Federaal Kenniscentrum voor de Gezondheidszorg
Centre Fédéral d'Expertise des Soins de Santé
Belgian Health Care Knowledge Centre

26 Octobre 2023

DÉVELOPPER UN ENSEMBLE D'INDICATEURS DE QUALITÉ POUR SURVEILLER LA QUALITÉ DES SOINS DISPENSÉS PAR LES CENTRES PÉDIATRIQUES MULTIDISCIPLINAIRES DE L'OBÉSITÉ (CPMO)

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LISTE DES ABBRÉVIATIONS

ABBRÉVIATION	DÉFINITION
ALT	Alanine Aminotransferase
AST	Aspartate Aminotransferase
BASO	Belgian Association for the Study of Obesity
BiPAP	Bi-level Positive Airway Pressure
BMI	Body Mass Index
BOT2	Functional fitness Bruininks-Oseretsky test of motor skills
BP	Blood Pressure
BREQ2	Behavioural Regulation in Exercise Questionnaire, version 2
CBCL	Child Behaviour Checklist
CDC	Center for Disease Control and Prevention
CDI	Children's Depression Inventory
CEPO	Centres of Expertise for Paediatric Obesity Management
CFQ	Child Feeding Questionnaire
CFR	Cross Functional Requirements
CLB	Centrum voor leerlingenbegeleiding (centre for student guidance)
CPAP	Continuous Positive Airway Pressure
DBP	Diastolic Blood Pressure
EDE-Q	Eating Disorder Examination Questionnaire
EOSS-P	Edmonton Obesity Staging System for Paediatrics
EPR	Electronic Patient Record
EU-SILC	European Union Statistics on Income and Living Conditions
FISMA	Federal Information Security Management Act
GDPR	General Data Protection Regulation
GP	General Practitioner
GPAQ	Global Physical Activity Questionnaire
HbA1c	Glycated haemoglobin
HBSC	Health Behaviour in School-aged Children survey
HDL-C	High Density Lipoprotein Cholesterol
HD4DP	Health Data for Data Providers
HIPAA	Health Insurance Portability and Accountability Act
HOMA-IR	Homeostatic Model Assessment of Insulin Resistance
HTN	Hypertension
IOTF	International Obesity Task Force
IQECAD	Initiative for Quality Improvement and Epidemiology in Children and Adolescents
IQED	Initiative for Quality Improvement and Epidemiology in Diabetes
ISPAD	International Society for Paediatric and Adolescent Diabetes
Kg	Kilogram

KCE	Belgian Health Care Knowledge Centre
L	Litre
LDL-C	Low Density Lipoproteins Cholesterol
M	Meters
MD	Mean Difference
mmHg	Millimetre of mercury
MSK	Musculoskeletal
NIHDI	National Institute for Health and Disability Insurance
OBVL	Parenting Load Questionnaire
ONE	Office de la Naissance et de l'Enfance
OSA	Obstructive Sleep Apnoea
PA	Physical Activity
PedsQL	Paediatric Quality of Life Inventory
PMOC	Paediatric Multidisciplinary Obesity management Centre
PSDQ	Parenting Styles and Dimensions Questionnaire
QI	Quality Indicator
REDCap	Research Electronic Data Capture
SBP	Systolic Blood Pressure
SDQ	Strengths and Difficulties Questionnaire
SEP	Socio-Economic Position
SES	Socio-Economic Status
SGTP	Serum Glutamic-Pyruvic Transaminase
TC	Total Cholesterol
TG	Triglycerides
T2D	Type 2 Diabetes
VAS	Visual Analogue Scale
WISC	Wechsler Intelligent Scale
YSR	Youth Self Report
6-MWD	6-minute walking distance
6-MWT	6-minute walk test

SYNTHÈSE

1 CONTEXTE

Le surpoids et l'obésité sont des maladies définies comme une accumulation excessive de masse graisseuse, ce qui augmente le risque de décès prématuré et de toutes sortes de maladies chroniques, telles que le diabète, les maladies cardiovasculaires, les problèmes orthopédiques et certains cancers. Ces maladies ont souvent un impact négatif sur la santé mentale et sont associées à de lourds stigmates et à un degré élevé de détresse psychologique, en particulier chez les enfants et les adolescents.[1-5]

Le pourcentage de jeunes souffrant de surpoids en Belgique est progressivement passé de 13,6 % en 1997 à 19,0 % (plus 5.8% d'obèses) en 2018.[6] Afin de s'attaquer à la tendance croissante du surpoids et de l'obésité chez les jeunes, **l'Institut national d'assurance maladie-invalidité (INAMI) souhaite mettre en place un modèle de soins échelonné comprenant un suivi régulier des enfants et des adolescents âgés de 2 à 17 ans**. Un **modèle de soins multidisciplinaire, axé sur les résultats et échelonné** avec un **suivi régulier** est conseillé dans la littérature pour améliorer la détection, obtenir un diagnostic rapide et correct, fournir un traitement multidisciplinaire approprié et éviter les rechutes, comme pour toutes les maladies chroniques complexes.[5]

