Concussion

Quality Measurement Set

Approved by the Concussion Quality Measurement Work Group on July 6, 2020. Approved by the AAN Quality Measure Subcommittee on July 17, 2020. Approved by the AAN Quality Committee on August 17, 2020. Approved by the American Academy of Neurology Institute Board of Directors on September 4, 2020.

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Table of Contents

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Improving Outcomes for Patients with Concussion

Rationale for Measures

In 2018, the American Academy of Neurology Institute (AANI) formed the Concussion Work Group to review existing guidelines, current evidence, and gaps in care in order to develop a measurement set for neurologists that promotes quality improvement and drives better outcomes for patients with concussion.

Measure Development Process

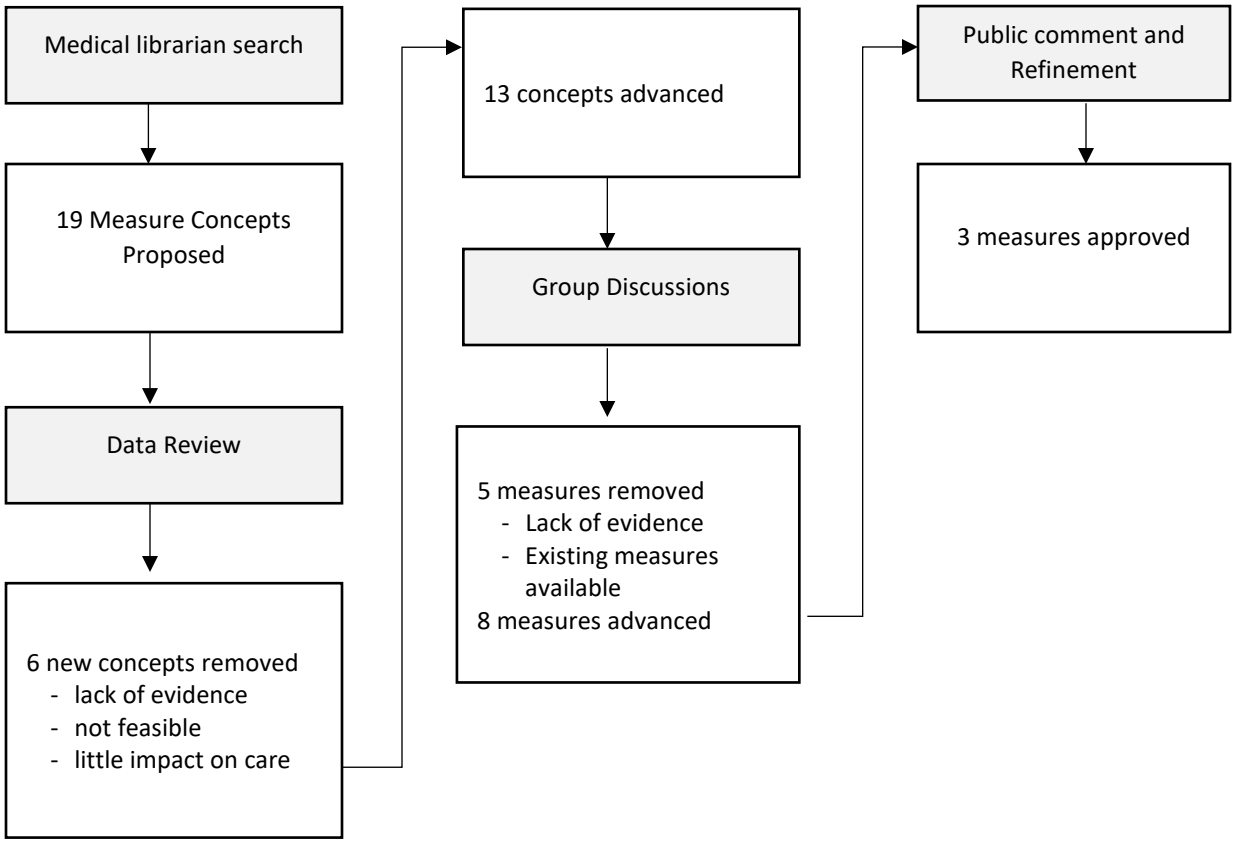
The AANI develops quality measures based on the belief that specialists should play a leading role in selecting and creating measures that will drive performance improvement and possibly be used in accountability programs in the future. All members of the Work Group were required to disclose financial relationships with industry and other entities to avoid actual, potential, or perceived conflicts of interest.

The Quality Measure Subcommittee (QMS) approved a new measure set concept around concussion. The QMS commissioned a work group comprised of AAN members as well as members of other specialty societies that care for patients with concussion. A facilitator from QMS was appointed to oversee the methodology. This Work Group was tasked with reviewing literature and proposing draft concepts for concussion management.

A series of virtual meetings was held to discuss and refine the measure concepts. The Work Group voted to approve or not approve each proposed measure.

Following the virtual meetings, measures were further refined and posted for public comment. The Work Group reviewed and responded to all of the public comments and refined the measures when feasible, and additional evidence was requested from respondents based upon their suggestions when not feasible. After the measures have been finalized, the Work Group votes to approve or not approve the whole measurement set. If approved by the Work Group, AANI staff facilitate internal AANI approvals. The Work Group drafts a manuscript which is an executive summary of the measurement set that is submitted for potential publication in *Neurology*. AAN measures undergo a maintenance review every three years.

Below is an illustration of the measure development process from proposals, discussion, research, evaluation, to approval.



Importance and Prevalence of Concussion

Concussion represents the immediate and transient symptoms of a mild traumatic brain injury, [1] and is defined as a clinical syndrome of biomechanically induced alteration of brain function[2]. The term "concussion" is often used interchangeably with "mild traumatic brain injury", and clear distinctions between the two are not widely agreed upon[1].

