficiently adapt to this changing landscape and priorities, the redeployment of healthcare resources must occur in all areas of the hospital according to the following guidelines.

Triage of referrals

Referrals should be *categorized* depending on the degree of urgency. This is mandatory in a pandemic in order to keep the use of resources for non-COVID-19 activities to a minimum. Common orthopaedic conditions can be triaged into four categories according to what is a safe and acceptable delay. Category 1 (Emergent): life- and limb-threatening conditions. Category 2 (Urgent): addressed within seven days. Category 3 (Semi-elective): can be postponed for three months. Category 4 (Elective): can be postponed for three to 12 months (Table 1).

Table 1 Categorization of referrals for common paediatric orthopaedic conditions

Category	Urgency	Description	Definition	Example
1	Emergent	Life- and limb-threatening conditions	No delay	Compartment syndrome
2	Urgent	Condition will worsen if not seen within 1 wk	< 7 days	The limping child
3	Semi-elective	Potential for worse outcome if delayed > 3 mths	Appointment delayed 3 mths	Clubfoot
4	Elective	Potential for optimal outcome decreased if not seen within 3 to 12 months	Appointment delayed 3 to 12 months	Limb-length discrepancy

However, it is important to emphasize here, that *continuous monitoring* of the surgical waiting lists is of paramount importance as it is impossible to predict when conditions will return to normal, hence the category assigned to various conditions may change with time. This continuous monitoring becomes even more relevant, as the postponed and rescheduled cases will be added to an already full operative list!

Maintaining lines of communication with patients and families is critical and telehealth is the ideal tool for this practice.

Telehealth

The electronic transmission of health care data, or telehealth becomes extremely relevant and pertinent in the context of COVID-19 and similar emergencies. Telehealth is the ideal tool for respecting confinement, social distancing and avoiding travel by families. It frees human resources, space and other infrastructure resources in the clinics (nursing, physiotherapists, radiology technicians, etc).

In many cases, a phone call may be sufficient to obtain the relevant information required to categorize the condition accordingly or to change category (and potentially avoid an unnecessary more invasive procedure if the condition is further delayed).

Ambulatory care

Only patients who absolutely need to be seen are to be scheduled.

Keep follow-up visits to minimum to comply and re-enforce confinement and social distancing thus protecting the patients, ourselves and all healthcare personnel and prevent spread of the disease.

Eliminate routine postoperative wound checks and radiographs as much as possible by using local family physicians and ambulatory centres. Results are then sent to the treating physician by telehealth delivery (email, text, Skype).

Even cast removal can be done locally in many instances.

Only those follow-ups that may alter the postoperative course are scheduled for the hospital clinic.

Operative units

Utilization of resources is kept to a strict minimum.

Use of the triage mentioned above and described further in detail, should be performed.

However, it has to be emphasized that ‘elective’ does not mean that surgery is not necessary. It only means that this is not a life- or limb-threatening condition and that it can be safely rescheduled for a later date.

A delay of a few months will not usually affect the long-term outcome but in some cases it could change the type of surgery needed. Not only the extent and complexity of surgery but it may change the approach from a simple conservative treatment (for example closed reduction or casting) to a more advanced stage requiring general anaesthesia and bony surgery.

Specific investigations

Ultrasounds, CT scans and MRI are to be used only if absolutely necessary. During a pandemic crisis these investigations should be limited as much as possible to help in the management of trauma cases, acute infections, tumours and conditions with progressive neurological deficit (where spinal cord compression and canal compromise is suspected).

Perform investigations in local hospitals whenever possible.

After establishing these guidelines, the conditions routinely presenting to an elective paediatric orthopaedic centre were reviewed. A safe and acceptable delay for deferring treatment was determined for 25 conditions after verification of the relevant literature and collective clinical judgement (Tables 2 to 6). A detailed explanation for the categorization assigned to each condition listed is found in the Supplementary Information.

Discussion

We are in the midst of the COVID-19 pandemic that is sweeping across the globe at lightning speed. It has, and continues to impose, a very heavy burden on the healthcare system. As a result of this unexpected life-

Table 2 Serious life- or limb-threatening conditions

Clinical condition	Recommendations	Category
Life-threatening conditions	Fat embolism	1
	Deep vein thrombosis/pulmonary embolism	1
Limb-threatening conditions	Compartment syndrome	1
	Necrotizing fasciitis	1
Non-accidental trauma	NO delay. Emergency workup. May be life threatening	1 to 2
Loss of limb function	In all cases of acute loss of function, emergency treatment is required	1
The limping child	No delay in workup. Imaging if indicated	2
Child with unexplained fever and bone pain	Immediate workup and treatment if indicated	2
Joint effusion and joint pain	Any suspicion of septic arthritis – urgent, no delay	2
	Juvenile rheumatic arthritis treatment should not be delayed more than a few wks	3
	Other aetiologies	4

