

Quality-Based Procedures Clinical Handbook for Paediatric Tonsillectomy with and without Adenoidectomy

Provincial Council for Maternal & Child Health & Ministry of Health
and Long-Term Care

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Acronyms

AAO-HNS	American Academy of Otolaryngology-Head and Neck Surgery
CCC	Chronic Complex Condition
CEAG	Clinical Expert Advisory Group
CEBM	Centre for Evidence-based Medicine
DAD	Discharge Abstract Database
ECFAA	Excellent Care for All Act
ED	Emergency Department
HBAM	Health Based Allocation Methodology
HIG	Inpatient Grouper
HSFR	Health System Funding Reform
HSP	Health Service Provider
ICES	Institute for Clinical Evaluative Sciences
LHIN	Local Health Integration Network
LOS	Length of Stay
MOHLTC	Ministry of Health and Long-Term Care
N/A	Not applicable
NACRS	National Ambulatory Care Referral System
OCCI	Ontario Case Costing Initiative
OSAS	Obstructive Sleep Apnea Syndrome
PAHSC	Paediatric Academic Health Sciences Centre
PBF	Patient-Based Funding
QBP	Quality-Based Procedure
ROP	Required Organizational Practice
SDS	Same Day Surgery
SING	Scottish Intercollegiate Guidelines Network

1.0 Purpose

Provided by the Ministry of Health and Long-Term Care

This clinical handbook has been created to serve as a compendium of the evidence-based rationale and clinical consensus driving the development of the policy framework and implementation approach for paediatric Tonsillectomy.

This document has been prepared for informational purposes only. This document does not mandate health care providers to provide services in accordance with the recommendations included herein. The recommendations included in this document are not intended to take the place of the professional skill and judgment of health care providers.

2.0 Introduction

Provided by the Ministry of Health and Long-Term Care

Quality-Based Procedures (QBP) are an integral part of Ontario's Health System Funding Reform (HSFR) and a key component of the Patient-Based Funding (PBF). This reform plays a key role in advancing the government's quality agenda and its ***Action Plan for Health Care***. HSFR has been identified as an important mechanism to strengthen the link between the delivery of high quality care and fiscal sustainability.

Ontario's health care system has been living under a global economic uncertainty for a considerable period of time. At the same time, the pace of growth in health care spending has been on a collision course with the provincial government's deficit recovery plan.

In response to these fiscal challenges and to strengthen the commitment towards the delivery of high quality care, the ***Excellent Care for All Act*** (ECFAA) received royal assent in June 2010. ECFAA is a key component of a broad strategy that improves the quality and value of the patient experience by providing them with the right care at the right time, and in the right place through the application of evidence-informed health care. ECFAA positions Ontario to implement reforms and develop the levers needed to mobilize the delivery of high quality, patient-centred care. Ontario's ***Action Plan for Health Care*** advances the principles of ECFAA reflecting quality as the primary driver to system solutions, value and sustainability.

2.1 What are we moving towards?

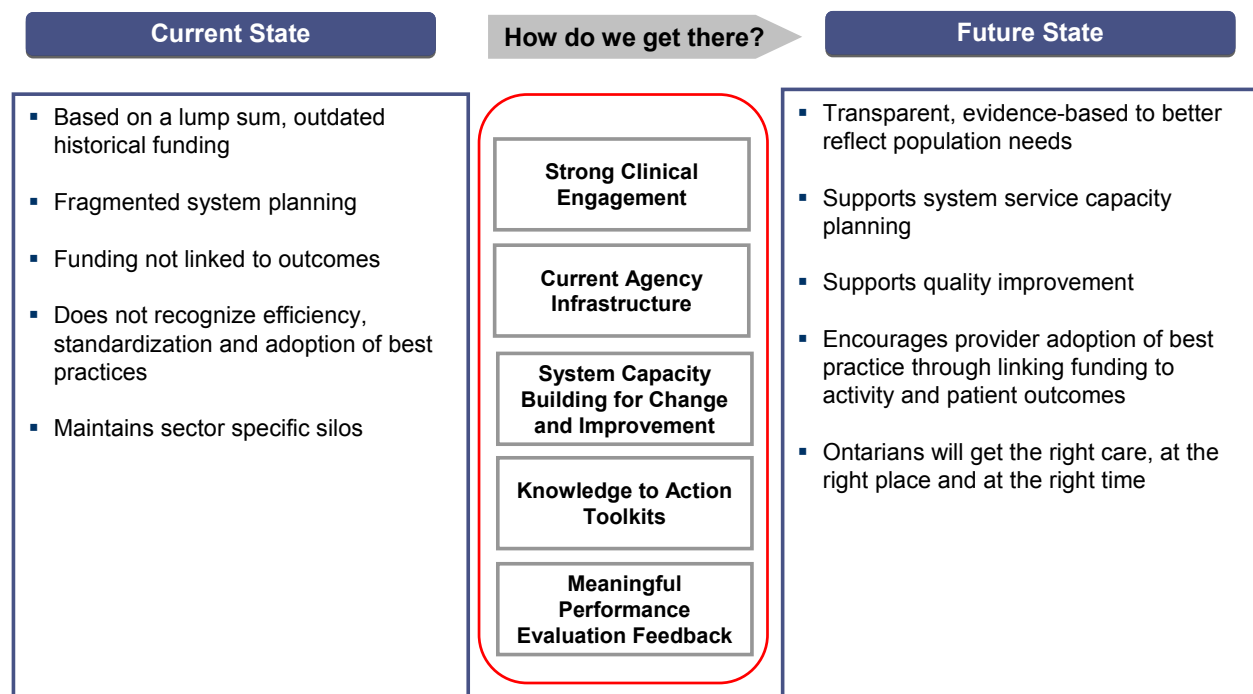
Prior to the introduction of HSFR, a significant proportion of hospital funding was allocated through a global funding approach, with specific funding for some select provincial programs and wait times services. A global funding approach reduces incentives for Health Service Providers (HSPs) to adopt best practices that result in better patient outcomes in a cost-effective manner.

To support the paradigm shift from a culture of ‘cost containment’ to ‘quality improvement,’ the Ontario government is committed to moving towards a patient-centred funding model that reflects local population needs and contributes to optimal patient outcomes (Figure 1).

Internationally, PBF models have been implemented since 1983. Ontario is one of the last leading jurisdictions to move down this path. This puts the province in a unique position to learn from international best practices and lessons learned by others to create a funding model that is best suited for Ontario.

PBF supports system capacity planning and quality improvement through directly linking funding to patient outcomes. PBF provides an incentive to health care providers to become more efficient and effective in their patient management by accepting and adopting best practices that ensure Ontarians get the right care, at the right time and in the right place.

Figure 1: The Ontario government is committed to moving towards patient-centred, evidence-informed funding that reflects local population needs and incents delivery of high quality care



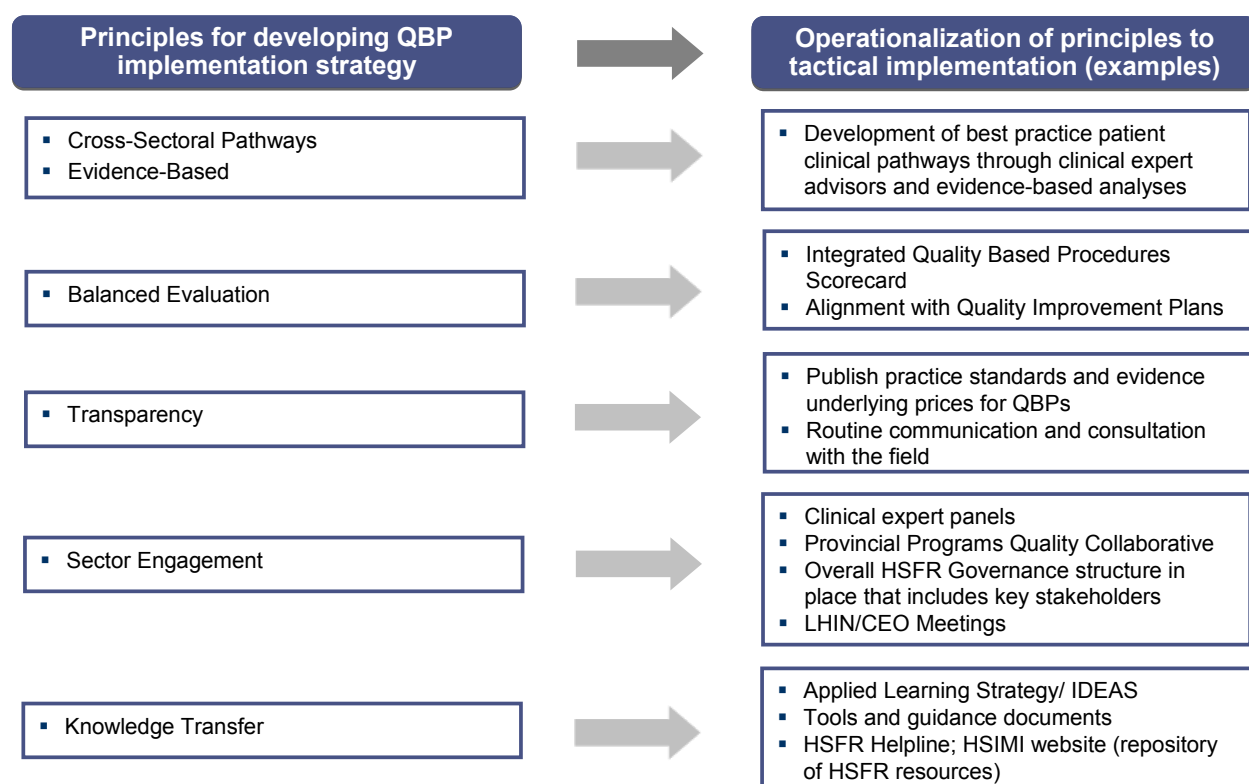
2.2 How will we get there?

The Ministry has adopted a three-year implementation strategy to phase in a PBF model and will make modest funding shifts starting in fiscal year 2012/13. A three-year outlook has been provided to the field to support planning for upcoming funding policy changes.

The Ministry has released a set of tools and guiding documents to further support the field in adopting the funding model changes. For example, a Quality-Based Procedure (QBP) Interim list has been published for stakeholder consultation and to promote transparency and sector readiness. The list is intended to encourage providers across the continuum to analyze their service provision and infrastructure in order to improve clinical processes and where necessary, build local capacity.

The successful transition from the current, ‘provider-centred’ funding model towards a ‘patient-centred model’ will be catalyzed by a number of key enablers and field supports. These enablers translate to actual principles that guide the development of the funding reform implementation strategy related to QBPs. These principles further translate into operational goals and tactical implementation, as presented in Figure 2.

Figure 2: Principles guiding the implementation of funding reform related to Quality-Based Procedures



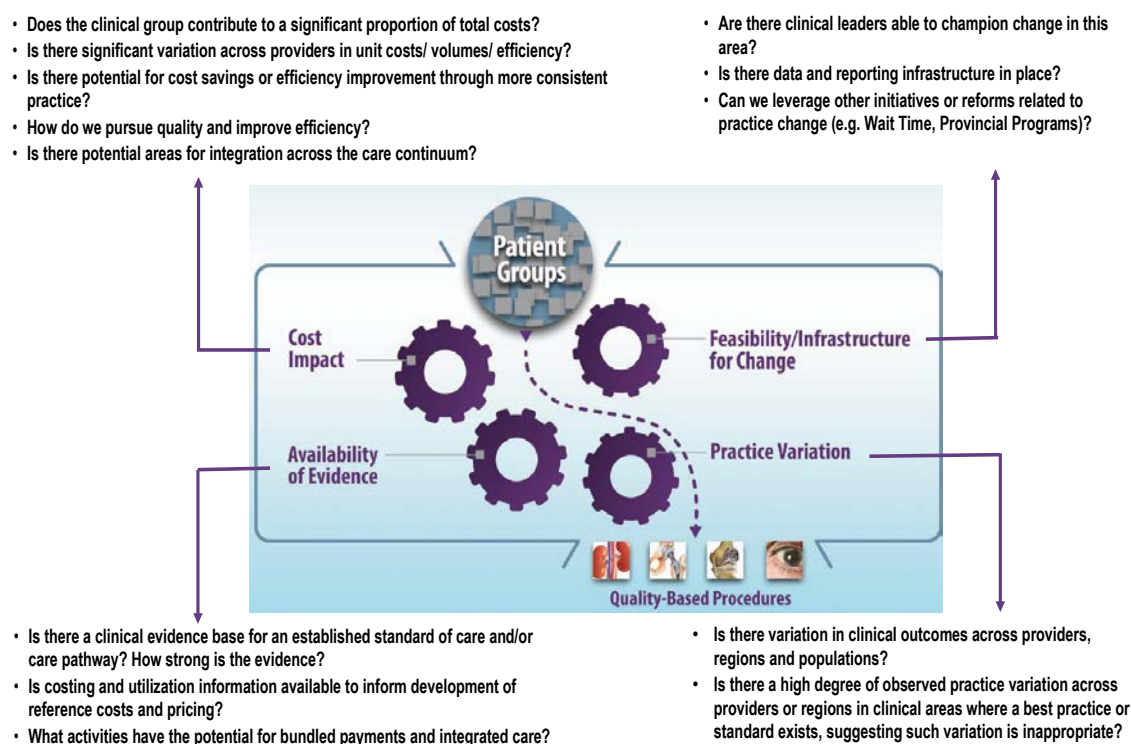
2.3 What are Quality-Based Procedures?

QBP involve clusters of patients with clinically related diagnoses or treatments. Chronic Kidney Disease was chosen as a QBP using an evidence and quality-based selection framework that identifies opportunities for process improvements, clinical re-design, improved patient outcomes, and enhanced patient experience and potential cost savings.

The evidence-based framework used data from the Discharge Abstract Database (DAD) adapted by the Ministry of Health and Long-Term Care for its Health Based Allocation Methodology (HBAM) repository. The HBAM Inpatient Grouper (HIG) groups inpatients based on the diagnosis or treatment responsible for the majority of their patient stay. Day Surgery cases are grouped within the National Ambulatory Care Referral System (NACRS) by the principal procedure they received. Additional data was used from the Ontario Case Costing Initiative (OCCI). Evidence such as publications from Canada and other jurisdictions and World Health Organization reports were also used to assist with the patient clusters and the assessment of potential opportunities.

The evidence-based framework assessed patients using four perspectives, as presented in Figure 3. This evidence-based framework has identified QBPs that have the potential to both improve quality outcomes and reduce costs.

Figure 3: Evidence-Based Framework



Practice Variation

The DAD has every Canadian patient discharge, coded and abstracted for the past 50 years. This information is used to identify patient transition through the acute care sector, including discharge locations, expected lengths of stay and readmissions for each and every patient, based on their diagnosis and treatment, age, gender, co-morbidities and complexities and other condition specific data. A demonstrated large practice or outcome variance may represent a significant opportunity to improve patient outcomes by reducing this practice variation and focusing on evidence-informed practice. A large number of 'Beyond Expected Days' for length of stay and a large standard deviation for length of stay and costs, were flags to such variation. Ontario has detailed case costing data for all patients discharged from a case costing hospital from as far back as 1991, as well as daily utilization and cost data by department, by day and by admission.