1.1-1.9 million sports and recreation-related concussions occur in children each year in the United States, although many are not seen in a health care setting[3]. Approximately 1 million outpatient clinic and emergency department visits for minor head injury in children occur annually in the United States, with an additional 1 million adults[4]. Concussion can occur in any age group, from early childhood through late adulthood, with the highest incidence in children age 10-19[5]. Much of the existing research on concussion has focused on sports-related concussion. Indeed, most of the published guidelines and consensus statements pertain specifically to sports-related concussion[1,2,6-8]. However, only half of pediatric ED visits for concussion are sport-related[9]. There appear to be sex differences in concussion incidence and recovery. In sports with similar rules between sexes (e.g., basketball, soccer), females have a higher risk of concussion than males[10]. Additionally, females have higher risk of prolonged symptoms[1,11].

While the majority of adults with concussion will return to pre-injury levels of symptoms and functioning within 14 days, considerable variability in recovery exists. Children often take longer than adults to recover[1]. Approximately 20-30% of children continue to have symptoms longer than 1 month[11,12]. Persistent post-concussion symptoms are associated with significant morbidity; children with persistent symptoms report lower quality of life than many other childhood chronic diseases including cancer, end-stage renal disease, and cerebral palsy[13].

Concussion remains a clinical diagnosis, inevitably involving some degree of subjectivity and uncertainty. An objective biomarker has not been established for the diagnosis or management of concussion. While the objective evidence regarding most aspects of concussion care is quite limited, several consensus statements and evidence-based guidelines are available to guide management[1,2,6-8,14].

2019 Concussion Measurement Set

The following measures were approved by the Work Group. There is no requirement that all measures in the measurement set be used. Providers are encouraged to identify the one or two measures that would be most meaningful for their patient populations and implement these measures to drive performance improvement in practice.

Concussion symptoms evaluation
Appropriate neurological exam
Documentation of return to play strategy or protocol

Other Potential Measures

The measures developed are a result of a consensus process. Work Group members are given an opportunity to submit new measures in advance of virtual meetings where all measures are reviewed and edited individually. The Work Group felt the following concepts were not ready for development at this time due to lack of strong evidence in a neurology population, difficulty locating data elements needed for measurement, existence of similar measures, or lack of known gaps in treatment. The Work Group recommends these concepts be revisited when this measurement set is updated in 3 years.

- Pediatric patients evaluated by use of PECARN algorithm prior to CT imaging
- Patients evaluated with New Orleans or Canadian CT rules prior to CT brain for concussion
- Patients that were symptom free without medication for 24 hours before starting return to play strategy
- Patients counseled to rest for first 48-72 hours then begin gradual return to cognitive and physical activity
- Patients offered supervised exercise
- Patients completing supervised exercise and given exercise guidance

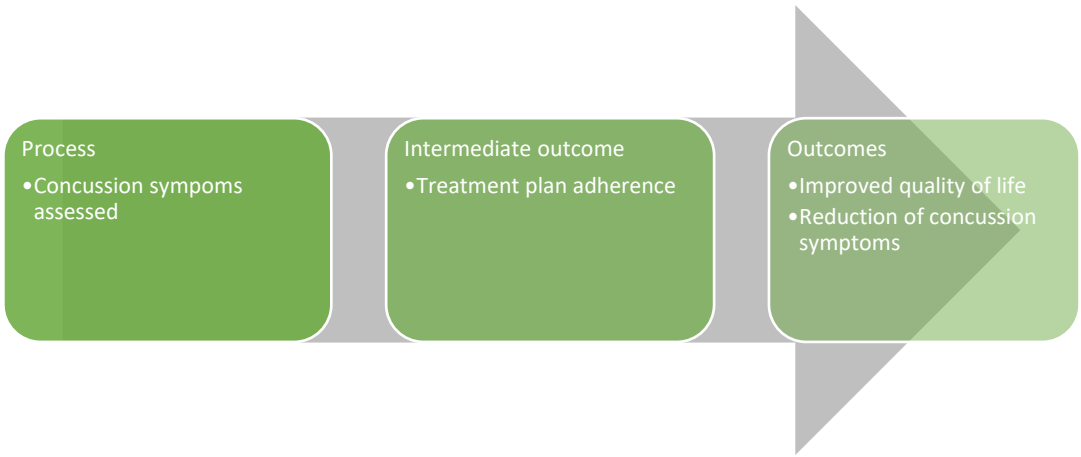
- Referral to multi-disciplinary concussion clinic
- Patients screened for depression with a validated tool
- Patients screened for depression with a validated tool at initial visit
- Patients who received a CT scan at initial visit
- Patients with headache who were offered a guideline recommended therapy

Measure Harmonization

The Work Group searched for existing measures on concussion and found no existing measures. The AAN advocates for reducing duplicative measures when possible.

Measure Title	Concussion symptoms evaluation completed

Description	Percentage of patients 5 years of age and older diagnosed with concussion who had a symptom evaluation completed at the initial visit	
Measurement Period	January 1, 20xx to December 31, 20xx	
Eligible Population	**Eligible Providers**	Medical Doctor (MD), Doctor of Osteopathy (DO), Physician Assistant (PA), Advanced Practice Registered Nurse (APRN)
	Care Setting(s)	Outpatient
	Ages	≥ 5 years of age
	Event	Office visit
	Diagnosis	Concussion
Denominator	All patients ≥ 5 years of age diagnosed with concussion	
Numerator	Patients who had a symptom evaluation^ completed at initial visit ^Evaluation tools for use in this measure include: • Child Sport Concussion Assessment Tool (Child-SCAT) • Health and Behavior Inventory (HBI) • Post-concussion Symptom Inventory (PCSI) • Post Concussion Symptoms Scale (PCSS) • Rivermead Postconcussive Symptom Questionnaire (RPQ) • Sport Concussion Assessment Tool (SCAT) These tools may change over time. You can find the up to date list of appropriate tools on the NINDS Common Data Elements website.	
Required Exclusions	None	
Allowable Exclusions	• Patient and/or caregiver unable to report symptoms (non-verbal) • Patient and/or caregiver refusal	
Exclusion Rationale	Patients and/or their caregivers need to be able to communicate symptoms. Patients and their caregivers have the right to refuse.	
Measure Scoring	Percentage	
Interpretation of Score	Higher Score Indicates Better Quality	
Measure Type	Process	
Level of Measurement	Provider	
Risk Adjustment	N/A	