Table 3 Hip, knee and lower limb alignment

Clinical condition	Recommendations	Category
DDH	Screening infants with DDH risk factors	3
	Treatment with Pavlik harness when indicated should not be delayed more than a few weeks	3
	For closed and open reduction of dislocated hip	3
	For treatment hip dysplasia in the adolescent patient	4
Congenital dislocation of the knee	Start manipulation and casting immediately when diagnosed	2
	Angular deformities of the lower limb	3
In-toeing/out-toeing	Follow-up after growth modulation procedures	3
	Growth modulation in patients reaching skeletal maturity	3
	Other angular deformities	4
Limb-length discrepancy	Physiologic in-toeing and out-toeing can be delayed	4
	Adolescent with an out-toeing gait with or without pain, rule out slipped capital femoral epiphysis	2
	Delay of 3 to 6 mths acceptable	4

DDH, developmental dysplasia of the hip

Table 4 Foot and ankle

Clinical condition	Recommendations	Category
Clubfoot	Newborn: initiation of Ponseti casting technique within 3 mths	3
	Recurrence of deformity or neglected clubfoot (late presentation)	4
Congenital vertical talus	Newborn: initiation of manipulation and casting within 3 mths	3
	Late presentation or recurrence treatment could be delayed for a few mths	4
Other common foot deformities	Metatarsus adductus	3
Flatfoot	Unless very painful, treatment can be delayed	4
Toe walking	Investigation for underlying serious conditions should not be delayed if indicated	3
	Orthopaedic treatment can be delayed for 3 mths or even more	3 to 4

Table 5 Spine

Clinical condition	Recommendations	Category
Scoliosis	EOS: severe curve, rapid progressive curve, symptomatic	3
	EOS: low magnitude curve, slow progression, asymptomatic	4
	EOS: that already started serial casting for treatment	3
	Adolescent idiopathic scoliosis	4
Kyphosis	Rounded kyphosis	4
	Angular kyphosis: no neurological impairment	3 to 4
Back pain	Angular kyphosis: progressive neurological deficit or sudden onset of neurological deficit	1
	Positive red flags and constitutional symptoms	1 to 2
	Neurological impairments	1
Torticollis	All other low back pain	3 to 4
	Congenital torticollis: can be delayed till age of 1 yr	3 to 4
Cervical spine instability	Acquired torticollis	2 to 3
	New onset of neurological impairment	1 to 2
	Non symptomatic, or known impairment without progression	3 to 4

EOS, early onset scoliosis

Table 6 Miscellaneous

Clinical condition	Recommendations	Category
Bone lesions	NO delay if any suspicion of malignancy or severe infections	2
Neuromuscular	Hip subluxation/dislocation	3
	Pressure sores, brace adjustment	3
	All other treatments	4
Children with ongoing or staged surgical treatment	Spica change for closed reduction of DDH, can wait up to 3 mths	3
	Bilateral hip dislocation (DDH), time interval between procedures	3
	Bilateral lower extremity deformities, time interval between procedures	4
	Removal of external fixator	3

DDH, developmental dysplasia of the hip

threatening pandemic, for which we were totally unprepared, healthcare authorities in every country of the world were forced to make difficult decisions in order to face this brutal COVID-19 onslaught. Directives were aimed at healthcare institutions and professionals, with

the goal of redirecting and redeploying almost all healthcare resources to face the ravages of the pandemic. These directives had several objectives including:

- first and most importantly maximizing the use of available resources to address COVID-19 situation;

- rendering all personnel in our division (medical, paramedical) available to help the front-line staff in the fight against this viral pandemic;
- enforcing social distancing by cancelling all clinic appointments and all elective surgical cases whenever feasible;²
- most importantly, helping stop the spread of COVID-19 thus protecting patients, their families and all stakeholders.

Excluded from this directive were musculoskeletal trauma and tumour teams that must continue their medical and surgical activities. All planned and non-emergency surgical procedures, all elective clinic visits and all other unnecessary clinic visits had to be postponed or cancelled, at the same time keeping in mind that it may well be months before conditions start to return to some normalcy.³

However, not all elective orthopaedic operative cases can be postponed or cancelled. A balance has to be struck between maintaining quality of care and addressing the needs of fighting COVID-19. Therefore, it becomes imperative, before postponing or cancelling patients, to clearly define what would be considered a safe and acceptable delay in the treatment of elective orthopaedic conditions.

In this paper we present our work in Montreal and how we were able to proceed and determine what we consider to be a safe and acceptable delay for the most common paediatric orthopaedic elective cases. The expert consensus of healthcare professionals working in MLICs considered a delay of three months before access to medical care acceptable for the vast majority of musculoskeletal conditions, taking into consideration the increased risk of long-term clinical complications associated with prolonged (more than three months) delay.⁴

A literature search on delays in the treatment of common paediatric orthopaedic cases in children resulted in no one study covering the topic of delays in a comprehensive manner. There were, however, numerous reports describing the effects of starting treatment for the common paediatric orthopaedic conditions at different ages. Furthermore, dozens of articles are being published every day on various aspects of COVID-19, specifically in 'The Orthopaedic Forum' feature of *The Journal of Bone & Joint Surgery*.³ None has specifically addressed what is considered to be a safe delay in elective paediatric orthopaedic conditions.