Availability of Evidence

A significant amount of research has been completed both in Canada and across the world to develop and guide clinical practice. Working with the clinical experts, best practice guidelines and clinical pathways can be developed for these QBP and appropriate evidence-informed indicators can be established to measure performance.

Feasibility/ Infrastructure for Change

Clinical leaders play an integral role in this process. Their knowledge of the patients and the care provided or required represents an invaluable component of assessing where improvements can and should be made. Many groups of clinicians have already formed and provided evidence and the rationale for care pathways and evidence-informed practice.

Cost Impact

The selected QBP should have no less than 1,000 cases per year in Ontario and represent at least 1 per cent of the provincial direct cost budget. While cases that fall below these thresholds may in fact represent improvement opportunity, the resource requirements to implement a QBP may inhibit the effectiveness for such a small patient cluster, even if there are some cost efficiencies to be found. Clinicians may still work on implementing best practices for these patient sub-groups, especially if it aligns with the change in similar groups. However, at this time, there will be no funding implications. The introduction of evidence into agreed-upon practice for a set of patient clusters that demonstrate opportunity as identified by the framework can directly link quality with funding.

2.4 How will QBPs encourage innovation in health care delivery?

Implementing evidence-informed pricing for the targeted QBPs will encourage health care providers to adopt best practices in their care delivery models, and maximize their efficiency and effectiveness. Moreover, best practices that are defined by clinical consensus will be used to understand required resource utilization for the QBPs and further assist in the development of evidence-informed prices. Implementation of a 'price X volume' strategy for targeted clinical areas will incent providers to:

- Adopt best practice standards;
- Re-engineer their clinical processes to improve patient outcomes; and
- Develop innovative care delivery models to enhance the experience of patients.

Clinical process improvement may include the elimination of duplicate or unnecessary investigations, better discharge planning, and greater attention to the prevention of adverse events, i.e. post-operative complications. These practice changes, together with adoption of evidence-informed practices, will improve the overall patient experience and clinical outcomes, and help create a sustainable model for health care delivery.

3.0 Description of Paediatric Tonsillectomy with and without Adenoidectomy

3.1 Population Group Definition

Definition

Tonsillectomy is defined by the American Academy of Otolaryngology Head and Neck Surgery (AAO-HNS) as a “surgical procedure performed with or without adenoidectomy that completely removes the tonsil including its capsule by dissecting the peritonsillar space between the tonsil capsule and the muscular wall” (Baugh, et al., 2011).

Tonsillectomy, with and without adenoidectomy, is one of the most common surgical procedures in Ontario with more than 14,000 procedures performed annually in children younger than 18 years. The Clinical Expert Advisory Group (CEAG) recommended the following population group definition for the purposes of this QBP Handbook:

Inclusion Criteria

Sex	<ul style="list-style-type: none">• Male• Female	
Age	<ul style="list-style-type: none">• 0 – 18 years	
Elective Surgery	<ul style="list-style-type: none">• Inpatient• Same Day Surgery	Admission category='L'
Intervention	<ul style="list-style-type: none">• Tonsillectomy <u>performed without</u> adenoidectomy• Tonsillectomy <u>performed with</u> adenoidectomy• Adenoidectomy	CCI 1.FR.87.* 1.FR.89.*
Discharge	<ul style="list-style-type: none">• Discharge to home/home setting• Discharge disposition is missing	Dischdisp IN ("","04","05")

Exclusion Criteria

The CEAG recommended the following exclusion criteria:

- Cranio-facial abnormalities (Table 1)
- Chronic Complex Conditions (Table 2)
- Previous peritonsillar abscess (J36: ICD-10)¹

¹ Hospitalizations in the 30 days prior to the index event for the J36 code were considered in order to determine whether a patient had this criterion. Any patient with a hospitalization with this code prior to their tonsillectomy was then excluded from the cohort.

Table 1: Cranio-facial abnormalities

ICD-10 Code	Description
Q35	Cleft palate
Q36	Cleft lip
Q37	Cleft palate with cleft lip
Q67.4	Other congenital deformities of skull, face and jaw
Q75.0	Craniosynostosis
Q87.0	Congenital malformation syndromes predominantly affecting facial appearance
Q75.4	Mandibulofacial dysostosis
Q90	Down's syndrome

Table 2: Chronic Complex Conditions¹ (Feudtner, 2001)

Category	Sub-category	ICD-10 Codes
Neuromuscular	Brain and spinal cord malformations	Q00 Anencephaly and similar malformations Q05 Spina bifida Q01.9 Encephalocele, unspecified Q02 Microcephaly Q03.9 Congenital hydrocephalus, unspecified Q04.3 Other reduction deformities of brain Q04.8 Other specified congenital malformations of brain Q06.2 Diastematomyelia Q06.4 Hydromyelia Q06.8 Other specified congenital malformations of spinal cord Q07.8 Other specified congenital malformations of nervous system Q07.9 Congenital malformation of nervous system, unspecified
	Central nervous system degeneration and disease	G20 Parkinson's G23 Other degenerative diseases of basal ganglia G24.0 Drug-induced dystonia G24.1 Idiopathic familial dystonia G24.2 Idiopathic nonfamilial dystonia G24.8 Other dystonia G25.0 Essential tremor G25.1 Drug-induced tremor G25.2 Other specified forms of tremor G25.3 Myoclonus G25.4 Drug-induced chorea G25.5 Other chorea G25.6 Drug-induced tics and other tics of organic origin G31.8 Other specified degenerative diseases of nervous system G90.3 Multi-system degeneration G10 Huntington's disease G80.3 Dyskinetic cerebral palsy G11 Hereditary Ataxias G12 SMA and related syndromes G91.0 Communicating hydrocephalus G91.1 Obstructive hydrocephalus G91.2 Normal-pressure hydrocephalus G91.3 Post-traumatic hydrocephalus, unspecified G91.8 Other hydrocephalus G91.9 Hydrocephalus, unspecified G94.1 Hydrocephalus in neoplastic disease (C00-D48) G94.2 Hydrocephalus in other diseases classified elsewhere G95 Other diseases of spinal cord G90.4 Autonomic dysreflexias G99 Peripheral neuropathies in other disorders Q03.0 Malformations of aqueduct of Sylvius Q03.1 Atresia of foramina of Magendie and Luschka Q03.8 Other congenital hydrocephalus

¹ Exclusion criteria should not be revised based on the number of years patients have had a condition prior to surgery.

	Epilepsy	G40.....Epilepsy G41.....Status epilepticus
	Infantile cerebral palsy	G80.....Cerebral palsy G81.....Hemiplegia G82.....Paraplegia and tetraplegia
	Mental retardation	F70.1Mild mental retardation, significant impairment of behaviour requiring attention or treatment F70.8Mild mental retardation, other impairments of behaviour F71Moderate mental retardation F72Severe mental retardation F73Profound mental retardation F78Other mental retardation F79Unspecified mental retardation
	Muscular dystrophies and myopathies	G71.....Primary disorders of muscles G72.....Other myopathies
	Cardiovascular	
	Heart and great vessel malformations	Q20.....Congenital malformations of cardiac chambers and connections Q21.....Congenital malformations of cardiac septa Q22.....Congenital malformations of pulmonary and tricuspid valves Q23.....Congenital malformations of aortic and mitral valves Q24.....Other congenital malformations of heart Q25.....Congenital malformations of great arteries Q26.....Congenital malformations of great veins
	Cardiomyopathy	I42Cardiomyopathy I51.5Myocardial degeneration
	Conduction disorders and dysrhythmias	I44Atrioventricular and left bundle-branch block I45Other conduction disorders I47Paroxysmal tachycardia I48Atrial fibrillation and flutter I49Other cardiac arrhythmias
Respiratory	Respiratory malformations	Q30.....Congenital malformations of nose Q31.....Congenital malformations of larynx Q32.....Congenital malformations of trachea and bronchus Q33.....Congenital malformations of lung Q34.....Other congenital malformations of respiratory system
	Chronic respiratory disease	P27Chronic respiratory disease originating in the perinatal period
	Cystic fibrosis	E84Cystic fibrosis
Renal	Congenital anomalies	Q60.....Renal agenesis and other reduction defects of kidney Q61.....Cystic kidney disease Q62.....Congenital obstructive defects of renal pelvis and congenital malformations of ureter Q63.....Other congenital malformations of kidney Q64.....Other congenital malformations of urinary system
	Chronic renal failure	N18.....Chronic kidney disease
Gastrointestinal	Congenital anomalies	Q39.....Congenital malformations of oesophagus Q41.....Congenital absence, atresia and stenosis of small intestine Q42.....Congenital absence, atresia and stenosis of large intestine Q43.1Hirschsprung's disease Q43.4.....Duplication of intestine Q43.7Persistent cloaca Q44.....Congenital malformations of gallbladder, bile ducts and liver Q45.....Other congenital malformations of digestive system
	Chronic liver disease and cirrhosis	K73.....Chronic hepatitis, not elsewhere classified K74.....Fibrosis and cirrhosis of liver K75.4.....Autoimmune hepatitis K75.8.....Other specified inflammatory liver diseases K75.9.....Inflammatory liver disease, unspecified K76.0.....Fatty (change of) liver, not elsewhere classified
	Inflammatory bowel disease	K50.....Crohn's disease [regional enteritis] K51.....Ulcerative colitis
Hematology and	Sickle cell disease	D57.....Sickle-cell disorders

immunodeficiency	Hereditary anemia	D55.....Anaemia due to enzyme disorders D56.1.....Beta thalassaemia D56.2.....Delta-beta thalassaemia D56.4.....Hereditary persistence of fetal haemoglobin [HPFH] D56.8.....Other thalassaemias D58.....Other hereditary haemolytic anaemias
	Hereditary immunodeficiency	D80.....Immunodeficiency with predominantly antibody defects D81.....Combined immunodeficiencies D82.....Immunodeficiency associated with other major defects D83.....Common variable immunodeficiency D84.....Other immunodeficiencies D89.8.....Other specified disorders involving the immune mechanism, not elsewhere classified D89.9.....Disorder involving the immune mechanism, unspecified
	HIV / AIDS	B24Human immunodeficiency virus [HIV] disease
Metabolic	Amino acid metabolism	E70Disorders of aromatic amino-acid metabolism E71.0Maple-syrup-urine disease E71.1Other disorders of branched-chain amino-acid metabolism E71.2Disorder of branched-chain amino-acid metabolism, unspecified E72Other disorders of amino-acid metabolism
	Carbohydrate metabolism	E73.0Congenital lactase deficiency E74Other disorders of carbohydrate metabolism
	Lipid metabolism	E75Disorders of sphingolipid metabolism and other lipid storage disorders E77Disorders of glycoprotein metabolism E78Disorders of lipoprotein metabolism and other lipidaemias E88.1Lipodystrophy, not elsewhere classified E88.2Lipomatosis, not elsewhere classified
	Storage disorders	E76Disorders of glycosaminoglycan metabolism E85Amyloidosis
	Other metabolic disorders	E71.3Disorders of fatty-acid metabolism E79Disorders of purine and pyrimidine metabolism E80.3Defects of catalase and peroxidase E80.4Gilbert's syndrome E80.5Crigler-Najjar syndrome E80.6Other disorders of bilirubin metabolism E80.7Disorder of bilirubin metabolism, unspecified E83Disorders of mineral metabolism E88.8Other specified metabolic disorders E88.9Metabolic disorder, unspecified
Other congenital / genetic defect	Chromosomal anomalies	Q90.....Down's syndrome Q91.....Edwards' syndrome and Patau's syndrome Q93.....Monosomies and deletions from the autosomes, not elsewhere classified Q95.2.....Balanced autosomal rearrangement in abnormal individual Q95.3.....Balanced sex/autosomal rearrangement in abnormal individual Q96.....Turner's syndrome Q98.1.....Klinefelter's syndrome, male with more than two X chromosomes Q98.2.....Klinefelter's syndrome, male with 46,XX karyotype Q98.4.....Klinefelter's syndrome, unspecified Q99.9.....Chromosomal abnormality, unspecified
	Bone and joint anomalies	E34.3Short stature, not elsewhere classified M41Scoliosis Q75.....Other congenital malformations of skull and face bones Q76.....Congenital malformations of spine and bony thorax Q77.....Osteochondrodysplasia with defects of growth of tubular bones and spine Q78.....Other osteochondrodysplasias
Neoplasms		Malignant neoplasms (C00-C97) In situ neoplasms (D00-D09) Benign neoplasms (D10-D36) Neoplasms of uncertain or unknown behaviour (D37-D48)

Note:

The following recommendation was received from the Health Analytics Branch (MOHLTC, Health System Information Management & Investment Division) regarding the QBP Tonsillectomy cohort definition, after the data analysis was completed by the Clinical Expert Advisory Group:

- *Two HIG groups (086 - Oral Cavity/Pharynx Intervention, 080 - Other Ear Intervention) and one CACS group (C101 - Tonsil/Adenoidectomy) accounted for 98% of cases in the expert panel cohort. However, these inclusions did not account for all of the diagnostic exclusions, and therefore may not be an appropriate replacement to the diagnostic exclusions. Other approaches to simplifying the large list of diagnostic exclusions were explored, but none of the approaches proved to be useful.*
- *Nevertheless, the HIG and CACS inclusions were useful as a supplementary extraction criteria to increase cohort homogeneity in terms of resource utilization and clinical case-mix groups. Applying these inclusions will also ensure that the tonsillectomy cohort does not overlap with another QBP cohort, many of which are based on HIG and CACS groups.*
- ***Therefore, our analyses supports the recommendation that the current tonsillectomy cohort be supplemented with inclusion of HIG 086 and 080, and CACS C101.***

The new supplementary extraction criteria outlined above does not change the final recommendations outlined in Section 4.2: Clinical Pathway Recommendations.

The recommended supplementary extraction criteria codes were not applied to the cohort used by the CEAG to perform data analysis presented in Section 2.3.3: Practice Variation.

3.2 Evidence-Based Rational

Key objectives of the QBP

This QBP Handbook is intended for all clinicians in academic and community-based facilities who interact with paediatric tonsillectomy patients.

The key objectives of this QBP are to:

- Provide clinicians with evidence-based recommendations on the pre-, intra- and post-operative care and management of paediatric patients undergoing tonsillectomy with or without adenoidectomy.
- Emphasize the need for evaluation and intervention in high-risk populations, including patients with suspected severe obstructive apnea syndrome (OSAS).
- Promote appropriate and timely counseling and education for patients, parents and caregivers.
- Reduce inappropriate or unnecessary variations in care, including the following:
 - Appropriate use of steroids,
 - Unnecessary administration of antibiotics, and
 - Inappropriate use of codeine.
- Reduce post-surgery readmission rates and Emergency Department (ED) revisit rates due to the most common complications (e.g.: dehydration, hemorrhage following surgical procedure, pain, and respiratory complications)².
- Ensure appropriate follow-up care strategies are in place.

² This list is prioritized based on the readmissions and ED revisit volume data received from the Institute for Clinical Evaluative Sciences (ICES, 2013)

Application of the Evidence-Based Framework

Refer to Figure 3 for the Evidence-Based Framework.

Availability of Evidence

Is there a clinical evidence base for an established standard of care/or care pathway? How strong is the evidence?