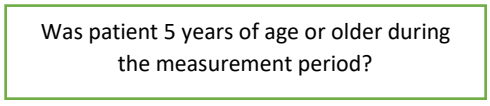
For Process Measures Relationship to Desired Outcome	
Opportunity to Improve Gap in Care	McCrory et al. state that "SRC [sports related concussion] is considered to be among the most complex injuries in sports medicine to diagnose, assess and manage."[1] Symptom evaluations assist a provider in identifying and subsequently managing the symptoms of concussion as they arise so the patient can return to baseline and resume regular activity. Evaluation tools for use in this measure include: • Child Sport Concussion Assessment Tool (Child-SCAT) Cost: Free https://bjsm.bmj.com/content/bjsports/early/2017/04/26/bjsports-2017-097492childscat5.full.pdf • Health and Behavior Inventory (HBI) Cost: Free • Post-concussion Symptom Inventory (PCSI) Cost: $29-39 for forms, $229-359 for startup kits https://www.parinc.com/Products/Pkey/6528 • Post Concussion Symptoms Scale (PCSS) Cost: Free https://impacttest.com/wp-content/uploads/Post-Concussion-Symptom-Scale.pdf • Rivermead Postconcussive Symptom Questionnaire (RPQ) Cost: Free http://www.tbi-impact.org/cde/mod_templates/12_F_06_Rivermead.pdf Symptom evaluation tools have not been linked to improved outcomes. These tools are a springboard for the caregiver to discuss patient symptoms and track them over time. Symptom evaluation tools should not be used by themselves to manage concussion but should be used to make treatment decisions. Treatment for concussion varies widely and we cannot recommend a treatment follow-up component for this measure at this time.
Harmonization with Existing Measures	No existing measures known
References and Supporting Evidence	1. McCrory P, Meeuwisse W, Dvorak J, et al. Consensus statement on concussion in sport-the 5th international conference on concussion in sport held in Berlin, October 2016. Br J Sports Med. 2017 Jun;51(11):838-47. 2. Lumba-Brown A, Yeates K, Sarmiento K, et al. Centers for Disease Control and Prevention Guideline on the Diagnosis and Management of Mild Traumatic Brain Injury Among Children. JAMA Pediatrics 2018; 172(11): e182853. 3. Giza C, Kutcher J, Ashwal S, et al. Summary of evidence-based guideline update: Evaluation and management of concussion in sports. Neurology 2013; 80:2250-2257.

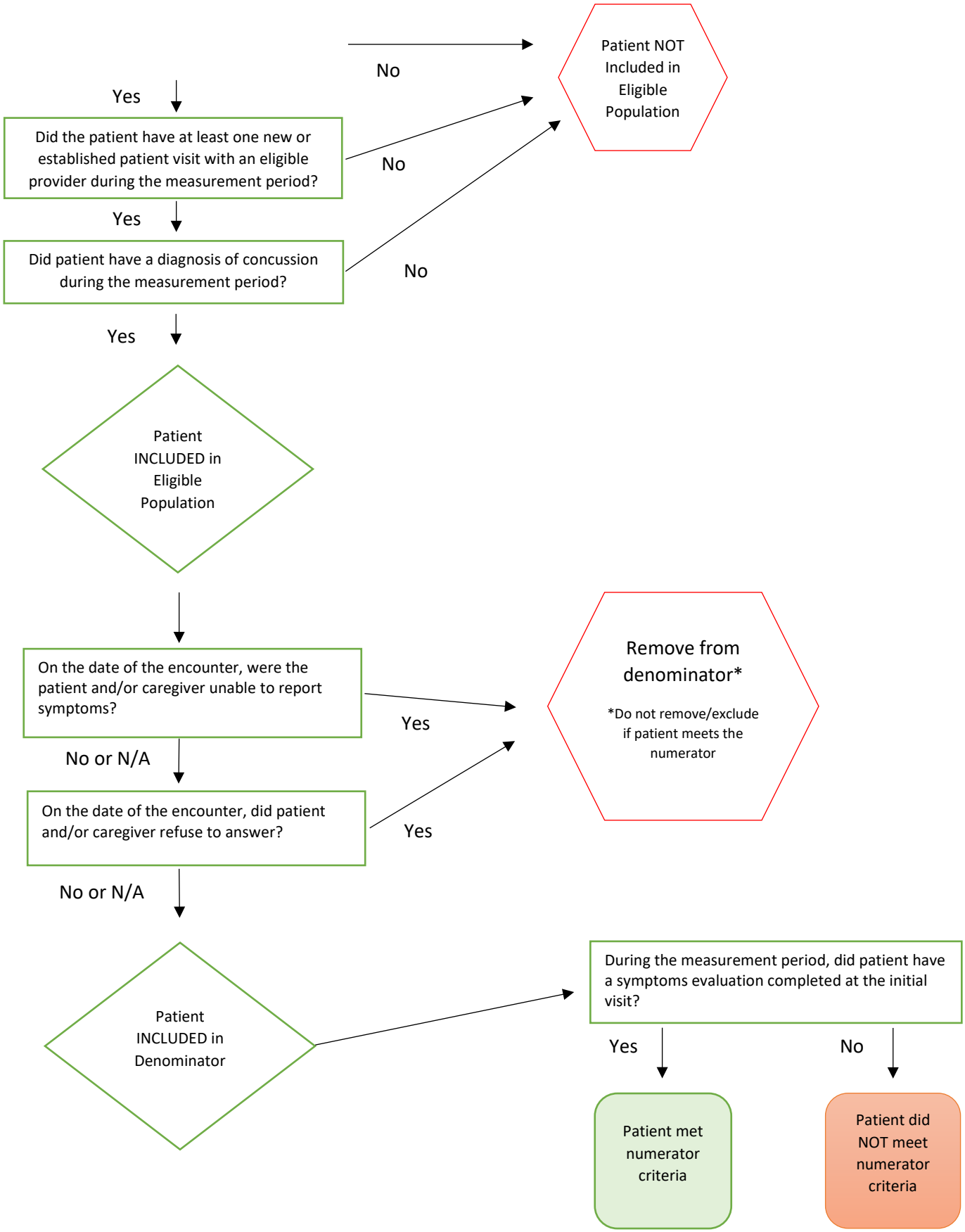
	4. The Management of Concussion-mild Traumatic Brain Injury Working Group. VA/DoD Clinical Practice Guideline for the Management of Concussion-Mild Traumatic Brain Injury. 5. The Management of Concussion-mild Traumatic Brain Injury Working Group. VA/DoD Clinical Practice Guideline for the Management of Concussion-Mild Traumatic Brain Injury. 6. Purcell L, Canadian Paediatric Society, Healthy Active Living and Sports Medicine Committee. Sport-related concussion: Evaluation and management. Paediatr Child Health 2014; 19:153-158. 7. Marshall S, Bayley M, McCullagh S, et al. Updated clinical practice guidelines for concussion/mild traumatic brain injury and persistent symptoms. Brain Injury 2015; 29:688-700. 8. Halstead M, Walter K, Moffatt K, and Council on Sports Medicine and Fitness. Sport-related concussion in children and adolescents. Pediatrics 2018; 142: e20183074.