Une structure à trois niveaux est particulièrement préconisée, combinant une bonne répartition géographique, une concentration de l'expertise dans des centres spécialisés et une collaboration efficace entre les trois niveaux de soins :

- **Le premier niveau de soins** comprend les **soins ambulatoires dispensés par des médecins** (généralistes, pédiatres et/ou médecins scolaires) **travaillant en réseau avec d'autres prestataires de soins ambulatoires** (diététicien, psychologue, pédopsychiatre, kinésithérapeute ou autre prestataire de soins). Ces soins peuvent être dispensés dans un cabinet médical, un établissement de santé ou à distance. Une fois que le surpoids ou l'obésité est identifié, le premier niveau de soins peut effectuer un dépistage initial des facteurs de risque pour confirmer la gravité de l'obésité.[7] L'objectif est de se référer dès que nécessaire au deuxième niveau de soins, où un triage diagnostique multidisciplinaire est effectué pour déterminer les soins ou interventions appropriés (par exemple, diététicien, psychologue ou autre prestataire de soins).
- **Le deuxième niveau de soins** comprend les **centres pédiatriques multidisciplinaires de l'obésité** (CPMO) avec une répartition géographique pondérée pour recevoir les patients en ambulatoire avec une équipe multidisciplinaire (pédiatre, diététicien, psychologue, travailleur social, physiothérapeute, infirmier, etc.) et pour les orienter vers le premier ou le troisième niveau de soins en fonction de leurs besoins. Le deuxième niveau de soins a une double fonction. La première fonction est un rôle consultatif pour soutenir le premier niveau de soins. La deuxième fonction consiste à élaborer un plan de traitement à mettre en place dans le CPMO, comprenant des services de soutien aux familles (psychothérapie), des techniques de motivation et des interventions comportementales. En fonction des besoins du patient, un programme d'exercices et/ou une intervention psychothérapeutique et/ou un suivi assuré par un diététicien doivent être prévus.
- **Le troisième niveau** se compose de **centres d'expertise pour la gestion de l'obésité pédiatrique** (CEGOP) où des soins hospitaliers multidisciplinaires sont offerts aux patients. Les CEGOP ont également une fonction consultative pour soutenir le premier et le deuxième niveau de soins.

Quel que soit le type de traitement, le modèle de soins échelonné doit **inclure un ajustement et un suivi continus.** Les soins de suivi sont généralement dispensés aux premier et deuxième niveaux de soins, mais pas au troisième, car ils sont toujours dispensés en ambulatoire.

Actuellement, les premier et troisième niveaux de soins existent déjà. Le niveau intermédiaire de soins est actuellement inexistant ou non officialisé. L'**INAMI souhaite signer un accord avec un maximum de 25 centres de deuxième niveau** (dans le cadre du réseau de 25 hôpitaux locorégionaux) ayant une expertise dans la prise en charge du surpoids et de l'obésité et devant répondre à des critères bien définis. L'accord définira le contenu du parcours de soins multidisciplinaire pour la gestion et le traitement du surpoids et de l'obésité chez les enfants et les adolescents (de 2 à 17 ans), les services à inclure dans la grille tarifaire et le mode de paiement. Pour suivre les centres et évaluer la qualité des soins dispensés, l'INAMI entend **définir un ensemble d'indicateurs de qualité (IQ)**.

1.1 Portée de l'étude et rôle du KCE

Pour rédiger l'accord, l'INAMI a formé un groupe de travail multidisciplinaire national, composé d'experts de la prise en charge du surpoids et de l'obésité chez les enfants et les adolescents. Un groupe de travail plus restreint sur les indicateurs de qualité, organisé par l'INAMI et géré par des chercheurs du KCE, a été formé pour **fournir un soutien scientifique et méthodologique** dans l'**élaboration d'un ensemble d'indicateurs de qualité** pour le suivi du deuxième niveau de soins. La mise en œuvre de l'ensemble final d'indicateurs de qualité sélectionnés, leur mesure sur la base de données collectées de manière prospective et l'analyse de la qualité des soins dispensés par tous les centres agréés (audit) ne relèvent pas de la mission actuelle.

2 MÉTHODES

Les chercheurs du KCE ont effectué un examen rapide de la littérature pour identifier les indicateurs de qualité pertinents pour l'évaluation des interventions (multidisciplinaires) sur la perte de poids et les résultats pour la santé chez les enfants et/ou les adolescents souffrant de surpoids ou d'obésité, qui sont appropriés pour le deuxième niveau de soins. **Le modèle de Donabedian** a été adopté. Il identifie trois dimensions des indicateurs de qualité :

- **Les indicateurs de structure** se rapportent aux attributs des milieux dans lesquels les soins sont prodigués. Cela comprend les ressources matérielles (telles que les installations, l'équipement et le financement), les ressources humaines (telles que le nombre de membres du personnel et leurs qualifications) et la structure organisationnelle (telle que le personnel médical, l'organisation, les méthodes d'examen par les pairs et les méthodes de remboursement).
- **Les indicateurs de processus** indiquent ce qui est réellement fait au moment de donner et de recevoir des soins, c'est-à-dire les activités du praticien pour poser un diagnostic, recommander ou mettre en œuvre un traitement ou toute autre interaction avec le patient.
- **Les indicateurs de résultat** mesurent les tentatives de décrire les effets des soins sur l'état de santé des patients et des populations.