Members of the CEAG undertook searches of the anaesthesia, otolaryngology, nursing and other relevant literature for studies that describe established standards of care for paediatric tonsillectomy with and without adenoidectomy. 83 references were identified as having relevance to the topic and are referenced in this QBP Handbook. The CEAG used the following major sources to inform the development of their recommendations:

- Two clinical practice guidelines:
 - American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS). Clinical practice guideline: Tonsillectomy in children (Baugh, et al., 2011).
 - Scottish Intercollegiate Guidelines Network. A national clinical guideline: Management of sore throat and indications for tonsillectomy (Scottish Intercollegiate Guidelines Network, 2010).
- Other guidelines based on high-quality systematic reviews:
 - Society for Ambulatory Anesthesia. Guidelines for the management of postoperative nausea and vomiting (Gan, et al., 2007).
 - British Committee for Standards in Haematology. Guidelines on the assessment of bleeding risk prior to surgery or invasive procedures (Chee, Crawford, Watson, & Greaves, 2008).
 - Registered Nurses Association of Ontario. Assessment and management of pain nursing best practice guideline (RNAO, 2007).
- A number of systematic reviews and meta-analyses, including the following Cochrane Reviews:
 - Nonsteroidal anti-inflammatory drugs and perioperative bleeding in paediatric tonsillectomy (Cardwell, Siviter, & Smith, 2005).
 - Antibiotics to reduce post-tonsillectomy morbidity (Dhiwakar, Clement, Mrinal, & McKerrow, 2012).
 - Oral rinses, mouthwashes and sprays for improving recovery following tonsillectomy (Fedorowicz, Al-Muharraqi, Nasser, Al-Harthy, & Carter, 2011).
 - Perioperative local anaesthesia for reducing pain following tonsillectomy (Hollis, Burton, & Millar, 1999).
 - Steroids for improving recovery following tonsillectomy in children (Steward, Grisel, & Meinzen-Derr, 2011).
 - Sucrose for analgesia in newborn infants undergoing painful procedures (Stevens, Yamada, & Ohlsson, 2004).

- Other scientific literature and empirical analysis brought to the CEAG's attention.
- Analysis of inpatient and outpatient data, supported by staff from the Institute for Clinical Evaluative Sciences (ICES).
- The CEAG discussion and consensus.

A formal meta-analysis was not undertaken, but the above resources were all considered by the CEAG in their deliberations. The definitions of the types of evidence and the grading of recommendations used in this Handbook originate from the Oxford Centre for Evidence-based Medicine (CEBM) Levels of Evidence framework (Howick, 2009).

Is costing and utilization information available to inform development of reference costs and pricing?

Costing and utilization information is available. Using the HBAM Inpatient Groups (HIGs), costs per case can be determined.

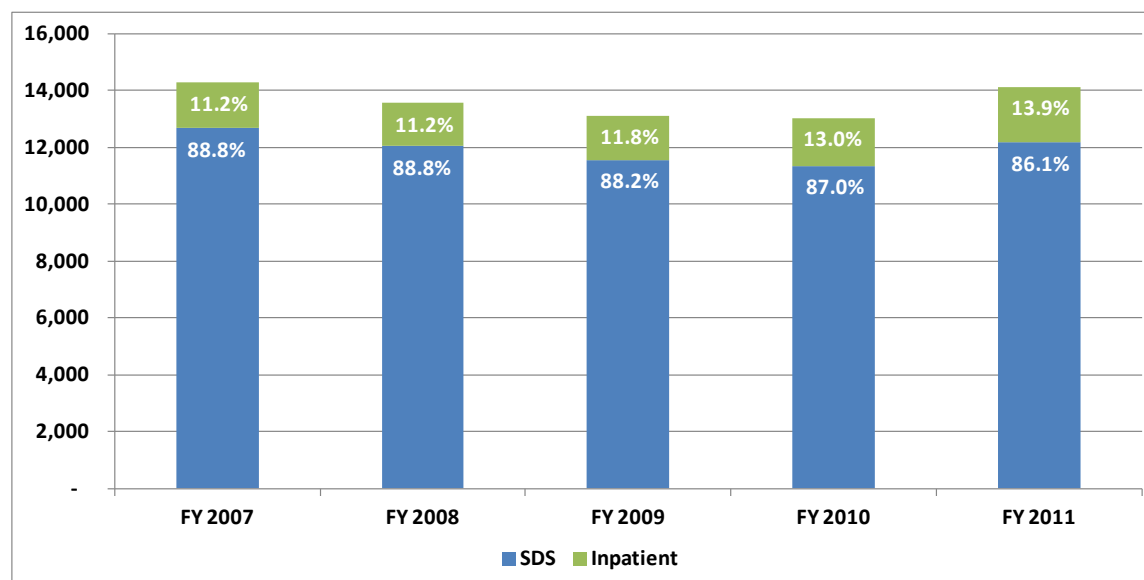
Practice Variation

Is there variation in clinical outcomes across providers, regions and population?

Relative proportion of Inpatient and Same Day Surgeries (SDS) ³

While the total volume of cases in the province remained relatively stable between FY 2007 and FY 2011, the relative proportion of inpatient surgeries went up from 11.2% to 13.9% over the last 5 years.

Figure 4: Inpatient vs. SDS paediatric tonsillectomy volumes (FY 2007 - FY 2011)



There is significant variation in the percentage of inpatient cases across LHINs. Of note, the following LHINs had the highest proportion of inpatient surgeries in FY 2011: Central West, Central and North West.

Table 3: Inpatient vs. SDS paediatric tonsillectomy volumes by LHIN (FY 2007 - FY 2011)

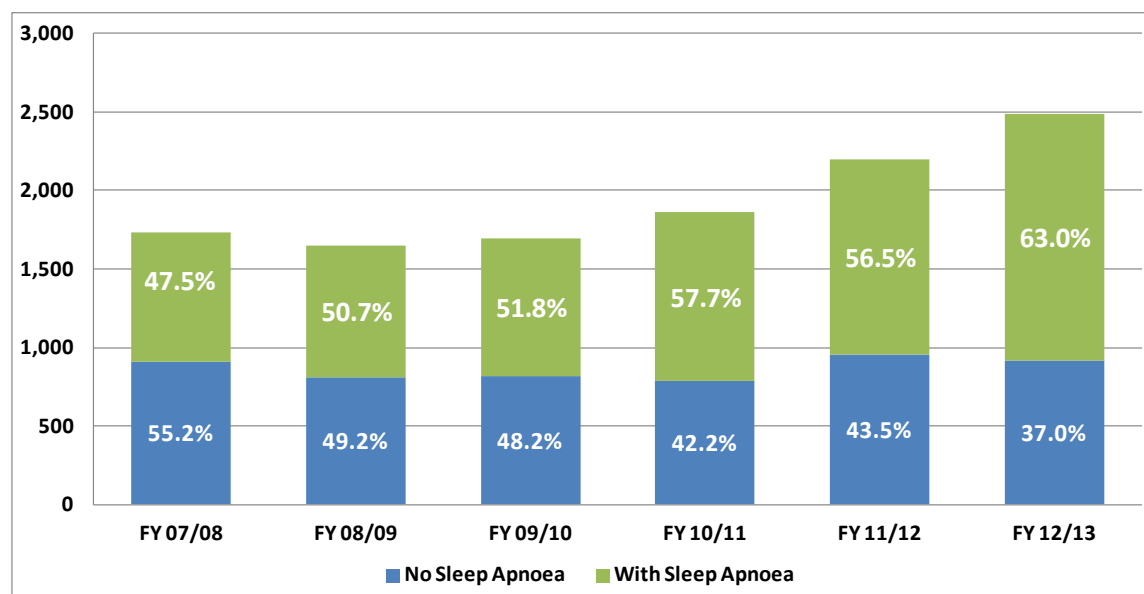
LHIN	FY 2007		FY 2008		FY 2009		FY 2010		FY 2011	
	SDS	Inpatient	SDS	Inpatient	SDS	Inpatient	SDS	Inpatient	SDS	Inpatient
Erie St. Clair	92%	7.6%	92%	7.6%	94%	6.3%	91%	8.6%	92%	8.2%
South West	83%	17.0%	85%	15.5%	83%	17.3%	85%	15.1%	86%	14.4%
Waterloo Wellington	96%	3.6%	97%	3.3%	95%	4.8%	94%	5.8%	95%	4.8%
HNHB	92%	7.9%	92%	8.2%	90%	10.0%	92%	8.3%	93%	6.7%
Central West	90%	10.0%	91%	9.5%	87%	12.9%	83%	17.4%	79%	20.8%
Mississauga Halton	93%	6.7%	92%	7.7%	92%	7.7%	92%	7.8%	90%	10.3%
Toronto Central	90%	10.1%	90%	9.7%	90%	9.8%	88%	12.4%	81%	18.9%
Central	85%	14.9%	86%	13.5%	88%	12.1%	82%	18.1%	78%	22.2%
Central East	84%	16.2%	81%	18.6%	81%	19.4%	80%	19.5%	81%	19.1%
South East	88%	12.0%	92%	8.2%	91%	8.8%	95%	5.1%	94%	6.0%
Champlain	91%	8.6%	89%	10.5%	88%	12.2%	86%	13.5%	88%	12.4%
NSM	90%	10.1%	89%	10.5%	90%	10.1%	87%	13.1%	86%	14.2%
North East	88%	12.2%	91%	9.2%	90%	10.0%	89%	10.8%	82%	17.9%
North West	62%	38.3%	63%	37.2%	58%	42.1%	65%	34.9%	65%	34.7%

³ All data discussed in this section is based on the *Paediatric Tonsillectomy* report provided by ICES (ICES, 2013).

Sleep apnea diagnosis for paediatric tonsillectomies⁴

The overall upward trend in inpatient tonsillectomies is largely driven by the increase in the number of procedures with sleep apnea diagnosis. This diagnosis is often based on clinical assessment due to challenges with access to the laboratory-based sleep testing.

Figure 5: Inpatient paediatric tonsillectomies with a sleep apnea diagnosis by fiscal year



Of note, the older paediatric population (11 to 18 years) has the lowest overall proportion of inpatient cases with sleep apnea diagnosis. However, this number has increased significantly over the past 5 years (28.6% in FY 2007/08 vs. 48.0% in FY 2012/13).

Table 4: Inpatient paediatric tonsillectomy cases by sleep apnea diagnosis and age group

Fiscal Year	Sleep Apnoea	Age Group		
		0-3	4-10	11-18
2007/08	No	53.7%	44.3%	71.4%
	Yes	46.3%	55.7%	28.6%
2008/09	No	48.1%	42.2%	72.8%
	Yes	51.9%	57.8%	27.2%
2009/10	No	48.0%	39.9%	70.7%
	Yes	52.0%	60.1%	29.3%
2010/11	No	47.0%	33.3%	58.5%
	Yes	53.0%	66.7%	41.5%
2011/12	No	44.2%	37.8%	63.2%
	Yes	55.8%	62.2%	36.8%
2012/13	No	41.6%	30.3%	52.0%
	Yes	58.4%	69.7%	48.0%

⁴ All data discussed in this section is based on the *QBP Paediatric Tonsillectomy Cohort* report provided by the Health Analytics Branch (HAB) of the Ministry of Health and Long-Term Care (MOHLTC, 2013). ICD-10-CA diagnosis codes for conditions excluded from the cohort were not available at the time of this analysis.

Length of Stay (LOS)⁵

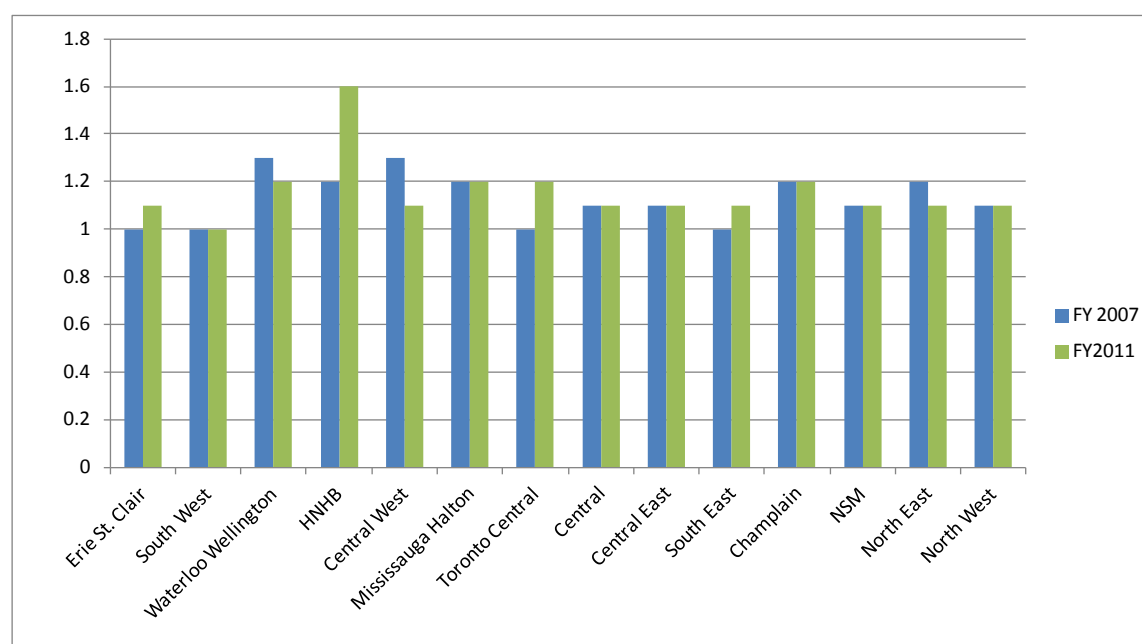
The LOS for inpatient surgeries remained stable between FY 2007 and FY 2011.

Table 5: Yearly LOS (days) for inpatient paediatric tonsillectomies in Ontario (FY 2007 - FY 2011)

	FY 2007	FY 2008	FY 2009	FY 2010	FY2011
Mean (\pmSD)	1.1 (0.54)	1.1 (0.61)	1.2 (0.91)	1.2 (1.11)	1.1 (1.11)
Median (Range)	1 (1-8)	1 (1-14)	1 (1-25)	1 (1-36)	1 (1-45)

Hamilton Niagara Haldimand Brant LHIN had the highest LOS in FY 2011.