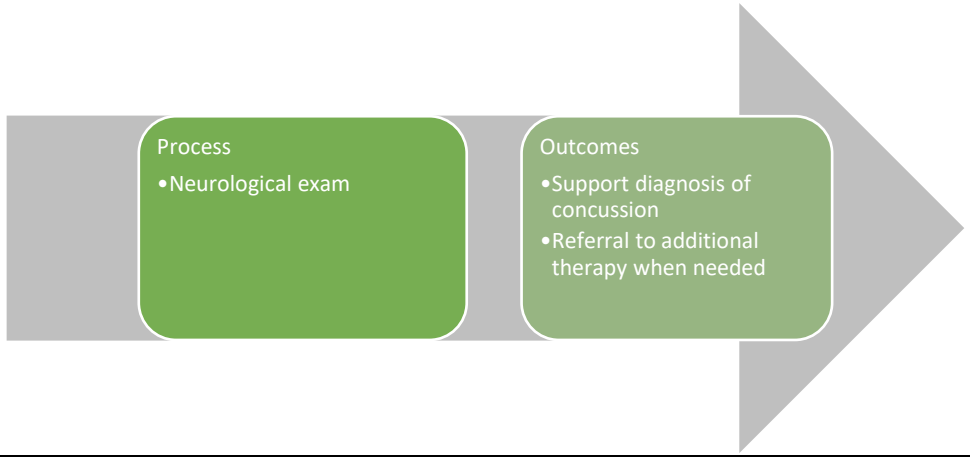
Code System	Code	Code Description

Initial Population		
CPT	99201-99205	Office or other outpatient visit 10, 20, 30, 45, or 60 minutes for the evaluation and management of a new patient
CPT	99211-99215	Office or other outpatient visit 5, 10, 15, 25, or 40 minutes for the evaluation and management of an established patient
Denominator		
ICD-10	S06.0X0A	Concussion without loss of consciousness, initial encounter
ICD-10	S06.0X0D	Concussion without loss of consciousness, subsequent encounter
ICD-10	S06.0X0S	Concussion without loss of consciousness, sequela
ICD-10	S06.0X1A	Concussion with loss of consciousness of 30 minutes or less, initial encounter
ICD-10	S06.0X1D	Concussion with loss of consciousness of 30 minutes or less, subsequent encounter
ICD-10	S06.0X1S	Concussion with loss of consciousness of 30 minutes or less, sequela
ICD-10	S06.0X9A	Concussion with loss of consciousness of unspecified duration, initial encounter
ICD-10	S06.0X9D	Concussion with loss of consciousness of unspecified duration, subsequent encounter
ICD-10	S06.0X9S	Concussion with loss of consciousness of unspecified duration, sequela
SNOMED	110030002	Concussion injury of brain (disorder)
SNOMED	62564004	Concussion with loss of consciousness (disorder)
SNOMED	62106007	Concussion with no loss of consciousness (disorder)
SNOMED	209828001	Concussion with 1-24 hours loss of consciousness (disorder)
SNOMED	209827006	Concussion with less than 1 hour loss of consciousness (disorder)
SNOMED	209829009	Concussion with more than 24 hours loss of consciousness and return to pre-existing conscious level (disorder)
SNOMED	209830004	Concussion with more than 24 hours loss of consciousness without return to pre-existing conscious level (disorder)
Numerator		
Numerator is met by documenting one of the following symptom evaluations was completed at the initial visit: • Child Sport Concussion Assessment Tool (Child-SCAT) • Health and Behavior Inventory (HBI) • Post-concussion Symptom Inventory (PCSI) • Post Concussion Symptoms Scale (PCSS) • Rivermead Postconcussive Symptom Questionnaire (RPQ) *There are not currently any codes for these questionnaires.		
Exclusions		
SNOMED	413312003	Patient non-compliant – refused service (situation)
SNOMED	288576002	Unable to communicate (finding)

Flow Chart Diagram: Concussion symptoms evaluated




Patient NOT Included in Eligible Population
No
Yes
Did the patient have at least one new or established patient visit with an eligible provider during the measurement period?
No
Yes
Did patient have a diagnosis of concussion during the measurement period?
No
Yes
Patient INCLUDED in Eligible Population
Remove from denominator*
*Do not remove/exclude if patient meets the numerator
On the date of the encounter, were the patient and/or caregiver unable to report symptoms?
Yes
No or N/A
On the date of the encounter, did patient and/or caregiver refuse to answer?
Yes
No or N/A
Patient INCLUDED in Denominator
During the measurement period, did patient have a symptoms evaluation completed at the initial visit?
Yes
No
Patient met numerator criteria
Patient did NOT meet numerator criteria