Le modèle générique de Donabedian était lié à un système de stadification clinique relativement nouveau et particulièrement pertinent pour la prise en charge des enfants et adolescents souffrant de surpoids ou d'obésité, à savoir le Edmonton Obesity Staging System for Paediatrics (EOSS-P), recommandé par les experts de l'Association belge pour l'étude de l'obésité (BASO). [7-9]

L'EOSS-P est utilisé pour stadifier les patients, en fonction de la gravité des comorbidités liées à l'obésité et des obstacles à la gestion du poids, en quatre catégories graduées (0 à 3) au sein de quatre domaines de santé principaux : métabolique, mécanique, santé mentale et milieu social (les 4M). L'EOSS-P peut être appliqué aux enfants et adolescents souffrant de surpoids ou d'obésité âgés d'au moins 2 ans. L'EOSS-P élabore une approche individualisée et significative de la gestion du poids qui s'aligne sur les niveaux de soins échelonnés proposés par l'INAMI : les stades 0 et 1 de l'EOSS-P s'alignent sur le premier niveau de soins, le stade 2 de l'EOSS-P s'aligne sur le deuxième niveau de soins (les CPMO) et le stade 3 de l'EOSS-P s'aligne sur le troisième niveau de soins (les CEGOP). Cependant, les niveaux de soins ne doivent pas être appliqués à la lettre. Si c'est cliniquement pertinent, un enfant ou un adolescent souffrant de surpoids ou d'obésité et répondant au niveau 2 de l'EOSS-P peut être référé au niveau 3 si les prestataires de soins de santé le jugent nécessaire. L'inverse est également possible. Un jeune souffrant de surpoids ou d'obésité qui correspond au niveau 3 de l'EOSS-P peut être traité au deuxième niveau de soins.

2.1 Résultats : identification et sélection des indicateurs de qualité

2.1.1 Indicateurs de qualité de structure et de processus

La plupart des ouvrages scientifiques préconisent une prise en charge multidisciplinaire des enfants et des adolescents souffrant de surpoids et d'obésité, impliquant des pédiatres, d'autres prestataires de soins de santé pédiatriques, des spécialistes du comportement en matière de santé (par exemple, des psychologues) et des spécialistes de l'exercice (par exemple, des physiothérapeutes), mais d'autres critères de structure, tels que les besoins en personnel d'une équipe multidisciplinaire en termes de nombre minimum ou de qualifications minimales, n'ont pas été définis. De même, la littérature scientifique préconise de combiner une alimentation saine avec une activité physique régulière, sans parvenir à un consensus sur la fréquence et la durée des consultations avec les diététiciens, les physiothérapeutes ou les coachs sportifs comme recommandations de processus. En outre, aucun article n'a évalué l'effet de la structure ou du processus en tant qu'indicateurs de qualité sur les résultats des soins pour le surpoids ou l'obésité chez les enfants et les adolescents.

Par conséquent, les critères de structure et de processus ne peuvent être décrits que comme des critères d'éligibilité, qui peuvent être utilisés par l'INAMI pour évaluer la conformité des CPMO aux critères des accords.

2.1.2 Indicateurs de qualité de résultat

Presque tous les indicateurs trouvés dans la revue rapide de la littérature étaient des indicateurs de résultat, qui ont été réunis en une longue liste d'indicateurs. Ceux qui se référaient au même concept ont été autant que possible regroupés en un seul indicateur et ont été liés au stade EOSS-P correspondant par les chercheurs du KCE. Cette liste a été liée aux indicateurs de résultat utilisés par les CEGOP Zeepreventorium et Clairs Vallons, afin d'assurer une concordance maximale entre les niveaux de soins. Une distinction a été faite entre les indicateurs « must-have » (essentiels pour le suivi des centres et l'évaluation de la qualité des soins dispensés par les CPMO) et les indicateurs « nice-to-have » (non obligatoirement collectés par les CPMO dans le cadre de l'accord avec l'INAMI).

Cinq indicateurs de qualité de résultat ont été approuvés comme « must-have » :

- IQ1 : La proportion d'enfants et d'adolescents avec une stabilisation ou au moins une diminution de 0,5 du score Z de l'IMC après un an de suivi .
- IQ2 : La proportion d'enfants et d'adolescents ayant des taux de lipides sanguins normaux après un an de suivi.
- IQ3 : La proportion d'enfants et d'adolescents ayant une tension artérielle systolique et diastolique (PAS et PAD) normale après un an de suivi.
- IQ4 : La proportion d'enfants (de plus de 6 ans) et d'adolescents atteignant une augmentation de 10 % de la distance parcourue à pied en 6 minutes après un an de suivi.
- IQ5 : La proportion d'enfants et d'adolescents ayant un changement positif dans les scores de qualité de vie (QdV) après un an de suivi.