Figure 6: Mean yearly LOS (days) for inpatient paediatric tonsillectomies by LHIN (FY 2007 and FY 2011)⁶



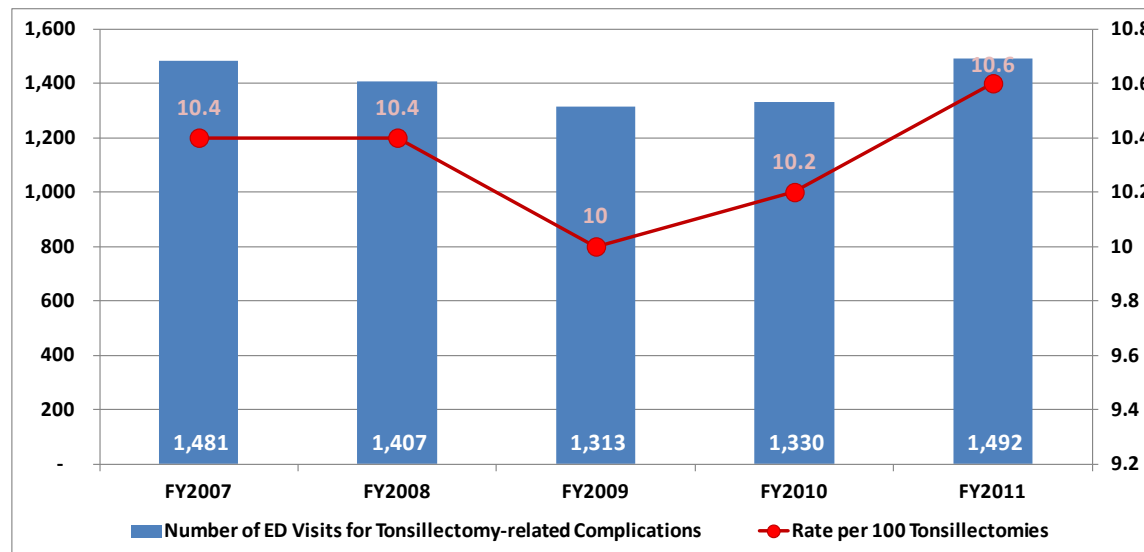
⁵ All data discussed in this section is based on the *Paediatric Tonsillectomy* report provided by ICES (ICES, 2013).

⁶ HNHBB = Hamilton Niagara Haldimand Brant; NSM = North Simcoe Muskoka.

ED Visits for Tonsillectomy-related Complications⁷

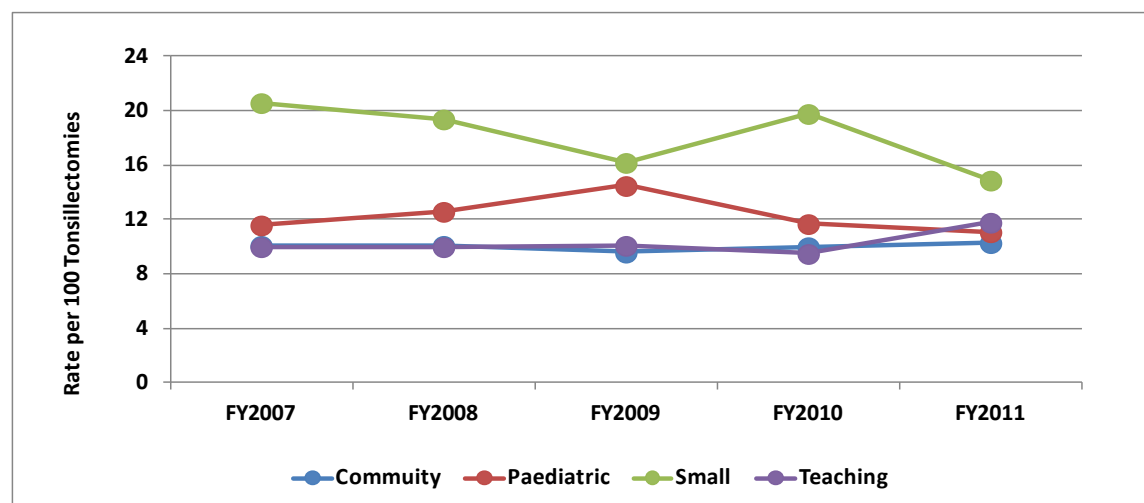
The total volume of subsequent ED visits for tonsillectomy-related complications within 30 days of initial surgery remained relatively stable between FY 2007 and FY 2011.

Figure 7: Number and rate of subsequent ED visits for tonsillectomy-related complications (FY 2007 - FY 2011)



While the rate of ED visits for tonsillectomy-related complications in *small hospitals* has been gradually declining, this group still has the highest overall rate (14.9/100 tonsillectomies), compared to *community* (10.3/100 tonsillectomies), *paediatric* (11.1/100 tonsillectomies) and *teaching hospitals* (11.8/100 tonsillectomies).

Figure 8: Rates of subsequent ED visits for tonsillectomy-related complications by hospital type (FY 2007 - FY 2011)



⁷ All data discussed in this section is based on the *Paediatric Tonsillectomy* report provided by ICES (ICES, 2013). ED data for FY 2012 was not available at the time of this analysis. Therefore, tonsillectomies that occurred in March 2012 have limited ED follow-up data.

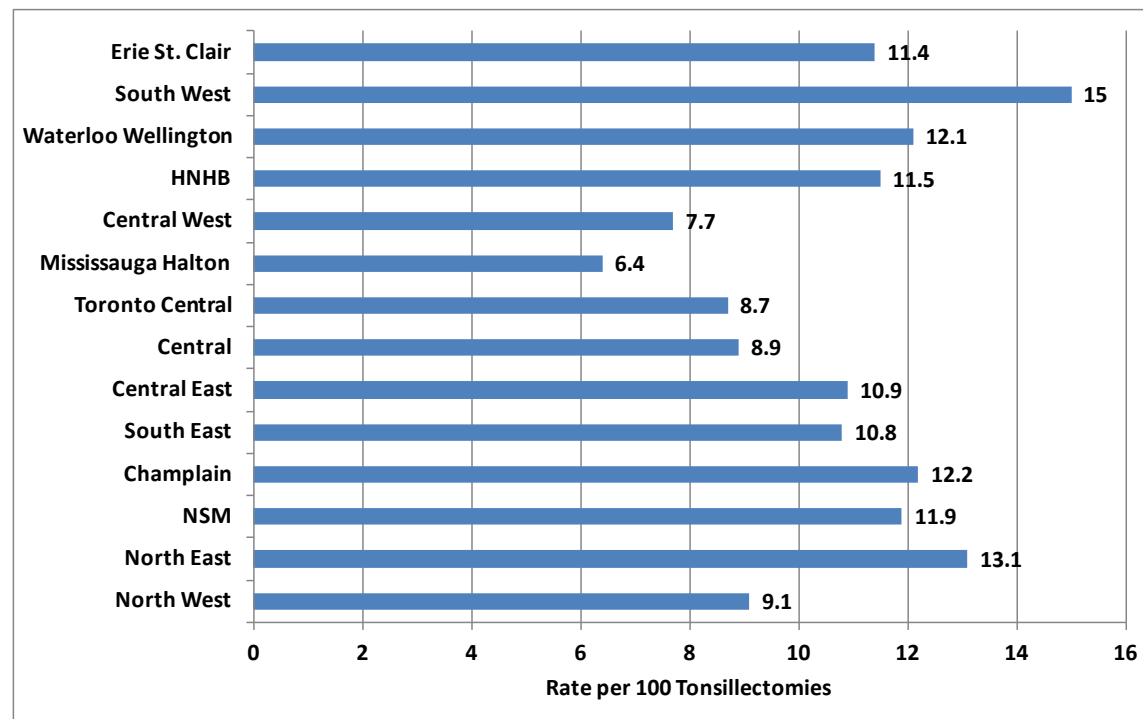
There is variation in the rate of subsequent ED visits for tonsillectomy-related complications within 30 days of initial surgery across LHINs.

Table 6: Rates of subsequent ED visits for tonsillectomy-related complications by LHIN (FY 2007 - FY 2011)

LHIN	Rate per 100 Tonsillectomies				
	FY2007	FY2008	FY2009	FY2010	FY2011
Erie St. Clair	12.2	12.2	10.4	13.3	11.4
South West	12.8	13.8	10.8	13.2	15
Waterloo Wellington	9.7	9.6	11.3	11.5	12.1
Hamilton Niagara Haldimand Brant	11.3	11.5	10.5	10.1	11.5
Central West	8.3	7.4	6.8	8.3	7.7
Mississauga Halton	7.3	8.3	7.1	7.9	6.4
Toronto Central	9.8	10.4	8.3	9.6	8.7
Central	8.5	8.3	8.2	7	8.9
Central East	10.2	9.2	10.4	10.1	10.9
South East	11.3	10.8	9.6	11.1	10.8
Champlain	14.4	14.4	15.3	13.4	12.2
North Simcoe Muskoka	10.7	10.5	12.1	10.9	11.9
North East	11.8	12.9	11.6	10.6	13.1
North West	11.7	9.1	10.3	12.7	9.1

The following LHINs had the highest rate of subsequent ED visits for tonsillectomy-related complications within 30 days of initial surgery in FY 2011: South West, North East and Champlain.

Figure 9: Rates of subsequent ED visits for tonsillectomy-related complications by LHIN (FY 2011)



The older paediatric population (11 to 18 years) has the highest overall rate of subsequent ED visits for tonsillectomy-related complications (14.2/100 tonsillectomies in FY 2011), with *Hospital-acquired infections* (HAI) and *Pain* being the leading causes (5/100 and 3.3/100 tonsillectomies in FY 2011 respectively). The rate of ED visits among the 0 to 3 years age group is slightly lower (10.8/100 tonsillectomies in FY 2011), with the leading causes being *Pain* and *Dehydration* (1.9/100 and 1.9/100 tonsillectomies respectively). The rate of ED visits among the 4 to 10 years age group is the lowest (9.3/100 tonsillectomies in FY 2011).

Figure 10: Rates of subsequent ED visits for tonsillectomy-related complications by age group (FY 2007 - FY 2011)

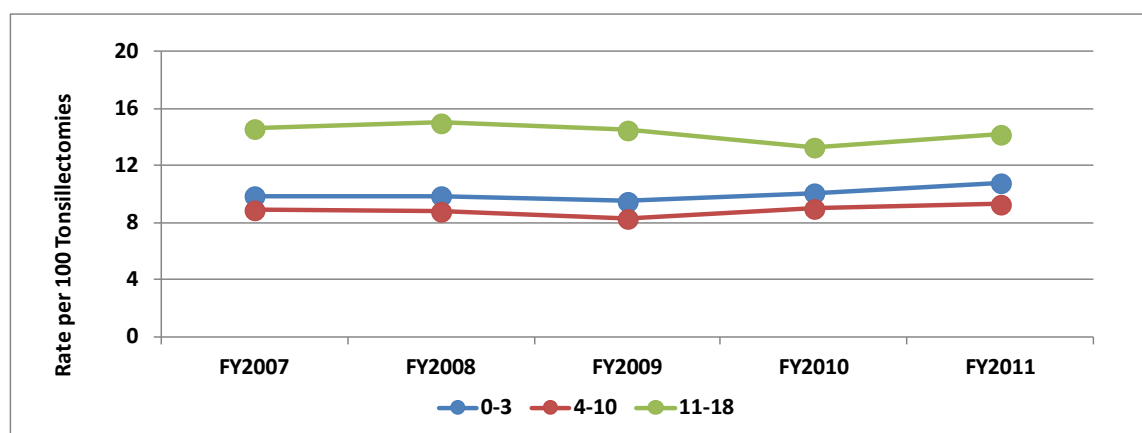


Table 7: Reasons for ED revisits among paediatric tonsillectomy patients (FY 2007 - FY 2011)

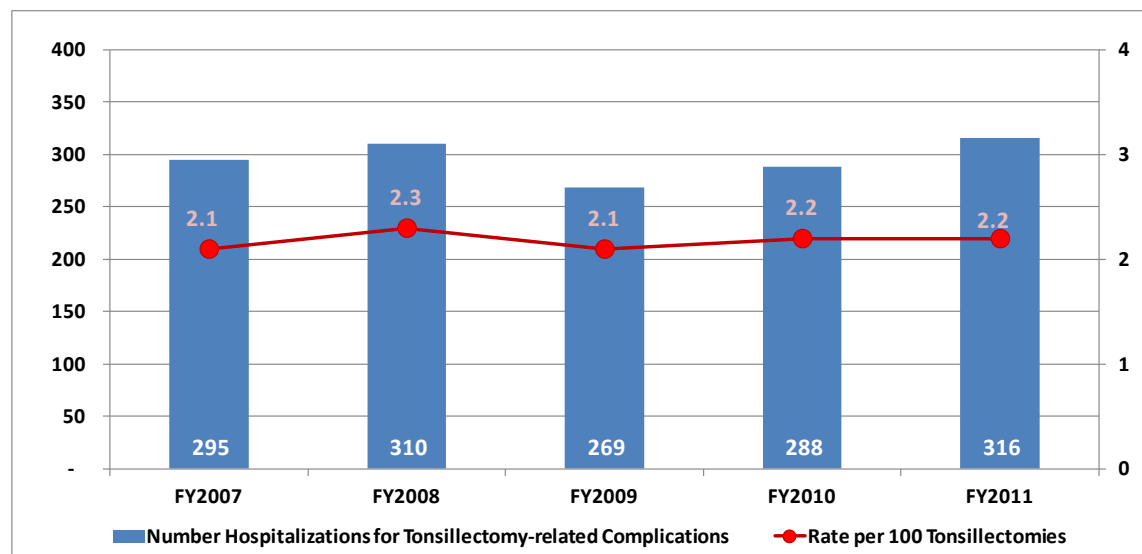
Complication Categories	Number (Rate per 100 Tonsillectomies)				
	FY2007	FY2008	FY2009	FY2010	FY2011
Age 0-3					
Allergic reactions	*	9 (0.3)	*	*	*
Dehydration	31 (1.1)	31 (1.1)	37 (1.5)	39 (1.6)	51 (1.9)
Hemorrhage / hematoma following surgical procedure	43 (1.5)	31 (1.1)	34 (1.3)	31 (1.2)	32 (1.2)
Hospital-acquired infections (HAI)	49 (1.7)	44 (1.5)	35 (1.4)	44 (1.8)	38 (1.4)
Medication-related problems	*	-	*	*	*
Pain	6 (0.2)	20 (0.7)	28 (1.1)	34 (1.4)	50 (1.9)
Respiratory conditions	24 (0.9)	27 (0.9)	18 (0.7)	28 (1.1)	21 (0.8)
Surgical site infections	39 (1.4)	40 (1.4)	33 (1.3)	26 (1)	27 (1)
Other	75 (2.7)	83 (2.9)	47 (1.8)	43 (1.7)	60 (2.3)
Age 4-10					
Allergic reactions	13 (0.2)	18 (0.2)	*	*	*
Dehydration	91 (1.1)	84 (1.1)	89 (1.2)	80 (1.1)	130 (1.5)
Hemorrhage / hematoma following surgical procedure	40 (0.5)	44 (0.6)	40 (0.5)	43 (0.6)	40 (0.5)
Hospital-acquired infections (HAI)	189 (2.3)	182 (2.4)	179 (2.4)	174 (2.3)	215 (2.5)
Medication-related problems	-	-	*	*	*
Pain	20 (0.2)	64 (0.8)	88 (1.2)	108 (1.4)	139 (1.6)
Respiratory conditions	50 (0.6)	31 (0.4)	29 (0.4)	43 (0.6)	37 (0.4)
Surgical site infections	82 (1)	61 (0.8)	72 (1)	80 (1.1)	90 (1.1)
Other	240 (2.9)	187 (2.4)	112 (1.5)	130 (1.7)	129 (1.5)
Age 11-18					
Allergic reactions	7 (0.2)	*	*	10 (0.3)	*
Dehydration	42 (1.3)	45 (1.5)	47 (1.5)	35 (1.2)	39 (1.3)
Hemorrhage / hematoma following surgical procedure	*	8 (0.3)	8 (0.3)	*	*
Hospital-acquired infections (HAI)	172 (5.2)	164 (5.5)	168 (5.4)	143 (4.7)	146 (5)
Medication-related problems	*	-	*	*	*
Pain	19 (0.6)	58 (1.9)	89 (2.9)	89 (2.9)	96 (3.3)
Respiratory conditions	*	*	8 (0.3)	6 (0.2)	7 (0.2)
Surgical site infections	44 (1.3)	41 (1.4)	38 (1.2)	38 (1.3)	38 (1.3)
Other	185 (5.6)	126 (4.2)	87 (2.8)	75 (2.5)	77 (2.6)

* Suppressed to protect privacy

Hospitalizations for Tonsillectomy-related Complications⁸

The total volume of subsequent hospitalizations for tonsillectomy-related complications within 30 days of initial surgery remained stable between FY 2007 and FY 2011.