Measure Title	Appropriate neurological exam	
Description	Percentage of patients aged 5 years and older diagnosed with concussion seen for an initial visit who had a neurological exam performed that included all components: 1) cervical assessment, 2) cognitive function, 3) vestibular function, 4) extraocular movements, 5) gait, 6) balance, and 7) coordination.	
Measurement Period	January 1, 20xx to December 31, 20xx	
Eligible Population	**Eligible Providers**	Medical Doctor (MD), Doctor of Osteopathy (DO), Physician Assistant (PA), Advanced Practice Registered Nurse (APRN)
	Care Setting(s)	Outpatient, Inpatient, Emergency Department
	Ages	≥ 5 years of age
	Event	Office visit, admission to inpatient unit, emergency department visit
	Diagnosis	Concussion
Denominator	Patients ≥ 5 years of age diagnosed with concussion seen for an initial visit	
Numerator	Patients who had a neurological exam that included all components: 1) Cervical assessment 2) Cognitive function 3) Vestibular function 4) Extraocular movements 5) Gait 6) Balance 7) Coordination	
Required Exclusions	None	
Allowable Exclusions	• Patient and/or caregiver refusal • Patients unable to participate in a neurological exam	
Exclusion Rationale	Certain patients might not be able to undergo an aspect of a neurological exam. Patients and/or their caregivers have the right to refuse a neurological exam.	
Measure Scoring	Percentage	
Interpretation of Score	Higher Score Indicates Better Quality	
Measure Type	Process	
Level of Measurement	Provider	
Risk Adjustment	N/A	
For Process Measures Relationship to Desired Outcome		

Opportunity to Improve Gap in Care	Concussion is a clinical diagnosis. If exam abnormalities are consistent with concussion, they should be tracked over time to monitor for resolution. McCrory et al. recommend that the key features of an exam should include a neurological examination which should encompass "mental status, cognitive functioning, sleep/wake disturbance, ocular function, vestibular function, gait and balance."[1] A general neuro exam to exclude spine and brain injury should be completed as part of the initial evaluation for concussion.
Harmonization with Existing Measures	No existing measures known
References and Supporting Evidence	1. McCrory P, Meeuwisse W, Dvorak J, et al. Consensus statement on concussion in sport-the 5th international conference on concussion in sport held in Berlin, October 2016. Br J Sports Med. 2017 Jun;51(11):838-47. 2. Harmon K, Clugston J, Dec K, et al. American Medical Society for Sports Medicine position statement on concussion in sport. British Journal of Sports Medicine 2019; 53:213-225. 3. The Management of Concussion-mild Traumatic Brain Injury Working Group. VA/DoD Clinical Practice Guideline for the Management of Concussion-Mild Traumatic Brain Injury. 4. Marshall S, Bayley M, McCullagh S, et al. Updated clinical practice guidelines for concussion/mild traumatic brain injury and persistent symptoms. Brain Injury 2015; 29:688-700.