Pour chacun des cinq indicateurs de résultat « must-have », une **fiche technique** a été élaborée à l'aide d'un modèle standard décrivant la collecte de données, les définitions techniques et les méthodes de calcul de l'indicateur (voir annexe 4).

Au-delà de ces indicateurs « must-have » bien décrits, des indicateurs « nice-to-have » ont également été suggérés à des fins de recherche afin de couvrir les quatre principaux domaines de la santé : métabolique, mécanique, santé mentale et milieu social (les 4M).

2.2 Difficultés à évaluer les indicateurs de qualité de résultat

Une réflexion plus poussée sur les indicateurs de qualité a déjà été menée au KCE à la lumière de plusieurs autres projets sur les indicateurs de qualité. Pour ce rapport, sept défis ont été identifiés et formulés comme suit. A noter que le premier de ces challenges doit être répondu en priorité :

- Défi 1 : créer une base de données unique à partir des dossiers conservés séparément par les CPMO dans le cadre de l'accord avec l'INAMI. Une base de données unique permettra de réaliser une évaluation prospective de la prise en charge multidisciplinaire des jeunes souffrant de surpoids ou d'obésité par les CPMO et de référencer les résultats obtenus pour chaque centre.
    - **La solution privilégiée est une base de données unique créée et gérée par un propriétaire central** (c'est-à-dire une institution scientifique fédérale) et alimentée de manière prospective et régulière par les CPMO. Une application telle que HD4DP (Health Data for Data Providers), développée par la plateforme healthdata.be (Sciensano), pourrait être utile pour faciliter la collecte de données, mais aussi pour demander aux CPMO de corriger les données si un contrôle qualité révèle des défauts de qualité.
    - **L'option la moins privilégiée est de fournir un modèle de base de données aux centres** dès l'entrée en vigueur de l'accord, afin que toutes les informations nécessaires à l'évaluation puissent être codées de manière uniforme et qu'un fichier soit envoyé à l'INAMI. Une fois par an, l'INAMI devrait pouvoir fusionner les bases de données afin de procéder à une analyse plus complexe des informations collectées et d'évaluer chaque centre. Les principaux inconvénients de cette stratégie comprennent le manque de contrôle sur la qualité des données et le nombre élevé de valeurs manquantes ou anormales.
- Défi 2 : utiliser des données quantitatives fiables pouvant être extraites des archives. Effectuer une recherche préliminaire pour identifier les données régulièrement collectées à d'autres fins (y compris le suivi du patient pendant le processus thérapeutique) et pour explorer les possibilités de relier les données liées à l'utilisation des soins (dossier médical global, résumé hospitalier minimum…).
- Défi 3 : proposer une évaluation quantitative et qualitative (conception de méthodes mixtes) telle que recommandée pour l'évaluation de systèmes complexes, sans être trop lourde et décourageante pour les CPMO participants.[10] Ce défi peut être résolu en sélectionnant un nombre raisonnable de sujets à étudier (« must-have »), d'une part en tenant compte du fait que des indicateurs quantitatifs et des questionnaires qualitatifs doivent être adressés à différents moments aux enfants et adolescents et/ou à leurs familles, et d'autre part, en avertissant les centres participants de la charge de travail que représente l'évaluation répétée des indicateurs pour chaque patient tout au long de leur prise en charge.
- Défi 4 : identifier les outils et questionnaires reconnus, idéalement disponibles en plusieurs langues (dont le français et le néerlandais) et en libre accès (sans droits d'auteur). Utiliser des techniques scientifiques telles que décrites dans le process book du KCE.
- Défi 5 : garantir le respect de la vie privée des patients. Si des données longitudinales sont nécessaires pour le suivi des patients, un identifiant unique sera nécessaire (par exemple le numéro NISS) pour permettre le couplage des données entre les différentes bases de données de santé. Un tiers (par exemple, la plateforme healthdata.be), qui donne accès à des données pseudonymisées, pourrait être impliqué.
- Défi 6 : éviter les biais de sélection des patients. Si la poursuite ou la résiliation du contrat de l'accord dépend de résultats positifs obtenus par l'évaluation de la qualité des soins à l'aide d'un ensemble d'indicateurs de qualité, il existe un risque que certains CPMO préfèrent sélectionner des enfants et des adolescents ayant plus de chances de voir des changements positifs significatifs dans un court laps de temps, afin de rapporter des réussites et de maintenir l'accord avec l'INAMI. L'évaluation de la qualité des soins doit faire partie d'un cercle vertueux non sanctionné de fixation d'objectifs, de mise en place d'un programme de traitement, d'évaluation et de feedback pour provoquer des actions correctives si nécessaire (planifier - faire - vérifier - agir). L'inclusion de facteurs casuistiques pour comparer les populations traitées dans tous les CPMO sera essentielle pour une analyse comparative pertinente. Le suivi de l'évolution des groupes traités dans chaque CPMO doit également tenir compte des facteurs de risque de la population cible. Un rapport d'audit comparant les performances de tous les CPMO en termes de processus et de résultats doit être publié régulièrement.