Figure 11: Number and rate of hospitalizations for tonsillectomy-related complications in Ontario (FY 2007 - FY 2011)



There is some variation in the rate of subsequent hospitalizations for tonsillectomy-related complications within 30 days of initial surgery across LHINs.

Table 8: Rates of hospitalizations for tonsillectomy-related complications by LHIN (FY 2007 – FY 2011)

LHIN	Rate per 100 Tonsillectomies				
	FY2007	FY2008	FY2009	FY2010	FY2011
Erie St. Clair	2.4	3.1	2.6	3	2.6
South West	2.7	3.6	2.2	2.9	2.8
Waterloo Wellington	2.3	1.6	1.6	1.2	1
Hamilton Niagara Haldimand Brant	2.4	2.6	2.5	2.5	2.7
Central West	1.4	1.2	1.5	2.1	2.2
Mississauga Halton	1.8	1.9	1.5	2.3	1.8
Toronto Central	2.3	3.4	1.7	2.2	1.9
Central	1.4	1.7	2.1	1.4	1.9
Central East	2.4	1.8	2.5	2	2.4
South East	*	*	1.6	1.9	1.8
Champlain	2.2	3.4	3.1	3.2	3.2
North Simcoe Muskoka	2.4	2.2	1.7	1.9	2.4
North East	1.4	2.7	*	1.6	2.2
North West	*	*	*	4.2	1

* Suppressed to protect privacy

⁸ All data discussed in this section is based on the *Paediatric Tonsillectomy* report provided by ICES (ICES, 2013).

Is there a high-degree of observed practice variation across providers or regions in clinical areas where a best practice or standard exists, suggesting such a variation is inappropriate?

Experience and observations by the CEAG suggest a high-degree of practice variation across providers in the following areas:

- Pre-operative patient assessment, including assessment of risk factors for post-surgical respiratory complications (e.g. sleep study).
- Patient and parental/caregiver education and counseling, including variability in content and methods of communication (e.g. print, online, in-person tours).
- Intra- and post-operative medication, including:
 - Variability in dosing regimens (e.g.: dexamethasone, acetaminophen, and morphine).
 - Inappropriate administration of antibiotics and codeine.
- Post-operative guidelines for observation, referral, and admission following tonsillectomy with and without adenoidectomy.

Feasibility/Infrastructure for Change

Are there clinical leaders able to champion change in the area?

In addition to the leadership provided by the CEAG members, support of this initiative by the Chiefs of Otolaryngology as well as leaders in Surgery, Anaesthesia and Nursing is critical to its success. Individual hospitals may wish to form a task force that would also include the Chief of Paediatrics, Manager of the Maternal and Child Program and other stakeholders who have a key role in providing care in the peri-operative setting as a means of addressing local implementation of the recommendations within this document.

Is there data and reporting infrastructure in place?

Currently, all inpatient surgeries are captured in the Discharge Abstract Database (DAD). All same day surgeries (SDS) are captured in the National Ambulatory Care Reporting System (NACRS).

Can we leverage other initiatives or reforms related to practice change (e.g. Wait Time, Provincial Programs)?

Other programs that could be leveraged include:

Accreditation Canada: Required Organizational Practices (ROPs)

Required Organizational Practices (ROPs) are among the most heavily weighted factors evaluated in giving an organization their accreditation decision. Therefore, they represent a major lever in moving practice forward in Canada.

Antimicrobial Stewardship Program

In 2013, Accreditation Canada introduced an ROP into their accreditation program that requires acute care hospitals across Canada to implement an antimicrobial stewardship program. The primary focus of this program is to “optimize the use of antimicrobials to achieve the best patient outcomes, reduce the risk of infections, reduce or stabilize levels of antibiotic resistance, and promote patient safety” (Accreditation Canada, 2012). Specific to antibiotics, a component of virtually every checklist is the use of prophylactic antibiotics. Therefore, the recommendations from this Handbook pertaining to antibiotic use could be incorporated into a tailored checklist for tonsillectomies.

Safe Surgery Checklist

A requirement of Accreditation Canada’s ROP is that hospitals across Canada must now use a Safe Surgery Checklist for all procedures in the operating room (Canadian Patient Safety Institute, 2013). In Ontario, use of a surgical checklist is also required by the provincial government with implementation supported by the Ontario Hospital Association (OHA). Provincial organizations are encouraged to customize checklists to the different types of surgeries in their various operating suites. It is possible that a specific checklist for tonsillectomies with and without adenoidectomy could be modified to incorporate a number of QBP recommendations.

Cost Impact

Does the clinical group contribute to a significant proportion of total costs? ⁹

Tonsillectomy is one of the most common paediatric surgical procedures in the Ontario. In FY 2011, there were 14,125 paediatric tonsillectomies (with and without adenoidectomy) in Ontario at a cost of [TBD].

In FY 2011, there were 1,492 subsequent ED visits for tonsillectomy-related complications within 30 days of initial surgery, for the following reasons: allergic reactions, dehydration, hemorrhage / hematoma following surgical procedure, hospital-acquired infections (HAI), medication-related problems, pain, respiratory conditions, surgical site infections and other complications.

In addition, there were 316 subsequent hospitalizations for tonsillectomy-related complications within 30 days of initial surgery in FY 2011.

Is there significant variation across providers in unit costs/volumes/efficiency?

TBD

Is there potential for cost savings or efficiency improvement through more consistent practice?

There is potential for cost savings and efficiency improvement through the application of this QBP. Specifically, cost savings can be achieved by:

- Reducing the number of ER visits and/or readmissions for the following complications: hemorrhage, dehydration, pain and respiratory complications.
- Reducing unnecessary use of antibiotics.
- Promoting appropriate administration of intra-operative steroids.

How do we pursue quality and improve efficiency?

- Adoption of best practices pertaining to pre-, intra- and post operative management of children undergoing tonsillectomy with and without adenoidectomy.
- Clinical process improvements focused on prevention of post-operative complications.
- Standardization of patient education and counseling programs.

Are there potential areas for integration across the care continuum?

- Emergency Department care.
- Community / Primary care physician follow-up.

⁹ Total costs, readmission and ED revisit costs: pending feedback from the MOHLTC Health Analytics branch..

Impact on Transformation

Is this aligned with Transformation priorities?

Following Ontario's Action Plan for Health Care, this Quality-Based procedure is aligned with Item #3 Right Care, Right Time, Right Place.

Will this contribute directly to Transformation system-redesign?

This quality based procedure will support and promote the Transformation system re-design in so far as it will require consistent implementation of the guidelines in order to:

- Promote 'High Quality Care', providing evidenced-based management of children undergoing tonsillectomy,
- Reduce inappropriate or unnecessary variations in care,
- Reduce the number of revisits to the ED and/or readmissions to hospital following surgery,
- Improve patient experience by standardizing counseling and education programs for families who are considering tonsillectomy for their child, and
- Ensure that pain management strategies are based on the best evidence, avoiding overmedication, and promoting safe and adequate pain control.

3.3 Documentation

How will the QBP be documented? Is there a need for a new data collection process? How will clinical documentation change? ¹⁰

TBD

What are the implications on physician billing and QBP funding?

At this time, physician payment models and OHIP fee schedules, as they relate to QBPs, will remain unchanged. Physicians' currently working under fee-for-service will continue to submit claims to OHIP for consultations, performing the procedure and follow-up.

¹⁰ Pending feedback from the MOHLTC on Chapter 8.0 of this QBP Handbook (Evaluation Metrics).

3.4 Clinical Expert Advisory Group and Clinician Engagement

The Clinical Expert Advisory Group for the paediatric QBP on tonsillectomy with and without adenoidectomy was composed of both clinical and decision support experts. Members included paediatric otolaryngologists from Paediatric Academic Health Sciences Centres (PAHSCs), general otolaryngologists from community hospitals, anesthesiologists, nurse specialists, clinical pharmacists, paediatricians and decision support specialists from across the province. See Chapter 10.0 for the list of membership.

Over the course of five months the CEAG held 2 in-person meetings and 3 teleconferences. In addition, a number of teleconferences were held with smaller sub-groups that then vetted their recommendations about specific content with the full CEAG. When required, the CEAG members sought feedback and input from others within their networks of expertise. CEAG decisions were made by general consensus.

4.0 Best Practices Guiding the Implementation

4.1 Definition of Best Practices

The process for identifying recommended practices involved the following steps:

1. Reviewing existing clinical guidelines and select meta-analyses.
2. Reviewing and summarizing the evidence cited for each recommendation in the available literature.
3. Consulting with members of the CEAG and expert sub-groups for additional evidence not included in the guidelines and meta-analyses reviewed.
4. Summarizing the results of steps 1 to 3 above for each phase and presenting the summary to the CEAG for review.
5. Facilitating discussion by the CEAG members on contextualizing the candidate practices for the Ontario health system and arriving at a consensus recommendation.
6. Identifying gaps in the evidence that the CEAG agreed are high value candidates for future evidence-based analyses.

4.2 Clinical Pathway Recommendations

The following recommendations were highlighted by the CEAG as the key recommendations that should be prioritized for implementation.

Phase 1: Pre-Operative

#	Grade ¹¹	Recommendations	Evidence to Support Recommendations
1.1 Pre-Operative Assessment			
1.1.1	C	Risk Factors for Post-Operative Bleeding <p>Prior to operative intervention patients should undergo a risk assessment for post-operative hemorrhage. This should include:</p> <ul style="list-style-type: none"> Both a patient history and family history of bleeding disorders. Patients with a negative bleeding history do not require routine coagulation screening prior to surgery. Medication history assessment to determine potential risks for increased post-operative hemorrhage in children who are taking Over the Counter (OTC) and/or natural health products and/or prescription medications. 	Literature Review <p>This recommendation is consistent with the Guidelines on the assessment of bleeding risk prior to surgery or invasive procedures, from the British Committee for Standards in Haematology, which states that “patients undergoing surgery should have a bleeding history taken. This should include detail of previous surgery and trauma, a family history, and detail of anti-thrombotic medication” (Chee, Crawford, Watson, & Greaves, 2008).</p> <p>In addition, the following analysis informed the development of this recommendation:</p> <ul style="list-style-type: none"> A cost-effectiveness analysis of coagulation testing prior to tonsillectomy and adenoidectomy in children (Cooper, Smith, & Ritchey, 2010).
1.1.2	C	Diagnosis of Obstructive Sleep Apnea Syndrome (OSAS) <p>OSAS is one of the major risk factors contributing to the occurrence of postoperative respiratory complications. An overnight sleep study (polysomnography) is considered to be the gold standard for diagnosis of OSAS. In Ontario access to polysomnography services for children is a challenge due to limited paediatric sleep laboratory availability in the province. The resulting long wait lists preclude screening by polysomnography for every patient suspected of having OSAS.</p> <p>In the absence of a sleep study, patient history and examination using physical markers and</p>	Literature Review <p>The following studies informed the development of this recommendation:</p> <ul style="list-style-type: none"> Urgent adenotonsillectomy: an analysis of risk factors associated with postoperative respiratory morbidity (Brown, et al., 2003). Outcome, risk, and error and the child with obstructive sleep apnea [Review] (Brown, 2011). A systemic review of obstructive sleep apnea and its implications for anesthesiologists (Chung, Yuan, & Chung, 2008). Morbidity after adenotonsillectomy for paediatric

¹¹ The grade of recommendation relates to the strength of the supporting evidence on which the recommendation is based. It does not reflect the clinical importance of the recommendation.

#	Grade ¹¹	Recommendations	Evidence to Support Recommendations
		overnight oxymetry monitoring can be used to determine the presence of risk factors.	<p>obstructive sleep apnea syndrome: waking up to a pragmatic approach (Leong & Davis, 2007).</p> <ul style="list-style-type: none"> Clinical practice guideline: Diagnosis and management of childhood obstructive sleep apnea syndrome (Marcus, et al., 2012). Tonsillectomy and adenoidectomy in children with sleep-related breathing disorders: Consensus Statement of a UK Multidisciplinary Working Party (Robb, et al., 2009). Wait times for sleep apnea care in Ontario: A multidisciplinary assessment (Rotenberg, George, Sullivan, & Wong, 2010).
1.1.3	C	<p>Pre-operative assessment of patients with known or suspected OSAS</p> <p>A standardized approach to the assessment of children with suspected OSAS, as defined by the Clinical Practice Guideline for diagnosis and management of childhood OSAS from the American Academy of Paediatrics, is recommended:</p> <p><u>History</u></p> <ul style="list-style-type: none"> Frequent snoring (≥3 nights/wk) Labored breathing during sleep Gasps/snorting noises/observed Episodes of apnea Sleep enuresis (especially secondary enuresis after at least 6 months of continence) Sleeping in a seated position or with the neck hyper extended Cyanosis Headaches on awakening Daytime sleepiness Attention-deficit/hyperactivity disorder Learning problems <p><u>Physical examination</u></p> <ul style="list-style-type: none"> Underweight or overweight Tonsillar hypertrophy Adenoidal facies Micrognathia/retrognathia High-arched palate Failure to thrive Hypertension <p>Patients with suspected severe OSAS should be considered for admission to hospital for their surgery. The accepted criterion for severe</p>	<p><u>Literature Review</u></p> <p>In addition to the Clinical Practice Guideline for diagnosis and management of childhood obstructive sleep apnea syndrome, from the American Academy of Paediatrics (Marcus, et al., 2012), and the Consensus Statement from the UK Multidisciplinary Working Party on Tonsillectomy and adenoidectomy in children with sleep-related breathing disorders (Robb, et al., 2009), the following evidence informed the development of this recommendation:</p> <ul style="list-style-type: none"> Urgent adenotonsillectomy: an analysis of risk factors associated with postoperative respiratory morbidity (Brown, et al., 2003). Morbidity after adenotonsillectomy for paediatric obstructive sleep apnea syndrome: waking up to a pragmatic approach (Leong & Davis, 2007).