Code System	Code	Code Description
Initial Population		
CPT	99201-99205	Office or other outpatient visit 10, 20, 30, 45, or 60 minutes for the evaluation and management of a new patient
CPT	99211-99215	Office or other outpatient visit 5, 10, 15, 25, or 40 minutes for the evaluation and management of an established patient
CPT	99221-99223	Initial hospital care 30, 50, or 70 minutes, per day, for the evaluation and management of a patient;
CPT	99231-99233	Subsequent hospital care 15, 25, or 35 minutes, per day, for the evaluation and management of a patient
CPT	99291, 99292	Critical care, evaluation and management of the critically ill or critically injured patient; first 30-74 minutes, each additional 30 minutes
Denominator		
ICD-10	S06.0X0A	Concussion without loss of consciousness, initial encounter
ICD-10	S06.0X0D	Concussion without loss of consciousness, subsequent encounter
ICD-10	S06.0X0S	Concussion without loss of consciousness, sequela
ICD-10	S06.0X1A	Concussion with loss of consciousness of 30 minutes or less, initial encounter
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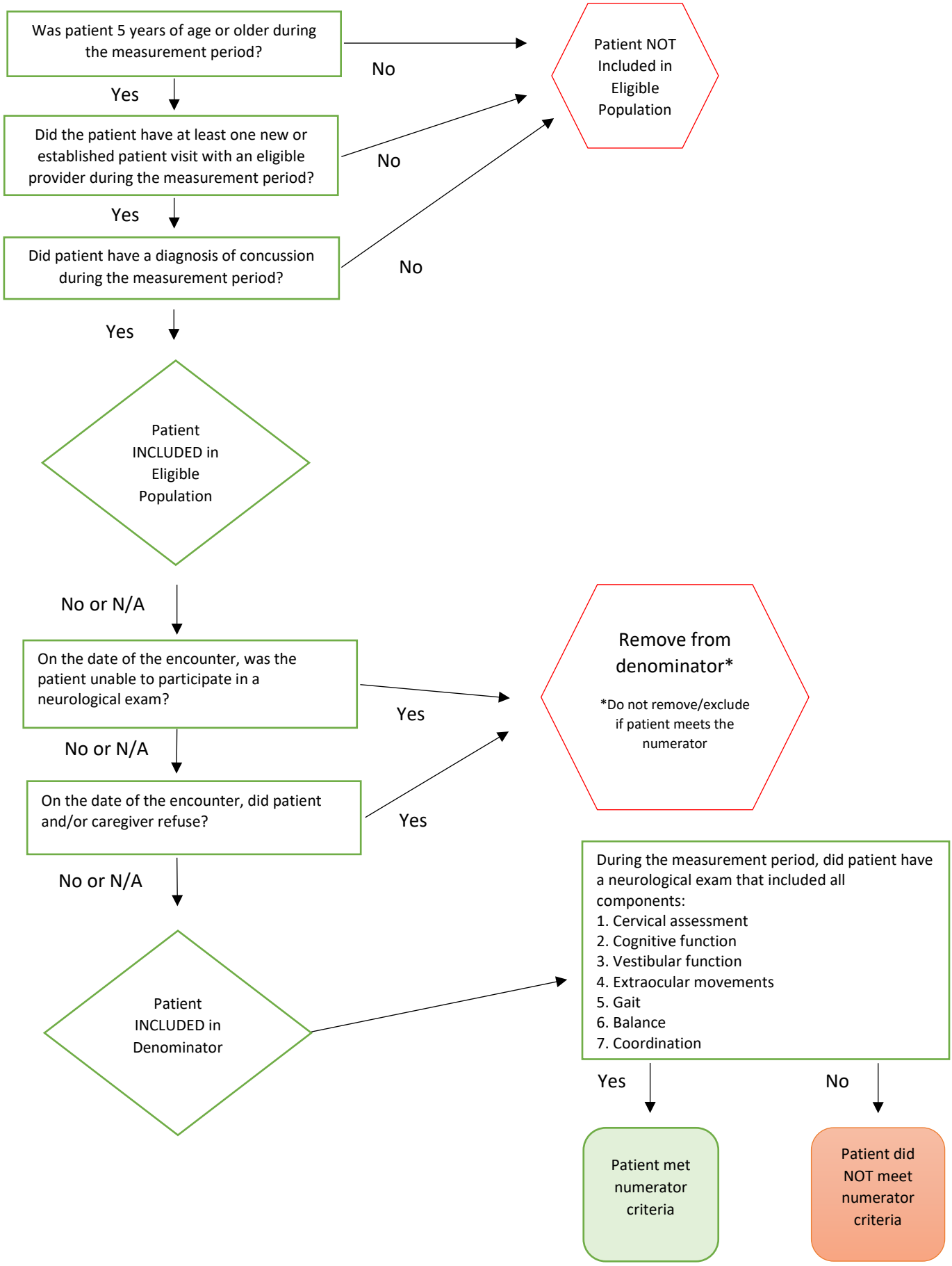
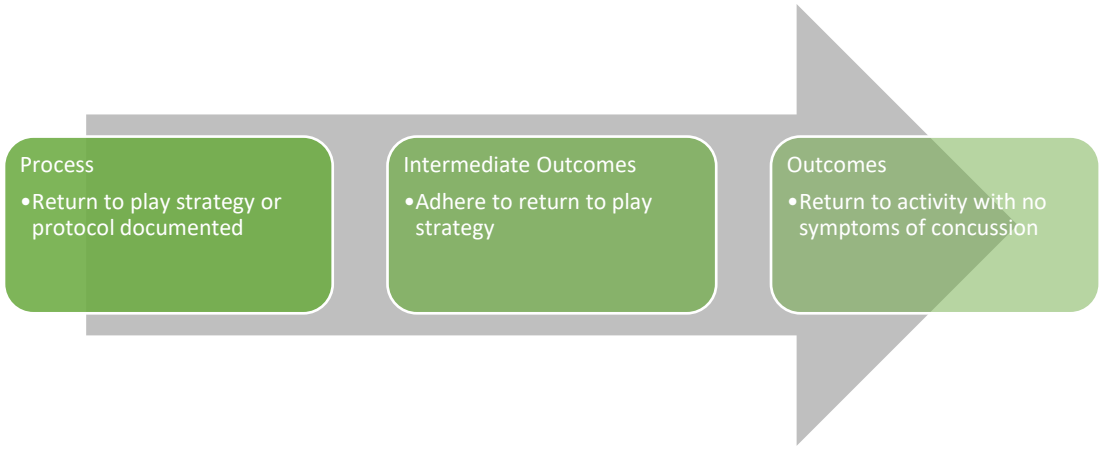
SNOMED	209830004	Concussion with more than 24 hours loss of consciousness without return to pre-existing conscious level (disorder)
Numerator		
SNOMED	84728005	Neurological examination (procedure)
Numerator can be met by documenting that each of the following components were completed: 1) Cervical assessment, 2) Cognitive function, 3) Vestibular function, 4) Extraocular movements, 5) Gait, 6) Balance, 7) Coordination		
Exclusions		
SNOMED	413312003	Patient non-compliant – refused service (situation)
Exclusions can be met by documenting that the patient and/or caregiver refused the neurological exam or that the patient was unable to participate in the exam.		

Flow Chart Diagram: Appropriate neurological exam


Was patient 5 years of age or older during the measurement period?
No
Patient NOT Included in Eligible Population
Yes
Did the patient have at least one new or established patient visit with an eligible provider during the measurement period?
No
Yes
Did patient have a diagnosis of concussion during the measurement period?
No
Yes
Patient INCLUDED in Eligible Population
No or N/A
On the date of the encounter, was the patient unable to participate in a neurological exam?
Yes
Remove from denominator*
*Do not remove/exclude if patient meets the numerator
No or N/A
On the date of the encounter, did patient and/or caregiver refuse?
Yes
No or N/A
Patient INCLUDED in Denominator
During the measurement period, did patient have a neurological exam that included all components:
1. Cervical assessment
2. Cognitive function
3. Vestibular function
4. Extraocular movements
5. Gait
6. Balance
7. Coordination
Yes
No
Patient met numerator criteria
Patient did NOT meet numerator criteria

Measure Title	Documentation of Return to Play Strategy or Protocol	
Description	Percentage of patients aged 5 years of age and older diagnosed with concussion who were cleared for full participation in sports that had documentation of a return to play strategy or protocol	
Measurement Period	January 1, 20xx to December 31, 20xx	
Eligible Population	**Eligible Providers**	Medical Doctor (MD), Doctor of Osteopathy (DO), Physician Assistant (PA), Advanced Practice Registered Nurse (APRN)
	Care Setting(s)	Outpatient, Urgent Care
	Ages	≥ 5 years of age
	Event	Office visit, urgent care visit
	Diagnosis	Concussion
Denominator	Patients ≥ 5 years of age diagnosed with concussion who were cleared for full participation in sports	
Numerator	Patients who had documentation of a return to play strategy or protocol^ ^Return to play strategy/protocol should include a gradual increase in physical activities. Each step should take at least 24 hours (or longer). Patients should return to previous step if symptoms return or worsen. While other progressions may be used and tailored to the specific sport or activity, below is the most common protocol: Step 1: Symptom-limited activity (daily activities) Step 2: Light aerobic exercise (walking, stationary bike) Step 3: Sport-specific exercise (running, sprinting, agility) Step 4: Non-contact practice (including resistance training) Step 5: Full contact practice (following medical clearance) Step 6: Competition (normal game play)	
Required Exclusions	Patients with prolonged symptoms after concussion	
Allowable Exclusions	• Patient and/or caregivers who refuse return to play strategy • Patients who are currently participating in sports without symptoms	
Exclusion Rationale	Patients have the right to refuse a service. Patients who have already returned to their sport prior to receiving clearance should be excluded.	
Measure Scoring	Percentage	
Interpretation of Score	Higher score indicates better quality	
Measure Type	Process	
Level of Measurement	Provider	
Risk Adjustment	N/A	