- Défi 7 : établir un lien entre la prise en charge de l'obésité infantile dans les CPMO et les résultats obtenus. Idéalement, les questions sur l'environnement et la vie quotidienne de l'enfant devraient être incluses comme facteurs casuistiques, au moins au début et à la fin du processus de prise en charge, pour prendre en compte tout changement significatif pouvant contribuer à la perte, la stabilisation ou l'augmentation de poids ou l'expliquer, quelle que soit l'efficacité du plan de traitement dans le CPMO.

3 CONCLUSION

En 2006, une première évaluation du troisième niveau de soins des enfants et adolescents atteints d'obésité sévère en Belgique a été réalisée par le KCE.[11] En plus des recommandations pour les soins hospitaliers, des recommandations ont été adressées aux futurs centres ambulatoires qui pourraient être reconnus comme fournissant le deuxième niveau de soins. Ces recommandations restent pertinentes.

À la demande de l'INAMI, le KCE a développé un ensemble d'indicateurs de qualité pour le suivi de la qualité des soins dispensés par les CPMO. Cette évaluation a été réalisée dans un délai très court (avec un horizon temporel de 3 mois) pour soutenir l'inclusion d'indicateurs de qualité dans la première version de la convention. C'est la raison pour laquelle les auteurs du KCE ont décidé de remplacer une revue systématique complète par une revue rapide de la littérature. Si l'on ne peut exclure l'hypothèse que cette méthode d'évaluation accélérée ait certainement eu un impact sur les résultats obtenus (notamment en ce qui concerne la disponibilité de preuves scientifiques pour les indicateurs de structure et de processus), l'implication d'experts et de professionnels du domaine a permis d'atténuer cette contrainte.

La collaboration avec des experts nationaux dans la prise en charge du surpoids et de l'obésité chez les jeunes a permis de sélectionner cinq indicateurs de résultat « must-have », fondés sur des données probantes et/ou sur les lignes directrices nationales et internationales, pour le suivi des centres et l'évaluation de la qualité des soins dispensés par les CPMO.

En plus de tous les défis liés à l'utilisation d'indicateurs pour évaluer la qualité des soins, un certain nombre d'aspects doivent être pris en compte. La gestion des données collectées par les CPMO doit être organisée avant la première collecte de données afin d'assurer la standardisation entre les centres. En outre, les premières années devraient être considérées comme une période de test au cours de laquelle la mesurabilité et l'interprétabilité des indicateurs seraient évaluées afin de permettre un réglage plus fin des indicateurs. Les résultats possibles sont soit qu'un indicateur est mesurable et interprétable sans aucune adaptation soit qu'il est non mesurable tel que défini à l'origine. Dans ce dernier cas, l'indicateur peut être exclu de l'ensemble d'indicateurs, reformulé ou remplacé.[12] Il convient donc de revoir régulièrement l'ensemble des indicateurs de qualité (par exemple tous les 3 ans).

3.1 Recommandations politiques

À l'Institut national d'assurance maladie-invalidité (INAMI) :

1. **Prendre une décision sur le statut des critères d'éligibilité** pour la reconnaissance et le financement dans le cadre de l'accord actuel avec l'INAMI et le **communiquer clairement aux CPMO :**
    - soit les considérer comme des indicateurs de structure et de processus et évaluer leur développement et leur lien avec les indicateurs de résultat de manière prospective dans le cadre du suivi des CPMO ;
    - soit les considérer comme des critères d'éligibilité pour obtenir et maintenir un financement en tant que CPMO dans le cadre de l'accord, auquel cas tout écart par rapport à la structure (en particulier le nombre minimum d'enfants et d'adolescents traités par an) et aux normes de processus peut entraîner la résiliation de l'accord avec le CPMO qui ne répond plus aux critères d'éligibilité.
2. **S'assurer que, à tous les niveaux de soins, un ensemble commun d'indicateurs de qualité de résultat est mesuré, en utilisant les mêmes outils de mesure valides et sans droit d'auteur, afin de :**
    - assurer la cohérence des mesures entre les différents niveaux de soins ;
    - et faciliter le suivi longitudinal des enfants et adolescents lorsqu'ils sont transférés d'un niveau de soins à un autre.
3. **Nommer un service public fédéral ou une institution fédérale pour mettre en place et gérer une base de données nationale alimentée de manière prospective et régulière par les CPMO** afin d'assurer le contrôle de la qualité des données et de permettre l'analyse des données pour l'évaluation des CPMO. Une telle base de données centrale serait idéalement aussi accessible à d'autres fins de recherche, telles que des essais cliniques.
4. **Nommer un (ensemble de) service public(s) fédéral(-aux) et/ou des institutions scientifiques (fédérales) pour :**
    - effectuer des analyses complexes pour évaluer la qualité des soins dispensés par les différents centres ;
    - rédiger des rapports d'évaluation périodiques ;
    - envoyer un rapport d'analyse comparative à tous les CPMO ;
    - rendre les résultats accessibles au public ;
    - évaluer régulièrement l'ensemble des indicateurs de qualité (par exemple tous les 3 ans), en particulier la pertinence des IQ sélectionnés, les méthodes de mesure, la fréquence de collecte et d'enregistrement des données, l'analyse des données et l'analyse comparative ;
    - mener des études pilotes pour évaluer quels outils de mesure pourraient être recommandés et reconnus pour atteindre les objectifs en limitant la charge de travail des professionnels de la santé (par exemple, de nouveaux outils, des outils utilisés dans d'autres populations ou des versions simplifiées reconnues des outils existants avec moins de questions).
5. **Utiliser les résultats des indicateurs de qualité de résultat comme données uniquement pour améliorer la qualité et non pour sanctionner les CPMO**
6. **Associer les représentants des associations de patients au comité d'accompagnement de la convention afin d'évaluer si les indicateurs sélectionnés sont acceptables du point de vue des patients**