#	Grade ¹¹	Recommendations	Evidence to Support Recommendations
		OSAS is defined as an apnea-hypopnea index (AHI) greater than 10 events per hour (Robb, et al., 2009). Other markers that should be considered for surgery as an inpatient include oxygen saturation nadir < 80% and carbon dioxide retention.	
1.1.4	C	<p>Indications for paediatric respiratory investigation</p> <p>The following indications should be considered for paediatric respiratory investigations such as a sleep study, pulmonary function tests, overnight oxymetry monitoring and an arterial blood gas:</p> <p><u>As outlined in the Consensus Statement of a UK Multidisciplinary Working Party:</u></p> <ul style="list-style-type: none"> • Diagnosis of OSAS unclear or inconsistent • Down syndrome • Cerebral palsy • Hypotonia or neuromuscular disorders • Significant Craniofacial anomalies • Mucopolysaccharidosis • Obesity (body mass index > 2.5 standard deviation scores or > 99th %ile for age and gender) • Significant co-morbidity such as congenital heart disease, chronic lung disease • Residual symptoms after adenotonsillectomy <p><u>Other indications based on the CEAG consensus:</u></p> <ul style="list-style-type: none"> • Age < 2 years • Failure to thrive • Pulmonary hypertension • Sickle cell disease 	<p><u>Literature Review</u></p> <p>The following evidence informed the development of this recommendation:</p> <ul style="list-style-type: none"> • Clinical Practice Guideline for diagnosis and management of childhood obstructive sleep apnea syndrome from the American Academy of Paediatrics (Marcus, et al., 2012). • Urgent adenotonsillectomy: an analysis of risk factors associated with postoperative respiratory morbidity (Brown, et al., 2003). • Consensus Statement from the UK Multidisciplinary Working Party on tonsillectomy and adenoidectomy in children with sleep-related breathing disorders (Robb, et al., 2009).
1.1.5	D	<p>Investigation of Pre-Operative Fever</p> <p>Fever is an indication for cancelling paediatric surgery.</p>	<u>CEAG Consensus</u>
1.2 Pre-Operative Hydration and Fasting			
1.2.1	D	<p>Hydration and Fasting Guidelines</p> <ul style="list-style-type: none"> • Intake of water and other clear fluids is permitted up to 2 hours before induction of anaesthesia. • Breast milk may be given up to 4 hours before induction of anaesthesia. • Formula or cow's milk may be given up to 6 hours before induction of anaesthesia. 	<u>CEAG Consensus</u>

#	Grade ¹¹	Recommendations	Evidence to Support Recommendations
		<ul style="list-style-type: none"> Solid food may be given up to a minimum of 6-8 hours before induction of anaesthesia. 	
1.2.2	A	Prescription of intravenous (IV) fluids: <ul style="list-style-type: none"> The use of isotonic fluid (D5W.0.9% NaCl) is recommended in most circumstances to provide routine IV fluid maintenance requirements. 	<u>Literature Review and CEAG Consensus</u> <p>The following evidence from the Canadian Paediatric Society Acute Care Committee helped inform the development of this recommendation:</p> <ul style="list-style-type: none"> Risk of acute hyponatremia in hospitalized children and youth receiving maintenance intravenous fluids (Friedman, 2013).
Pre-Operative Parental/Caregiver and Patient Education			
1.3.1	D	Counseling Topics <p>Parental/caregiver anxiety is a common phenomenon and can be a significant predictor of child anxiety before surgery. Timely information, tailored to the needs and concerns of parents/caregivers and children, is recommended in order to decrease intra-operative stress for the child, improve patient compliance, improve outcomes and family satisfaction. The following topics should be incorporated into the routine pre-operative counseling:</p> <p><u>Medication</u></p> <ul style="list-style-type: none"> Acknowledgement/ warning regarding potential risks associated with over-the-counter, natural health products and prescription medications. <p><u>Nutrition</u></p> <ul style="list-style-type: none"> Fasting guidelines for the child. Counseling regarding appropriate nutrition for parents on the day of surgery (to ensure they remember to manage their own nutritional needs). <p><u>Anaesthesia Care</u></p> <ul style="list-style-type: none"> Information regarding the risks associated with specific pain management options, such as morphine, in order to allay potential anxiety in parents / caregivers. <p><u>Activity</u></p> <ul style="list-style-type: none"> Post-operative complications, particularly bleeding, are most likely to occur in the 2 weeks after surgery. Therefore, parents should be advised not to plan long trips out of town for a minimum of 2 weeks after the operation. 	<u>Literature Review and CEAG Consensus</u> <p>There is little published evidence concerning the effectiveness of, and satisfaction with, provision of parental/caregiver education specific to tonsillectomy/adenoidectomy. The CEAG identified a number of studies pertaining to the general issue of parental anxiety before surgery in children, including the following:</p> <ul style="list-style-type: none"> Reducing the anxiety of children undergoing surgery: parental presence during anaesthetic induction (Cameron, Bond, & Pointer, 1996). A psychological preoperative program: effects on anxiety and cooperative behaviors (Cuzzocrea F, 2013). Informing parents about anaesthesia for children's surgery: a critical literature review (Franck & Spencer, 2005). Teaching the psychosocial aspects of pediatric surgery (Harris, Sibley, Rodriguez, & Brandt, 2013). Family-centered preparation for surgery improves peri-operative outcomes for children (Kain, Caldwell-Andrews, Mayes, Weinberg, & Want, 2007). The effect of preoperative nutritional face-to-face counseling about child's fasting on parental knowledge, preoperative need for

#	Grade ¹¹	Recommendations	Evidence to Support Recommendations
		<p>Potential approaches to communicating this information include:</p> <ul style="list-style-type: none"> • Individual verbal communication • Small group discussions • Written pamphlets • Videos 	<p>information, and anxiety, in pediatric ambulatory tonsillectomy (Klemetti, et al., 2010).</p> <ul style="list-style-type: none"> • Day case tonsillectomy in children: parental attitudes and consultation rates (Kanerva & Tarkkila Pit Karanta, 2003). • Homeopathy in the paediatric population (Spiegelblatt, 2005). • Children and natural health products: What a clinician should know. Position Statement from the Canadian Paediatric Society, Drug Therapy and Hazardous Substances Committee (Vohra & Clifford, 2005). <p>In addition, various counseling resources developed by provincial facilities were reviewed by the CEAG during their deliberations.</p>
1.3.2	D	<p>Management of Pre-Operative Anxiety in Children</p> <p>Surgery has been shown to cause anxiety in children, which in turn may result in short and long term negative outcomes. Consideration should be given by the clinical team to providing targeted resources to facilitate patient comfort and to reduce perceived and actual psychological trauma, anxiety, and behavioral issues in children preparing for surgery.</p> <p>Strategies may include, but are not limited to: music therapy, video games, behavioral preparation programs (e.g.: playful dramatization of the operative procedure, manipulation of medical instruments), psychologist's support.</p> <p>A number of provincial institutions are currently facilitating parental presence during induction of anesthesia with good outcomes. The CEAG felt the evidence for the effectiveness of parental presence during induction of anaesthesia was insufficient for them to make a recommendation. This practice should be left to the discretion of individual institutions.</p>	<p><u>Literature Review</u></p> <p>There is little published evidence concerning the effectiveness of, and satisfaction with, provision of patient education specific to paediatric tonsillectomy. The CEAG identified a number of studies pertaining to the general issue of pre-operative anxiety in children:</p> <ul style="list-style-type: none"> • Preoperative parental information and parents' presence at induction of anaesthesia (Astuto, et al., 2006). • A psychological preoperative program: effects on anxiety and cooperative behaviors (Cuzzocrea F, 2013). • Case report: an unforeseen peril of parental presence during induction of anesthesia (Johnson, Nickerson, & Quezada, 2012). • Reducing paediatric anxiety preoperatively: strategies for nurses (St-Onge, 2012). • The effect of performing preoperative preparation program on school age children's anxiety (Vaezzadeh, et al., 2011). • Prevention and intervention strategies to alleviate preoperative anxiety in children: a critical

#	Grade ¹¹	Recommendations	Evidence to Support Recommendations
			review (Wright, Stewart, Finley, & Buffett-Jerrott, 2007).
1.3.3	D	Pre-Surgical OR Tours The availability of pre-operative Operating Room (OR) tours is recommended. OR tours (either real or virtual) are strongly advised in order to help children prepare for surgery, reduce family uneasiness, increase satisfaction and contribute to establishing an improved service. On the tour, children and parents/caregivers can familiarize themselves with the process and envision what the day of the operation will be like by: <ul style="list-style-type: none"> • Visiting the surgical waiting area, operating room and recovery room, Note: the visit may be virtual • Learning what to expect on the day of surgery, and • Learning about anesthesia. 	<u>CEAG Consensus</u>

Phase2: Intra-Operative

#	Grade ¹²	Recommendations	Evidence to Support Recommendations
2.1 Anaesthesia			
2.1.1	A	Topical Anesthetics for IV placement Topical anesthetic is recommended for IV placement prior to anaesthesia induction in order to minimize pain associated with line insertion.	<u>Literature Review</u> The use of anesthetic cream before intravenous (IV) insertion has been shown to be both safe and effective in decreasing pain during IV placement. A variety of options is available, with no strong evidence in the paediatric literature to recommend one single agent over another based on efficacy. Commonly used preparations include 4% liposomal lidocaine (Maxilene) and 4% amethocaine (Ametop). Applying 0.5 inches (nickel size amount) to the IV insertion site 30 to 60 minutes prior to insertion will provide 1 to 3 hrs of numbing sensation. The following sources informed the development of this recommendation: <ul style="list-style-type: none"> • Vascular Access Guideline (BC Provincial Renal Agency, 2011). • A comparison of amethocaine and liposomal lidocaine cream as a pain reliever before venipuncture in children: a randomized control trial (Poonai, Rieder, & Lim, 2012). • Evaluation of a low-dose lidocaine iontophoresis system for topical anesthesia in adults and children: a randomized, controlled trial (Zempsky, Sullivan, Paulson, & Hoath, 2004). • A clinical study to evaluate the efficacy of ELA-Max (4% liposomal lidocaine) as compared with eutectic mixture of local anesthetic cream for pain reduction of venipuncture in children (Eichenfield, Funk, Fallon-Friedlander, & Cunningham, 2002). • Topical anesthetics for intravenous insertion in children: a randomized equivalency study (Kleiber, Sorenson, Whiteside, & Gronstal, 2002).

¹² The grade of recommendation relates to the strength of the supporting evidence on which the recommendation is based. It does not reflect the clinical importance of the recommendation.

#	Grade ¹²	Recommendations	Evidence to Support Recommendations
2.1.2	B	Local Anesthesia Local intra-operative anaesthetic may be used as a method of reducing post-operative pain. Due to increased risk of bleeding associated with infiltration, topical application of local anesthetic is preferred.	<u>Literature Review</u> The literature on the use of intra-operative local anesthetic for reduction of post-operative pain is conflicting. A Cochrane Review by Hollis concluded that the efficacy of local anesthetics in reducing pain or need for supplemental analgesia in patients undergoing tonsillectomy/adenoidectomy is lacking (Hollis, Burton, & Millar, 1999). In a 2008 meta-analysis by Grainger et al. it was found that local anesthetics do seem to provide a modest reduction in post-tonsillectomy/adenoidectomy pain. Topical local anesthetic on a swab appears to provide a similar level of analgesia to that of infiltration without the potential adverse effects and may be used for providing additional post-operative analgesia (Grainger & Saravanappa, 2008).
2.2 Medication			
2.2.1	A	Intra-Operative Steroids Based on available evidence, a single intra-operative dose of intravenous steroids (dexamethasone) is strongly recommended as a safe and effective treatment for reducing morbidity from paediatric tonsillectomy/adenoidectomy. Based on available literature, dexamethasone 0.15 mg/kg dose IV is recommended, up to a maximum of 8 mg/dose. Steroids are not recommended for patients with suspected malignancy because of the risks of tumor lysis syndrome including hyperuricemia, hyperkalemia, hyperphosphatemia, hypocalcaemia and acute renal failure.	<u>AAO-HNS Guideline</u> This recommendation is consistent with the AAO-HNS Guideline which states that “clinicians should administer a single, intra-operative dose of intravenous dexamethasone to children undergoing tonsillectomy. This strong recommendation is based on randomized controlled trials and systematic reviews of randomized controlled trials with a preponderance of benefit over harm” (Baugh, et al., 2011). <u>SIGN Guideline</u> This recommendation is consistent with the SIGN Guideline which states that a single intra-operative dose of dexamethasone “is recommended to prevent postoperative vomiting in children undergoing tonsillectomy or adenotonsillectomy” (Scottish Intercollegiate Guidelines Network, 2010). <u>Literature Review</u> In addition to the AAO-HNS and SIGN Guidelines, the following studies helped inform the development of this recommendation: <ul style="list-style-type: none"> • Cochrane Review: Steroids for improving recovery following tonsillectomy in children (Steward, Grisel, & Meinzen-Derr, 2011). • A 2013 updated systematic review

#	Grade ¹²	Recommendations	Evidence to Support Recommendations
			<p>& meta-analysis of 36 randomized controlled trials; no apparent effects of non steroidal anti-inflammatory agents on the risk of bleeding after tonsillectomy (Riggin, Ramakrishna, Sommer, & Koren, 2013).</p> <ul style="list-style-type: none"> • Dexamethasone and risk of nausea and vomiting and postoperative bleeding after tonsillectomy in children: a randomized trial (Czarnetzki, et al., 2008). • Perioperative dexamethasone administration and risk of bleeding following tonsillectomy in children: a randomized controlled trial (Gallagher, et al., 2012). • Dexmedetomidine versus morphine or fentanyl in the management of children after tonsillectomy and adenoidectomy: a meta-analysis of randomized controlled trials (He, Cao, Shi, & Zhang, 2013). • Dexamethasone reduces postoperative vomiting and pain after pediatric tonsillectomy (Elhakim, Naglaa, I, Riad, & Refat, 2003). • Impact of perioperative dexamethasone on postoperative analgesia and side-effects: Systematic Review and Meta-analysis (Waldron, et al., 2013). • Tumor lysis syndrome: a systematic review of case series and case reports (Firwana, et al., 2012). • Fatal peri-operative acute tumour lysis syndrome precipitated by dexamethasone (McDonnell, Barlow, Campisi, Grant, & Malkin, 2008).
2.2.2	A	<p>Acetaminophen</p> <p>Administration of acetaminophen is strongly recommended for management of post-operative pain.</p> <p>The maximum recommended intra-operative dose of acetaminophen is 20 mg/kg/dose per rectum. Clinicians and nursing staff should receive education regarding rectal administration of non-rectal doses of acetaminophen.</p> <p>The maximum recommended peri-</p>	<p><u>AAO-HNS Guideline</u></p> <p>This recommendation is consistent with the American Academy of Otolaryngology Clinical Practice Guideline for Tonsillectomy in Children, which states that “rectal administration of medication was better tolerated than oral administration of acetaminophen” (Baugh, et al., 2011).</p> <p><u>Literature Review</u></p>

#	Grade ¹²	Recommendations	Evidence to Support Recommendations
		operative oral dose of acetaminophen is 15 mg/kg.	<p>The evidence base demonstrates that acetaminophen is effective in reducing opioid requirements following surgery. Moreover, “children with adequate analgesia with acetaminophen have less postoperative nausea and vomiting” (Korpela, Korvenoja, & Meretoja, 1999).</p> <p>Intra-operative use of <i>high dose</i> rectal acetaminophen (25-45 mg/kg/dose) has been investigated in several studies, but its routine use remains controversial (Buck, 2011). These studies assessed the pharmacokinetic effects of high dose acetaminophen over a 24 hour period and did not account for continued high dose administration of acetaminophen (Birmingham, et al., 2001).</p> <p>As per the Health Canada Drug Product Database acetaminophen suppositories are available in the following strengths: 120 mg, 160 mg, 325 mg, and 650 mg. For doses that are significantly smaller than commercially available products, acetaminophen infant drops (80 mg/mL) can be given per rectum.</p> <p>The expert consensus is that rectal absorption of acetaminophen may be erratic (Anderson, Kanagasundaram, & Woollard, 1996), (Walson, Halvorsen, Edge, Casavant, & Kelley, 2013). This absorption pattern may be due to several factors including placement of the suppository and the pH within the rectum. Therefore, oral administration may be considered as an option in the peri-operative period as well as the post-operative period if the patient is able to tolerate medications by mouth.</p> <p>The following dosing reference was used to inform the development of this recommendation:</p> <ul style="list-style-type: none"> Acetaminophen (Pediatric and Neonatal Lexi-Drugs) (Lexicomp, c1978-2013).
2.2.3	A	Ketamine Ketamine is not recommended for postoperative pain control in paediatric tonsillectomy/adenoidectomy patients.	<p><u>Literature Review</u></p> <p>Recent meta-analysis of clinical trials that used ketamine as a perioperative analgesic in children found that administration of ketamine was associated with decreased PACU postoperative pain intensity and non-opioid analgesic requirements.</p>