For Process Measures Relationship to Desired Outcome	
Opportunity to Improve Gap in Care	Returning to a sport after a concussion is a difficult decision which is hampered by the many guidelines providing varying recommendations. Getting a patient back playing their sport safety should be done by using a return to play strategy or protocol that outlines the types of physical activities that the patient tolerated prior to clearance.
Harmonization with Existing Measures	No existing measures are known.
References and Supporting Evidence	1. Managing Return to Activities. https://www.cdc.gov/headsup/providers/return_to_activities.html 2. McCrory P, Meeuwisse W, Dvorak J, et al. Consensus statement on concussion in sport-the 5th international conference on concussion in sport held in Berlin, October 2016. Br J Sports Med. 2017 Jun;51(11):838-47. 3. King D, Brughelli M, Hume P, Gissane C. Assessment, Management and Knowledge of Sport-related Concussion: Systematic Review. Sports Medicine 2018: 44:449-471. 4. Ontario Neurotrauma Foundation. Guidelines for Diagnosing and Managing Pediatric Concussion. 2014. 5. Purcell L, Canadian Paediatric Society, Healthy Active Living and Sports Medicine Committee. Sport-related concussion: Evaluation and management. Paediatr Child Health 2014; 19:153-158. 6. Marshall S, Bayley M, McCullagh S, et al. Updated clinical practice guidelines for concussion/mild traumatic brain injury and persistent symptoms. Brain Injury 2015; 29:688-700.

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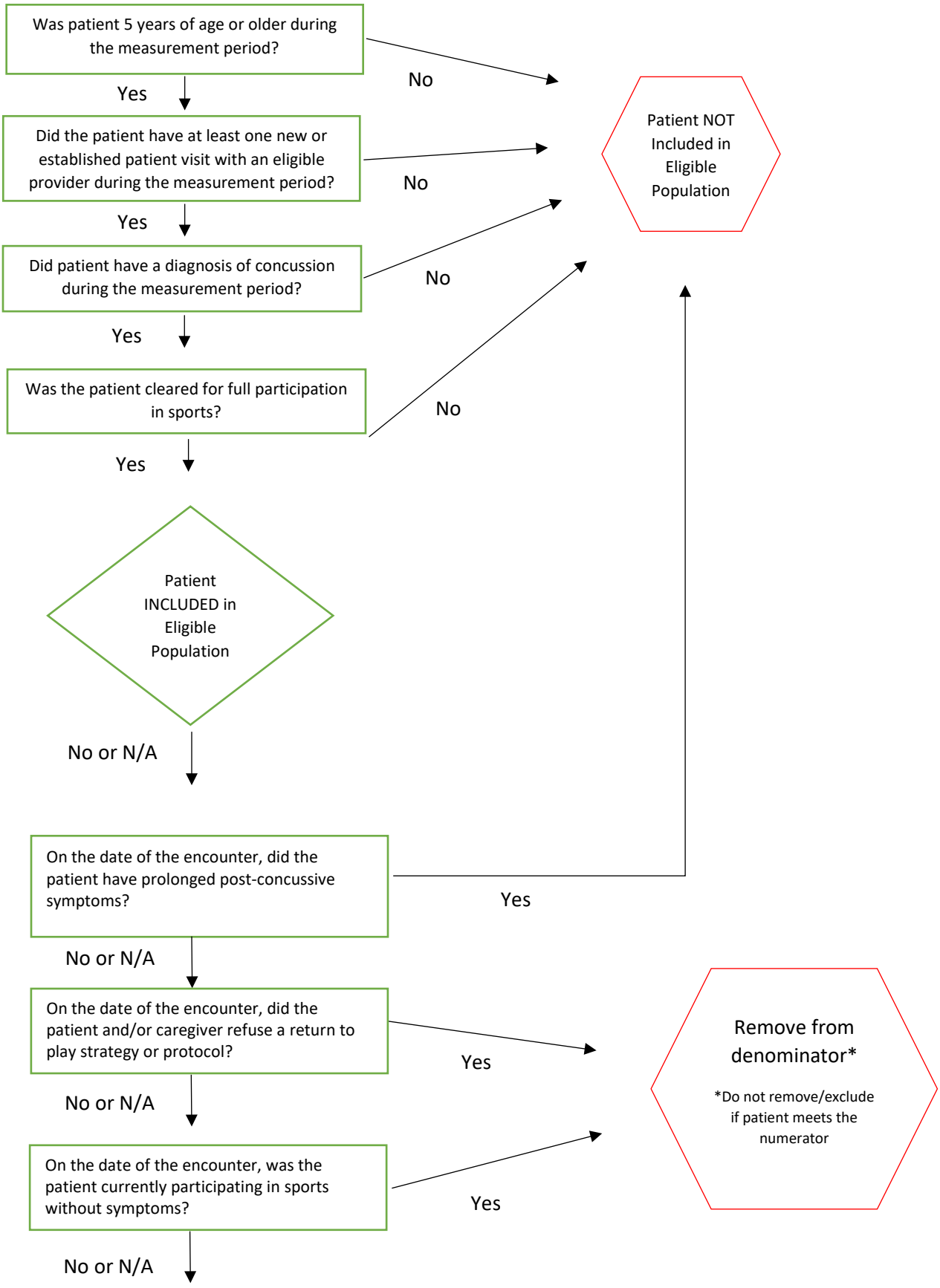
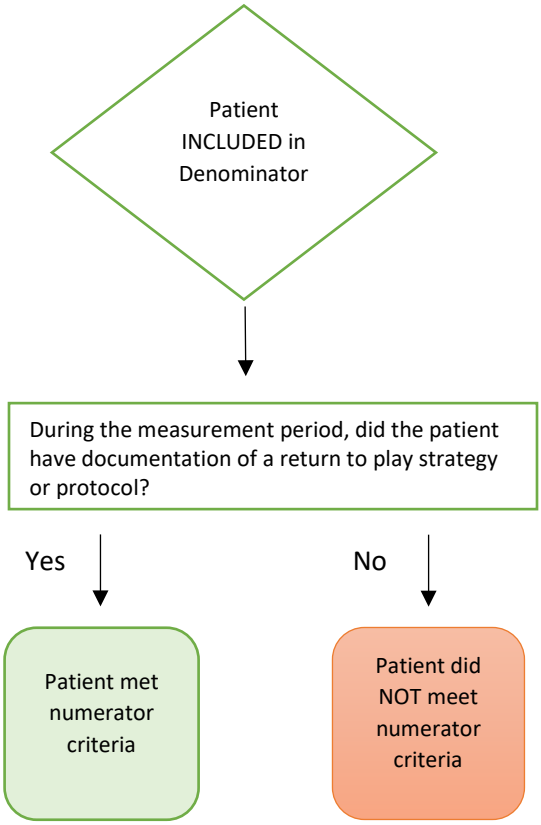
SNOMED	209829009	Concussion with more than 24 hours loss of consciousness and return to pre-existing conscious level (disorder)
SNOMED	209830004	Concussion with more than 24 hours loss of consciousness without return to pre-existing conscious level (disorder)
SNOMED	84989007	Cleared by (contextual qualifier) (qualifier value)
	223366009	Healthcare professional (occupation)
Numerator		
SNOMED	419512005	Returns to baseline activity status (finding)
SNOMED	223446004	Recommendation to return (procedure)
SNOMED	370858005	Following clinical pathway protocol (regime/therapy)
SNOMED	229164006	Sport specific rehabilitation (regime/therapy)
SNOMED	300798006	Able to participate in sporting activities (finding)
SNOMED	300768004	Able to perform play and sports activities (finding)
SNOMED	365379003	Finding related to ability to participate in sporting activities (finding)
Exclusions		
SNOMED	413312003	Patient non-compliant – refused service (situation)
Exclusions can be met by documenting that the patient and/or caregiver refused the return to play strategy/protocol or that the patient is already participating in activities/sports without symptoms.		