Au troisième niveau de soins, à savoir les centres d'expertise pour la gestion de l'obésité pédiatrique (les CEGOP, Zeepreventorium et Clairs Vallons) :

1. **Encourager une coopération harmonieuse** entre les différents niveaux de soins pour s'assurer que le suivi des enfants et des adolescents souffrant de surpoids ou d'obésité est adapté de manière optimale à leurs besoins et que le soutien adéquat est offert pour le traitement multidisciplinaire du surpoids ou de l'obésité tout au long de la période de 2 à 17 ans. Un coordinateur pour le troisième niveau de soins devrait être nommé pour faciliter la communication avec le premier et le deuxième niveaux de soins et pour coordonner le suivi.

■ SCIENTIFIC REPORT

1 INTRODUCTION

1.1 Overweight and obesity in children and adolescents in Belgium

Overweight and obesity are diseases defined as an excessive accumulation of body fat, which increases the risk of premature death and various chronic diseases, such as diabetes, cardiovascular disease, orthopaedic problems and some cancers. They are also associated with high levels of stigma and negative impact on mental health such as psychological distress, particularly among children and adolescents.[1-5]

Box 1 – The use of BMI to classify weight in children and adolescents in Belgium

The Body Mass Index (BMI) is a simple tool allowing to classify the weight status into broad categories: underweight, normal weight, overweight, and obesity. In children and adolescents, the cut-offs of the BMI categories are age and sex-specific. Sciensano uses the cut-offs recommended by the International Obesity Task Force (IOTF) and Health Behavior in School-aged Children survey (HBSC) conducted in the Flemish and the French Community to give a picture of the weight status of young people in Belgium (Table 1).

Table 1 – The revised international child cut-offs corresponding to the BMI cut-offs at 18 years

BMI cut-offs at 18 years	Extended International (IOTF) Body Mass Index Cut-Offs for Thinness, Overweight and Obesity in Children and adolescents[a]
16	Thinness grade 3
17	Thinness grade 2
18.5	Thinness grade 1
20	Normal weight
25	Overweight
30	Obesity
35	Morbid obesity

The cut-offs for the exact ages by month from 2 to 18 years can be found here: https://www.worldobesity.org/about/about-obesity/obesity-classification and in Appendix 7.2 for overweight and obesity specifically.

According to Sciensano, by determining the BMI (See Box 1), the percentage of overweight young people in 2018 (19.0%) was significantly higher than in the first year of the Health Interview Survey in 1997 (13.6%). The prevalence of overweight and obesity did not vary significantly by gender. However, there were significant differences by age: the percentage of overweight young people was significantly higher among toddlers (24.4% of 2-4 year old) than among young adolescents (11.9% of 15-17 year old). For obesity, the percentage was significantly higher among toddlers (11.7% of 2-4 year old) than among older groups (5.0% of 5-9 year old, 4.6% of 10-14 year old and 3.3% of 15-17 year old).[6]

Traditionally, clinical recommendations for assessing and managing paediatric obesity have relied on anthropometric measures, such as body mass index (BMI), BMI percentile and/or BMI z-score, to monitor health risks and determine weight management success. However, anthropometric measures do not always accurately and reliably identify children and adolescents with obesity-related health risks or comorbidities. The Belgian Association for the Study of Obesity (BASO) advices to use an alternative,

[a] In children, different cut-off points are used. Other commonly used cut-offs for children include those provided by the World Health Organisation (WHO) and Center for Disease Control and Prevention (CDC).

more comprehensive clinical staging system, the Edmonton Obesity Staging System for Paediatrics (EOSS-P).[7]

1.2 The Edmonton Obesity Staging System for Paediatrics (EOSS-P)

As anthropometric measures do not always accurately and reliably identify children and adolescents with obesity-related health risks or comorbidities, a new clinical staging system (the Edmonton Obesity Staging System for Paediatrics, EOSS-P) adapted from the adult-oriented EOSS, was developed by Canadian researchers in 2016 (see Appendix 1).[7] The EOSS-P is used to stratify children and adolescents according to severity of obesity-related comorbidities and barriers to weight management into four graded categories (0 to 3) within four main health domains: metabolic, mechanical, mental health and social milieu (the 4Ms) and proposes a stage-based management plan (see Table 2).[7] The four main domains of the 4M staging system are impacted by obesity and can impact responsiveness to weight management. The EOSS-P is based on common clinical assessments that are widely available and routinely completed by clinicians, and has the potential to provide clinical and prognostic information to help evaluate and inform the management of paediatric obesity. The EOSS-P can be applied to children and adolescents with overweight or obesity who are ≥2 years of age. The staging system is a tool reliant on clinician ratings, which are based on common clinical assessments including medical history, clinical examination and routine investigations. The 4Ms are distinct categories, and progression in one of the categories does not necessarily coincide with a concomitant increase in the others.