#	Grade ¹²	Recommendations	Evidence to Support Recommendations
			However, ketamine did not decrease opioid requirements post-operatively (Dahmani, et al., 2011).
2.2.4	A	Intra-Operative NSAIDs NSAIDs (excluding ketorolac) can be safely used for the intra-operative management of pain.	<u>AAO-HNS Guideline</u> This recommendation is consistent with the American Academy of Otolaryngology Clinical Practice Guideline for Tonsillectomy in Children, which states that “NSAIDs, ketorolac excluded, can be safely used for the postoperative treatment of pain following tonsillectomy. Post-tonsillectomy hemorrhage rates with ketorolac range from 4.4% to 18%, and therefore ketorolac use should be avoided” (Baugh, et al., 2011). <u>Literature Review</u> A review from the Cochrane Collaboration found that “NSAIDs did not significantly alter the number of peri-operative bleeding events requiring surgical intervention” and that “there was significantly less nausea and vomiting when NSAIDs were used compared to alternative analgesics” (Cardwell, Siviter, & Smith, 2005). This review included 15 clinical trials which compared NSAIDs with other analgesics or placebo and looked at bleeding requiring surgical intervention.
2.2.5	C	Analgesia for patients with known or suspected OSAS Evidence indicates increased sensitivity to narcotics and other anesthetic drugs with central respiratory and sedating effects, among patients with OSAS and obesity. An individualized anesthesia plan should be recommended for this population in order to avoid respiratory function compromise. Of note, the use of opioids, including morphine, hydromorphone and fentanyl, should be minimized in diagnosed or suspected patients with OSAS, as these drugs may cause a dose-dependent reduction of respiratory drive, respiratory rate, and tidal volume that in turn can lead to hypoventilation, hypoxemia, and hypercarbia.	<u>Literature Review</u> This recommendation is consistent with the Consensus Statement from the UK multidisciplinary working party on “Tonsillectomy and adenoidectomy in children with sleep-related breathing disorders”, which states that “children with severe OSA are acutely sensitive to the respiratory depressant effects of opioids and inhalational anaesthetic agents” and that “avoidance or careful titration of opioids is advised” (Robb, et al., 2009). In addition, the following evidence informed the development of this recommendation: <ul style="list-style-type: none"> • Perioperative complications during use of an obstructive sleep apnea protocol following surgery and anesthesia (Bolden, Smith, Auckley, Makarski, & Avula, 2007). • A systemic review of obstructive sleep apnea and its implications for anesthesiologists (Chung,

#	Grade ¹²	Recommendations	Evidence to Support Recommendations
			<p>Yuan, & Chung, 2008).</p> <ul style="list-style-type: none"> • Preoperative and postoperative management of obstructive sleep apnea patients (Mickelson, 2007).

Phase3: Post-Operative

#	Grade ¹³	Recommendations	Evidence to Support Recommendations
3.1 Medication			
3.1.1	A	<p>Acetaminophen, Ibuprofen and Morphine</p> <p>Acetaminophen and morphine are recommended as primary pharmacologic agents for treatment of post-operative pain. Ibuprofen may be used if there are tolerance issues with morphine or if pain control is inadequate with acetaminophen and morphine.</p> <p>Recommended dosing guidelines for <u>routine administered medications</u></p> <ul style="list-style-type: none"> • Acetaminophen: 15 mg/kg/dose PO or PR every 4 to 6 hours as needed (not to exceed 75 mg/kg/day or 4 grams/day, whichever is less). • Ibuprofen: 5-10 mg/kg/dose PO every 6 to 8 hours as needed (not to exceed 40 mg/kg/day or 2.4 grams/day, whichever is less). <p>Administration for breakthrough pain</p> <ul style="list-style-type: none"> • Morphine: Start low and titrate up with small increments.^{14, 15} <ul style="list-style-type: none"> ○ <u>Intravenous</u> Suggested maximum starting dose is 0.05 mg/kg/dose IV q2-4 hours as needed with a usual maximum starting dose of 2.5 to 5 mg/dose. ○ <u>Oral</u> Maximum starting dose is 0.1 to 0.2 mg/kg/dose PO q4-6h as needed with a usual maximum starting dose of 10 mg/dose. 	<p><u>CEAG Consensus (Morphine)</u></p> <p><u>Literature Review</u></p> <p>Acetaminophen and morphine are recommended for the treatment of postoperative pain in tonsillectomy patients. When prescribed within the recommended dosing guidelines, they are safe and effective at relieving postoperative pain. Both morphine and acetaminophen can be administered orally and rectally.</p> <p>The following dosing references were used in the development of this recommendations:</p> <ul style="list-style-type: none"> • Acetaminophen (Pediatric and Neonatal Lexi-Drugs) (Lexicomp, c1978-2013). • Ibuprofen (Pediatric and Neonatal Lexi-Drugs) (Lexicomp, c1978-2013). • Morphine (systemic) (Pediatric and Neonatal Lexi-Drugs) (Lexicomp, c1978-2013). <p>In addition, the following sources informed the development of this recommendation:</p> <ul style="list-style-type: none"> • Assessment and Management of Pain Nursing Best Practice Guideline, from the Registered Nurses Association of Ontario (RNAO, 2007). • Drug Handbook and Formulary from the Hospital for Sick Children (Lau, 2009). • Pediatric Doses of Commonly Prescribed Medications from the Children's Hospital of Eastern Ontario (CHEO, 2011).
3.1.2	A	<p>Codeine</p> <p>Due to the pharmacogenetic variability in the CYP 2D6 enzyme and the unpredictable</p>	<p><u>AAO-HNS Guideline</u></p> <p>This recommendation is consistent with the American Academy of</p>

¹³ The grade of recommendation relates to the strength of the supporting evidence on which the recommendation is based. It does not reflect the clinical importance of the recommendation.

¹⁴ Doses are provided for pediatric patients greater than 6 months of age. Ideal body weight should be used to calculate doses for patients greater than the normal weight for their height.

¹⁵ See cautionary note of increased sensitivity to narcotics and other anesthetic drugs with central respiratory and sedating effects, among patients with obstructive sleep apnea and/or obesity (recommendation #2.2.5)

#	Grade ¹³	Recommendations	Evidence to Support Recommendations
		<p>response to codeine, avoid codeine use in children less than 18 years of age undergoing tonsillectomy or adenoidectomy for the treatment of post-operative pain.</p> <p>In addition to codeine, other opioids that are metabolized by cytochrome P-450 (CYP) 2D6 isoenzyme to active metabolites (for example oxycodone) should be avoided in pediatric patients as genetic polymorphism of CYP2D6 can lead to variations in drug metabolism which, in turn, can lead to variable drug effect. Excluding codeine, the repercussions of this variability have yet to be fully elucidated in the paediatric or adult population.</p>	<p>Otolaryngology Clinical Practice Guideline for Tonsillectomy in Children, which states that “acetaminophen with codeine does not provide superior control of pain compared with acetaminophen only following tonsillectomy either at rest or with swallowing” (Baugh 2011).</p> <p><u>Literature Review</u></p> <p>The activity of codeine depends on CYP2D6 activity and its ability to convert it to morphine. 75% to 92% of the population have normal activity of CYP2D6 and fall into the extensive metabolizers group. The concern is for those individuals who have poor function of CYP2D6, thus experiencing little to no analgesic effect, and the ultra rapid metabolizers that are able to convert codeine into large amounts of morphine, putting them at risk of toxicity.</p> <p>The following sources informed the development of this recommendation:</p> <ul style="list-style-type: none"> • Codeine, ultrarapid-metabolism genotype, and postoperative death (Ciszkowski, Madadi, Phillips, Lauwers, & Koren, 2009). • Pharmacogenetics implementation consortium (CPIC) guidelines for codeine therapy in the context of cytochrome P450 2D6 (CYP2D6) genotype (Crews, et al., 2012). • Pharmacogenetics of codeine metabolism in an urban population of children and its implications for analgesic reliability (Williams, Patel, & Howard, 2002). • No pain relief from codeine? An introduction to pharmacogenomics (Fagerlund & Braaten, 2011). • More codeine fatalities after tonsillectomy in North American children (Kelly, et al., 2012).
3.1.3	D	<p>Cox-2 Inhibitors</p> <p>Cyclooxygenase-2 (COX-2) inhibitors such as celecoxib are not recommended for</p>	<p><u>Literature Review</u></p> <p>In adult patients, celecoxib has an approved indication for short term</p>

#	Grade ¹³	Recommendations	Evidence to Support Recommendations
		postoperative pain control in paediatric patients ¹⁶ .	<p>management of postoperative pain. In children less than 18 years of age, however, the only approved indication is for the treatment of pain associated with juvenile rheumatoid arthritis. Another COX-2 inhibitor, Rofecoxib, has been studied in pediatric postoperative pain as a result of tonsillectomy, but has since been taken off the market due to adverse effects.</p> <p>The following evidence informed the development of this recommendation:</p> <ul style="list-style-type: none"> • Comparative study of acetaminophen-morphine versus rofecoxib-morphine for post-tonsillectomy pain control (Vallée, Carignan, Lafrenaye, & Dorion, 2007). • Post-tonsillectomy pain management in children: can we do better? (Bean-Lijewski, Kruitbosch, Hutchinson, & Browne, 2007). • Dosing celecoxib in pediatric patients with juvenile rheumatoid arthritis (Krishnaswami, et al., 2012). • Celecoxib Product Monograph (Pfizer Inc, 2013).
3.1.4	B	Post-Operative NSAIDs NSAIDs (excluding ketorolac) can be safely used for the management of pain, nausea and vomiting following tonsillectomy.	<u>AAO-HNS Guideline</u> This recommendation is consistent with the <u>AAO-HNS Clinical Practice Guideline for Tonsillectomy in Children</u> (Baugh, et al., 2011). <u>Literature Review</u> Current evidence, including the 2005 review by the Cochrane Anaesthesia Group (Cardwell, Siviter, & Smith, 2005) and the 2013 updated systematic review & meta-analysis of 36 randomized controlled trials from the Journal of Clinical Otolaryngology (Riggin, Ramakrishna, Sommer, & Koren, 2013), indicates that NSAIDs can be considered as a safe method of analgesia among children undergoing tonsillectomy.
3.1.5	A	Antibiotics There is no evidence to support the routine	<u>Literature Review, CEAG Consensus</u> The following studies informed the

¹⁶ Additional research into efficacy and safety of celecoxib is underway, and this recommendation may be updated in the future.

#	Grade ¹³	Recommendations	Evidence to Support Recommendations
		use of antibiotics for infection prevention or to reduce post-operative bleeding. Individual consideration should be taken into account in instances where other co-morbidities may require the use of antibiotics in facilitating post-tonsillectomy recovery.	development of this recommendation: <ul style="list-style-type: none"> Antibiotics to reduce post-tonsillectomy morbidity: A review from the Cochrane Ear, Nose and Throat Disorders Group (Dhiwakar, Clement, Mrinal, & McKerrow, 2012). Cefprozil treatment of persistent and recurrent acute otitis media (Pichichero ME, et al., 1997).
3.2 Post-Discharge Planning and Complication Management			
3.2.1	D	Management of Post-Operative Bleeding Follow-up assessment and potential referral to a paediatrician should be considered in cases of bleeding that require readmission/hospital intervention for investigation of underlying causes of bleeding.	<u>CEAG Consensus</u>
3.2.2	D	Management of Post-Operative Fever Most cases of fever post-tonsillectomy are the result of dehydration based on clinical assessment. Therefore, dehydration should be ruled out as the first approach in children who present to ER after tonsillectomy. Further investigation may be required.	<u>Literature Review, CEAG Consensus</u> In addition to the CEAG consensus, the following study informed the development of this recommendation: <ul style="list-style-type: none"> A study of postoperative fever following paediatric tonsillectomy (Anand, Phillipps, Allen, Joynson, & Fielder, 1999).
3.2.3	C	Guidelines for Observation due to Respiratory Complications Consideration should be given to an extended period of post-operative observation if there is a significant co-morbidity, which may include: <ul style="list-style-type: none"> Age <2 Obesity (body mass index > 2.5 standard deviation scores or > 99th percentile for age and gender) OSAS without pulmonary hypertension or co-morbidities Sickle cell anemia Carbon dioxide retention 	<u>Literature Review</u> The following evidence informed the development of this recommendation: <ul style="list-style-type: none"> Clinical Practice Guideline: Diagnosis and management of childhood obstructive sleep apnea syndrome (Marcus, et al., 2012). Tonsillectomy and Adenoidectomy in Children with Sleep-Related Breathing Disorders: Consensus Statement of a UK Multidisciplinary Working Party (Robb, et al., 2009).
3.2.4	C	Guidelines for Pre-op Referral to due Respiratory Complications Consideration should be given to referral to a tertiary centre if there is a significant co-morbidity, which may include: <u>As outlined in the Consensus Statement of a</u>	<u>Literature Review</u> The following evidence informed the development of this recommendation: <ul style="list-style-type: none"> Clinical Practice Guideline: Diagnosis and management of childhood obstructive sleep apnea

#	Grade ¹³	Recommendations	Evidence to Support Recommendations
		<p><u>UK Multidisciplinary Working Party:</u></p> <ul style="list-style-type: none"> • Down syndrome • Significant craniofacial anomalies • Significant co-morbidity such as congenital heart disease, chronic lung disease • ECG or echocardiographic abnormalities • Hypotonia or neuromuscular disorders (moderately or severely affected) <p><u>Other indications based on the CEAG consensus</u></p> <ul style="list-style-type: none"> • Age < 18 months • Age <3 yrs PLUS pulmonary hypertension OR significant co-morbidity • Failure to thrive due to severe OSAS (described by polysomnographic indices including Obstructive Index > 10, Respiratory Disturbance Index > 40, and Oxygen saturation nadir < 80%) • Severe cerebral palsy • Mucopolysaccharidosis and syndromes associated with a difficult airway 	<p>syndrome (Marcus, et al., 2012).</p> <ul style="list-style-type: none"> • Tonsillectomy and Adenoidectomy in Children with Sleep-Related Breathing Disorders: Consensus Statement of a UK Multidisciplinary Working Party (Robb, et al., 2009).
3.2.5	D	<p>Guidelines for Hospital Admission due to Respiratory Complications Post-Operatively</p> <p>An individualized approach to hospital admission is recommended for patients who experience respiratory complications post-tonsillectomy.</p>	<u>CEAG Consensus</u>
3.3 Patient and Parental/Caregiver Education			
3.3.1	C	<p>Post-Operative Pain Management Counseling</p> <p>The following topics should be incorporated into the routine post-operative counseling on pain management:</p> <p><u>Dosing instructions and timing</u></p> <ul style="list-style-type: none"> • Clinicians / Anaesthesia should ensure thorough communication regarding the doses and timing of analgesics given pre- and intra-operatively with nursing and parents to ensure adequate pain relief while not exceeding maximum safe dosages. Specifically, parents should receive 	<p><u>SIGN Guideline</u></p> <p>This recommendation is consistent with the SIGN Guidelines which state that “patients/carers should be given written and oral instruction prior to discharge from hospital on the expected pain profile and the safety profile of the analgesic(s) issued with particular reference to appropriate dose and duration of use” (Scottish Intercollegiate Guidelines Network, 2010).</p> <p><u>Literature Review</u></p> <p>The following studies informed the</p>