These findings led us to the development of the guidelines and classification system presented here. In some instances, however, it is not clear in which category certain conditions should be classified. Not every condition is black and white. In such cases, obtaining more information regarding the complaints of the patient and history could be of immense help. Hence the invaluable and increasing role of telehealth in paediatric orthopaedics.⁵ Recent technological advances in information technology have led to the development of sophisticated telehealth techniques.

Yet in many cases, all that is needed are answers to specific questions and a detailed history, which could be obtained by phone. This could help us determine the category of a given condition, and hence decide what a safe delay is. Telehealth is especially indicated to deliver care during global emergencies, such as the current coronavirus (COVID-19) pandemic as a means of reducing the risk of cross-contamination caused by close contact while protecting the physicians, nurses and other allied health personnel.^{6,7} Paediatric orthopaedists have been slow in implementing telehealth strategies despite evidence of its effectiveness.^{8,9} Also, and as previously mentioned, it is important to continuously monitor the surgical waiting list, as various conditions may change category with prolonged delays. As much as we advocate for the use of telehealth in this unprecedented situation, the critical role of the physical exam and the necessity of clinical judgement must not be overlooked or underestimated.

This project is not without its limitations. The underlying concept for this paper was that the degree of urgency dictated the acceptable delay. We acknowledge that many other factors; age, surgeon bias, environment, etc, are at play and may not have been adequately incorporated. Secondly, the use of a consensus approach methodology such as the Delphi Technique could be implemented to further refine this work.

In conclusion, with every unprecedented crisis, come unprecedented opportunities. We are now obliged to rethink and reorganize ourselves, in order to address this new challenge. Social distancing and isolation are forcing us to look for alternatives that will allow us to maintain our practice, our contact with our patients and still deliver quality and safe care to the children and families with common orthopaedic conditions. At all times, it is crucial to maintain open the lines of communication with patients and families in these difficult times, to reassure them that, despite the imposed isolation, their voice and concerns are heard and that they are not neglected. Once the COVID-19 storm subsides, and it will, we should reflect and take a moment to ask ourselves what we have learned from this crisis, and what can we do to optimize change our delivery of health.

Received 12 May 2020; accepted 17 May 2020.

COMPLIANCE WITH ETHICAL STANDARDS

FUNDING STATEMENT

The authors did not receive allocated funds for this project however; their time for research is supported by the Shriners of North America.

OA LICENCE TEXT

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ETHICAL STATEMENT

Ethical approval: This article is a perspective on a topic and does not contain any studies with human participants performed by any of the authors.

Informed consent: This article does not contain any studies with human participants performed by any of the authors, therefore informed consent is not applicable.

ICMJE CONFLICT OF INTEREST STATEMENT

MB reports personal fees from NuVasive, Inc, Smith + Nephew, Depuy Synthes, outside the submitted work.

JO reports grants from AO North America and from Shriners International, outside the submitted work.

NS reports consulting fees from Depuy Synthes, outside the submitted work.

The other authors declare no conflict of interest.

ACKNOWLEDGEMENTS

The authors would like to thank Saleh Alfaisali, MD for his contribution to this manuscript and Kathleen Montpetit for all her assistance in its production. We would also like to thank Nathalie Kamel and Paula Wall for their precious help in the preparation of the manuscript.

AUTHOR CONTRIBUTIONS

DK: Contributed to the design, data acquisition, drafting and critical revision of the manuscript, provided final approval of version submitted.

MB: Contributed to the design, data acquisition, drafting and critical revision of the manuscript, provided final approval of version submitted.

ND-O: Contributed to the design, data acquisition, drafting and critical revision of the manuscript, provided final approval of version submitted.

JO: Contributed to the design, data acquisition, drafting and critical revision of the manuscript, provided final approval of version submitted.

TP: Contributed to the design, data acquisition, drafting and critical revision of the manuscript, provided final approval of version submitted.

OR: Contributed to the design, data acquisition, drafting and critical revision of the manuscript, provided final approval of version submitted.

NS: Contributed to the design, data acquisition, drafting and critical revision of the manuscript, provided final approval of version submitted.

RH: Initiated and planned this paper, Contributed to the design, data acquisition, drafting and critical revision of the manuscript, provided final approval of version submitted.

SUPPLEMENTAL MATERIAL

Supplemental material is available for this paper at

<https://online.boneandjoint.org.uk/doi/suppl/10.1302/1863-2548.14.200107>

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