The 4M staging system of the EOSS-P identifies disease severity and potential barriers to effective management within the 4M's framework, most likely to impact prognosis in paediatric obesity. Some of the proposed cut-offs (e.g., lipid panel, blood pressure) were based on clinical practice guidelines, while others were based on clinical and research knowledge and expertise.[7]

According to the literature, the EOSS-P informs an individualised and meaningful approach to weight management that aligns with the levels of care as proposed by the NIHDI (see Table 2).[5, 7, 13] For children and adolescents at stage 0, the literature indicates that the management strategy should be to prevent progression to a higher stage through the reinforcement and support of positive health behaviours. For children and adolescents at stages 1, 2 or 3 the management strategies are designed to reverse modifiable risk factors and prevent progression to higher stages. Persistence or progression to a higher level within these stages over an extended period (e.g., 12 months) should trigger intensification of the management strategy.

The EOSS-P is an assessment tool that can support clinical and policy-based decisions regarding the allocation of resources (i.e., human, financial, time) for obesity management, and provides a platform for future research and clinical care designed to individualise therapeutic options.[5, 13] Given the evidence supporting the presence of many types of obesity with different aetiologies and consequences, an expanded understanding of paediatric overweight and obesity may improve the current but incomplete practice that focuses primarily on anthropometric assessment.

Table 2 – The Edmonton Obesity Staging System for Paediatrics including a management plan

EOSS-P stage	Level of care proposed by the NIHDI	Management plan according to the EOSS-P
0	First	Ongoing monitoring of obesity-related risk factors and healthy lifestyle/behavioural counselling by the primary health care provider at regular visits.
1	First	Ongoing monitoring of obesity-related risk factors and healthy lifestyle/behavioural counselling by the primary health care provider in conjunction with dietician/mental health provider depending on individual needs.
2	Second (or third)	Referral to multidisciplinary paediatric obesity clinic for comprehensive assessment; receive more intensive, family-centred counselling and lifestyle/behavioural intervention; plan regular follow-up clinical appointments.
3	Third (or second)	Referral to tertiary level for comprehensive assessment, which may include subspecialty care to manage comorbidities; receive more intensive, family-centred counselling and lifestyle/behavioural interventions; consider complementary, intensive therapeutic options; plan regular follow-up clinical appointments.

1.3 A stepped care model to manage overweight and obesity in children and adolescents in Belgium

In order to tackle the growing trend of overweight and obesity among young people, the National Institute for Health and Disability Insurance (NIHDI) wants to set up a stepped care model including regular follow-up for **children and adolescents between 2 and 17 years old**.[5]

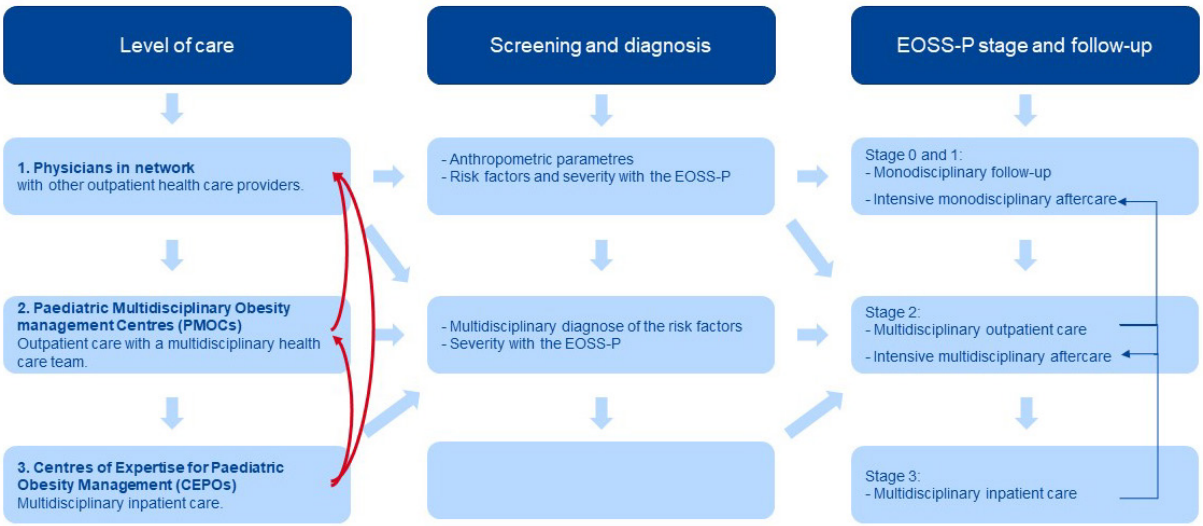
A chronic, outcome-oriented, stepped care model with **regular follow-up** is advised to improve detection, achieve timely and correct diagnosis, provide appropriate multidisciplinary treatment and prevent relapse, as in all complex chronic diseases.[14] The care model needs to be personalised according to the age of the child, the severity of the obesity and its possible comorbidities, and the resilience of the family. The child and the family are at the centre of the care.[5]