#	Grade ¹³	Recommendations	Evidence to Support Recommendations
		<p>written communication regarding the name, dose and timing of each medication given to the child before discharge. Parents should be instructed to keep a record of the type of pain medication they give and the times it is given. Documentation should include their assessment of the effectiveness of the medication.</p> <ul style="list-style-type: none"> Parents should be warned that the child may experience pain and refuse to return to normal activities for at least 7 days following surgery (Stewart, Ragg, Sheppard, & Chalkiadis, 2012). Pain may interfere with fluid intake leading to dehydration. If the pain does not improve or starts to increase with intensity, parents should follow the action plan that they have been given¹⁷. <p><u>Mixing food with medication</u></p> <ul style="list-style-type: none"> Clear instructions should be provided for parents who wish to mix their child's medication with food. Mixing medication with food is not recommended because it may prevent the child from getting the full dose. Parent should be instructed to administer medication that is not mixed with food which can then be followed <u>by food</u>. <p><u>Medication Side-Effects</u></p> <ul style="list-style-type: none"> Parents should be reassured that although Morphine is a potent drug their child is prescribed a dose which is safe to use for their child after tonsillectomy. Side-effects of morphine should be reviewed to address parental concerns. <p><u>Pain Scale</u></p> <ul style="list-style-type: none"> A universal pain scale handout should be provided to parents. This tool should work for any age group and for parents of varying levels of education. Instruction must be provided regarding how to use and interpret the scale in order to assess post-operative pain management following discharge. <p><u>Homeopathic and/or naturopathic medications</u></p> <ul style="list-style-type: none"> If parents are giving homeopathic 	<p>development of this recommendation:</p> <ul style="list-style-type: none"> A Position Statement from the Canadian Paediatric Society, Drug Therapy and Hazardous Substances Committee: Children and natural health products: What a clinician should know (Vohra & Clifford, 2005). A Position Statement from the Canadian Paediatric Society: Homeopathy in the paediatric population (Spiegelblatt, 2005). A review from the Cochrane Collaboration: Oral rinses, mouthwashes and sprays for improving recovery following tonsillectomy (Fedorowicz, Al-Muharraqi, Nasser, Al-Harthy, & Carter, 2011). A single-blinded, randomized, controlled trial: The use of ice-llolies for pain relief post-paediatric tonsillectomy (Sylvestre, Rafferty, Bew, & Knight, 2011). A randomized clinical trial: Parental assessment and management of children's postoperative pain (Unsworth, Franck, & Choonara, 2007). <p>In addition, various counseling resources developed by provincial facilities were reviewed by the CEAG during their deliberations</p>

¹⁷ See Recommendation #3.3.3.

#	Grade ¹³	Recommendations	Evidence to Support Recommendations
		<p>and/or naturopathic medications to the child, they should obtain a detailed description of the medication from the prescriber listing ingredients and the side effect profile and bring this to their physician.</p> <ul style="list-style-type: none"> • Homeopathic and/or naturopathic medications should not be mixed with prescription medications without prior consultation with a physician and/or pharmacist. <p><u>Oral Rinses and non-pharmacological alternatives</u></p> <ul style="list-style-type: none"> • Certain rinses such as hydrogen peroxide may not be effective and are potentially dangerous, particularly in younger children who are unable to rinse and spit out the solution. The following non-pharmacological options to keep the pharynx moist and thereby decrease pain are recommended: ice chips, freezies¹⁸, ice cream. 	
3.3.2	D	<p>Other Post-Operative Counseling Topics</p> <p>In addition to the information regarding pain management strategies outlined in the previous recommendation, parents / caregivers should be given instructions regarding nutrition, hydration, mouth care and appropriate level of activity. Of note, the importance of adequate liquid intake should be reinforced <i>in order to prevent dehydration</i> after surgery:</p> <p><u>Nutrition & Hydration</u></p> <ul style="list-style-type: none"> • <u>The link between appropriate pain management and hydration should be emphasized.</u> • Information regarding the appropriate post-operative diet, including the list of foods that should be avoided (e.g. hot, spicy, acidic or dry foods that might irritate the throat such as toast, crackers, tomatoes, orange juice and lemonade). • Information regarding the importance of hydration, including the list of liquids that should be avoided (e.g.: hot liquids, acidic liquids, citrus juices etc) <p><u>Mouth Care</u></p> <ul style="list-style-type: none"> • Information regarding the importance of appropriate mouth care, including 	<u>CEAG Consensus</u>

¹⁸ Snacks of frozen flavored sugar water, fruit juice or fruit purée in a plastic tube.

#	Grade ¹³	Recommendations	Evidence to Support Recommendations
		<p>rinsing and gentle tooth brushing, should be provided. Gargling and/or swishing anything around in the back of the throat is not recommended.</p> <p><u>Activity</u></p> <ul style="list-style-type: none"> Information regarding the appropriate level of activity, including bathing, should be provided. Rough sports or contact sports that may affect the throat are not recommended. Post-operative complications, particularly bleeding, are most likely to occur in the 2 weeks after surgery. Therefore, parents should be advised not take their child on long trips during this time. 	
3.3.3	D	<p>Action Plan for Parents/Caregivers</p> <p>An Action Plan for Parents/Caregivers should be developed in order to facilitate appropriate management of post-operative complications including bleeding, fever, nausea and pain.</p> <p>Relevant contact information should be provided to ensure an effective 24/7/365 response, particularly in cases of bleeding and/or fever that require hospital intervention. The information that is provided should specify if the number to call varies according to hour or day. Depending on the facility, this may include a number of avenues, including a “Number to Call” at the hospital, Emergency Department, or a family physician. It is recommended that families remain within 1 hour travel-time from an acute care facility for a period of 14 days.</p>	<p><u>SIGN Guidelines</u></p> <p>This recommendation is consistent with the SIGN Guidelines which state that “at the time of discharge, patients/carers should be provided with written information advising them whom to contact and at what hospital unit or department to present if they have postoperative problems or complications” (Scottish Intercollegiate Guidelines Network, 2010).</p> <p><u>Literature Review, CEAG Consensus</u></p> <p>The following studies informed the development of this recommendation:</p> <ul style="list-style-type: none"> A randomized clinical trial of a nurse telephone follow-up on paediatric tonsillectomy pain management and complications (Paquette J, 2013). Follow-up phone calls after pediatric ambulatory surgery for tonsillectomy: what can we learn from families? (Le, Drolet, Parayno, C, & Castiglione, 2007).

Other Considerations

The CEAG identified a number of gaps in the evidence that are high value candidates for future evidence-based analyses:

Cox-2 Inhibitors

- Additional studies are needed to support the safety and efficacy of celecoxib use in paediatric tonsillectomy patients.

Diagnosis of OSAS

- Future research is recommended to evaluate the effectiveness of home-based sleep studies for diagnosis of OSAS in paediatric patients.
- Future research is recommended to evaluate the use of home videos to confirm the presence of OSAS in paediatric patients.
- Future research is recommended to establish acceptable definitions of mild, moderate and severe OSAS.

5.0 Implementation of Best Practices

How should best practices be implemented to ensure standardized and optimal patient care? How can organizations/communities tailor the recommended patient clinical pathways and best practices to their local circumstances?

Organizations and communities will have the flexibility to identify areas of the pathway that will require customization to their circumstances. In addition, they will be able to identify the most appropriate health care practitioner for the various parts of the pathway for their situation.

Successful implementation will require the development of partner relationships with all involved in the pathway (both within the hospital and between the hospital and community health care providers).

Describe the roles of the clinicians and multi-disciplinary teams in implementing the best practices

Clinicians and multi-disciplinary teams will be critical in implementing the QBP. Their role is to determine the best way to implement the QBP in their unique environment, comparing current practice to the recommendations, identifying areas for improvement, developing strategies to get to best practice and ensuring optimal environments for care. Internal processes would have to be aligned with the recommendations provided in this Handbook in order to ensure institution-level uptake.

Describe data management implications (if applicable)

As mentioned previously in the Evidence-Based Framework section, data collection and reporting infrastructure is currently in place.

6.0 Implications for Multi-Disciplinary Teams

Will the QBP have any implication for multidisciplinary teams? Describe the immediate and/or long-term impact on physicians, nurses, allied health, health records, etc.

A successful implementation of this QBP will require an inter-disciplinary approach, with collaboration among the Surgical Team, Anaesthesia, Nursing, and Pharmacy. The involvement and support of hospital administrators, medical staff leadership, and health care providers is essential.

How does it align with clinical practice? Will it change current clinical practice?

This QBP will help reduce variability in practice and clinical outcomes across the province.

7.0 Service Capacity Planning

Will be provided by the Ministry of Health and Long-Term Care.

8.0 Performance Evaluation and Feedback

The following are the proposed evaluation metrics for the paediatric QBP on tonsillectomy with and without adenoidectomy:

Evaluation Metric	Domain	Relevance	Rational	Feasibility/ Data Source
Currently Available / For Immediate implementation				
1 Number of ED visits and/or readmissions and due to hemorrhage broken down by: <ul style="list-style-type: none"> Age: 0-3, 4-10, and 11-18 years. Time frame: within 24 hours, 48 hours, 7 days, 14 days and 28 days. 	Effectiveness Appropriateness	Clinicians Administrators LHINS	To measure variation in practice across hospitals	DAD, NACRS
2 Number of ED visits and/or readmissions due to dehydration broken down by: <ul style="list-style-type: none"> Age: 0-3, 4-10, and 11-18 years. Time frame: within 24 hours, 48 hours, 7 days, 14 days and 28 days. 	Effectiveness Appropriateness	Clinicians Administrators LHINS	To measure variation in practice across hospitals	DAD, NACRS
3 Number of ED visits and/or readmissions due to pain broken down by: <ul style="list-style-type: none"> Age: 0-3, 4-10, and 11-18 years. Time frame: within 24 hours, 48 hours, 7 days, 14 days and 28 days. 	Effectiveness Appropriateness	Clinicians Administrators LHINS	To measure variation in practice across hospitals	DAD, NACRS
4 Percentage of Inpatient vs. Same Day Surgeries	Effectiveness Efficiency	Administrators LHINS	To measure variation in practice across hospitals	DAD, NACRS
For Future Development				
5 Percentage of planned vs. unplanned admissions broken down by reason for admission	Access Appropriateness Integration	Administrators LHINS	To investigate increasing need for diagnostic tools (e.g.: sleep study)	Provider databases
6 Appropriate administration of dexamethasone	Effectiveness Appropriateness	Clinicians Administrators LHINS	To measure variation in practice across hospitals	Provider databases
7 Inappropriate administration of antibiotics	Effectiveness Appropriateness	Clinicians Administrators	To measure variation in	Provider databases

Evaluation Metric		Domain	Relevance	Rational	Feasibility/ Data Source
8	Inappropriate administration of codeine	Effectiveness Appropriateness	LHINS	practice across hospitals	Provider databases
			Clinicians Administrators LHINS	To measure variation in practice across hospitals	

9.0 Support for Change

The ministry, in collaboration with its partners, will deploy a number of field supports to support adoption of the funding policy. These supports include:

- Committed clinical engagement with representation from cross-sectoral health sector leadership and clinicians to champion change through the development of standards of care and the development of evidence-informed patient clinical pathways for the QBPs.
- Dedicated multidisciplinary clinical expert group that seek clearly defined purposes, structures, processes and tools which are fundamental for helping to navigate the course of change.
- Strengthened relationships with ministry partners and supporting agencies to seek input on the development and implementation of QBP policy, disseminate quality improvement tools, and support service capacity planning.
- Alignment with quality levers such as the Quality Improvement Plans (QIPs). QIPs strengthen the linkage between quality and funding and facilitate communication between the hospital board, administration, providers and public on the hospitals' plans for quality improvement and enhancement of patient-centered care.
- Deployment of a Provincial Scale Applied Learning Strategy known as IDEAS (Improving the Delivery of Excellence Across Sectors). IDEAS is Ontario's investment in field-driven capacity building for improvement. Its mission is to help build a high-performing health system by training a cadre of health system change agents that can support an approach to improvement of quality and value in Ontario.

We hope that these supports, including this Clinical Handbook, will help facilitate a sustainable dialogue between hospital administration, clinicians, and staff on the underlying evidence guiding QBP implementation. The field supports are intended to complement the quality improvement processes currently underway in your organization.

10.0 Membership

Paediatric Tonsillectomy with and without Adenoidectomy QBP Clinical Expert Advisory Group			
Name	Job title	Organization	LHIN
Murad Husein	Paediatric Otolaryngologist, Co-chair	London Health Sciences Centre	2
Brian Hughes	Otolaryngologist	Stratford	2
Dominic Langley	Manager, Decision Support	London Health Sciences Centre	2
Marina Bayer	RN; Education Practice Lead - Paediatrics	Grand River Hospital	3
Michael Parrish	Paediatric Anesthesiologist	McMaster Childrens' Hospital	4
Laurene Boynton	Clinical Nurse Educator, Paediatrics	William Osler Health System	5
Sandra Vojvodich	Otolaryngologist	Trillium Health Partners	6
Evan Propst	Paediatric Otolaryngologist	The Hospital for Sick Children	7
Rick Fox	Otolaryngologist	St. Josephs Health Centre	7
Sanjay Mahant	Paediatrician	The Hospital for Sick Children	7
Marina Strzelecki	Clinical Pharmacist	The Hospital for Sick Children	7
Everton Gooden	Otolaryngologist, Co-chair	North York General Hospital	8
Akhter Hamid	Paediatrician	Rouge Valley Health System	9
Melinda Lorenzo Fleming	Anesthesiologist	Kingston General Hospital/ Hotel Dieu Hospital	10
Johnna MacCormick	Paediatric Otolaryngologist	Children's Hospital of Eastern Ontario	11
Natalie Dayneka	Clinical Pharmacist	Children's Hospital of Eastern Ontario	11
Kenny Ngo	Otolaryngologist	Orillia Soldiers' Memorial Hospital	12
Kierston Miron	RN; Clinical Educator for Mat/Child and Surgical Program	Sault Area Hospital	13
Secretariat			
Marilyn Booth	Executive Director	PCMCH	
Anna Shynlova- Bucciarelli	Senior Project Manager	PCMCH	
ICES			
Astrid Guttman	Senior Scientist	ICES	
Nadia Gunraj	Epidemiologist	ICES	

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