Flow Chart Diagram: Documentation of Return to Play Strategy or Protocol




Patient INCLUDED in Denominator
During the measurement period, did the patient have documentation of a return to play strategy or protocol?
Yes
No
Patient met numerator criteria
Patient did NOT meet numerator criteria

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Appendix A Disclosures

Work Group Member	Disclosures
Wayne Anderson, DO, FAAN, FAHS	Dr. Anderson has been an expert witness in CRPS and catastrophic injury cases.
Steven Broglio, PhD, ATC	Dr. Broglio has received funding for travel from the NCAA, NIH, AAN, and NATA. He serves as an editor for the Journal of Athletic Training, Concussion, British Journal of Sports Medicine, Athletic Training & Sports Health Care. Dr. Broglio has received research support from the NCAA, DoD, NIH, and University of Michigan. He has provided an affidavit for a legal proceeding.
Daniel Feinberg, MD, FAAN	Dr. Feinberg has given expert testimony on behalf of defendants and plaintiffs.
Aravind Ganesh, MD	Dr. Ganesh receives honoraria from NHS Health Education England and Genome BC. He receives research support from Rhodes Trust, Wellcome Trust, and Murray Speight Foundation. Dr. Ganesh received compensation for serving on a board of directors for Advanced Health Analytics, SnapDx, and TheRounds.ca.
Lauren Green, DO, RD	Nothing to disclose.
Michael S. Jaffee, MD, FAAN, FANA	Dr. Jaffee has received funding for travel to serve as Chair for a DoD Congressionally Directed Medical Research Program which includes studies on the chronic effects of concussion. He receives research support from Neurorehabilitation, the University of Florida, and the state government of Florida. Dr. Jaffee has received compensation as an evaluating neurologist for the national NFL disability programs and has provided an affidavit regarding clinical care as a paid subject matter expert to the NCAA.
Michael Kaplen, Esq	Nothing to disclose.
Matthew Lorincz, MD, PhD	Dr. Lorincz has received funding for travel to the NCAA to review concussion protocols, editorial service for Medlink Neurology, and serving on the Xenith Scientific Advisory Board.
Arthur De Luigi, DO, MHSA, FAAPMR, CAQSM, CAQBIM, DABPM, RMSK	Nothing to disclose.
Deepak Patel, MD, FAAFP, FACSM	One time honorarium from Springer Publishing for “Concussion Management for Primary Care” published in May 2020.
Sean Rose, MD	Dr. Rose has received research support from the Abigail Wexner Research Institute at Nationwide Children’s Hospital, the Dale and Amy Earnhardt Fund, MORE Foundation, Riddell, ElMindA, S Dallas Rowe and Associates.
Jack Tsao, MD, DPhil, FAAN, FANA	Dr. Tsao serves as the Navy Reserve representative to the Department of Defense Traumatic Brain Injury Advisory Committee. He receives royalties from Springer for two books: 1) Traumatic Brain Injury: A Clinician’s Guide to Diagnosis, Management, and Rehabilitation, and 2) Teleneurology in Practice: A Comprehensive Clinical Guide. Dr. Tsao holds stock in Biogen and Illumina.
Adam Webb, MD, FAAN	Dr. Webb has received compensation for activities with Bard Medical as a consultant.

Steven Broglio, PhD, ATC provided edits to measures on behalf of the National Athletic Trainer’s Association but is not listed as an author of this work.

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