In particular, a **three-tier structure** is advocated in a **multidisciplinary care pathway**, combining good geographical distribution, concentration of expertise in specialised centres and effective collaboration between the three levels of care.[5, 14] The first level of care consists of physicians within a network with other outpatient health care providers (e.g. Kind&Gezin, CLB, ONE, family physician). The third level of care is ensured by two Centres of Expertise for Paediatric Obesity Management (CEPOs) (i.e. Zeepreventorium and Clairs Vallons) that deliver multidisciplinary inpatient care. To provide a comprehensive chronic, outcome-oriented, stepped care model with regular follow-up, the second level still needs to be developed, i.e. Paediatric Multidisciplinary Obesity management Centres (PMOCs), to deliver outpatient care with a multidisciplinary health care team.

The triage is based on metabolic, mental, mechanical and/or social milieu risk factors (the 4 Ms) to determine the severity of obesity and the setting in which treatment can be most effective.[7, 14] The care pathway must be flexible and individualised.

The NIHDI proposed a structure in three levels of care as depicted in Figure 1.[5]

Figure 1 – The outcome-oriented, three-tier stepped care model with regular follow-up



Legend: EOSS-P: The Edmonton Obesity Staging System for Paediatrics[7]; Red arrows: indicate ab advice function; Blue arrows: indicate the follow-up.

1. **The first level of care** includes outpatient care provided by **physicians** (general practitioners (GP), paediatricians and/or school doctors), with continuing medical education (e.g. training by Eetexpert, CEPIA or by the BASO) **working in a network with other outpatient health care providers** (e.g. dietician, psychologist, paediatric psychiatrist, physiotherapist or other care provider). This care can be provided in medical practice, a healthcare facility, or remotely.. Once overweight or obesity is identified, the first level of care may perform an initial risk factor screening to confirm the severity of obesity with the EOSS-P.[7] Levels 0 and 1 of the EOSS-P correspond to the first level of care. If the assessment reveals a higher EOSS-P level, the GP or paediatrician who carried out the assessment

can refer the child/adolescent to a Paediatric Multidisciplinary Obesity management Centre (PMOC). The GP or paediatrician may also ask a PMOC for advice on outpatient care. At the second level of care, a multidisciplinary diagnosis is carried out to determine the appropriate care or interventions (e.g. dietician, psychologist or other care provider). Patients who are referred back to the first level of care after triage can be followed up by a GP or paediatrician and also a couple of other care providers (e.g. dietician, psychologist, physiotherapist or other care provider). This requires **a network of specialised outpatient health care providers** (including home care such as home visits). The extension of various reimbursement or financing modalities or the creation of a specific fee as a national nomenclature (e.g. extension of reimbursed sessions with dieticians, psychologists, physiotherapists or long-term medical consultations) should be further explored. If the treatment proves to be ineffective, the patient can still be referred to the second level of health care. Criteria must be established to determine whether the treatment is effective or not.

2. **The second level of care includes a maximum of 25 Paediatric Multidisciplinary Obesity management Centres** (PMOCs) with a weighed geographical distribution (in the framework of the 25 locoregional hospital networks). Their target population is patients with at least one criterium in stage 2 of the EOSS-P scale (e.g. type 2 diabetes, lipid abnormalities or moderate mental health issues). They work on an outpatient basis with a multidisciplinary team (paediatrician, dietician, psychologist, social worker, physiotherapist, nurse, etc.) and refer the children and adolescents to the first or third level of care depending on their needs. The PMOC needs to have the expertise to support the first level of care. (e.g. the PMOC can help the first level to develop a treatment plan and refer children and adolescents to the appropriate care providers). The second function consists of drawing up a treatment plan to be initiated in the PMOC, including family support services (counselling), motivational techniques and behavioural interventions. Depending on the patient's needs, an exercise programme and/or psychotherapeutic intervention and/or follow-up with a dietician should be planned. Pharmacological treatment could be discussed and initiated (e.g. Saxenda). Multidisciplinary consultation (at least 4 times per year) and regular follow-up are foreseen within the framework of the agreement and tailored to the needs of the patient. Finally, the function of PMOC is also to follow up on patients who return from the 3rd level of care. The extension of various reimbursement or financing modalities or the creation of a specific fee as a national nomenclature (e.g. extension of reimbursed sessions with dieticians, psychologists, physiotherapists or long-term medical consultations) should be further explored.

3. **The third level** consists of **two Centres of Expertise for Paediatric Obesity Management** (CEPOs, i.e. Zeepreventorium and Clairs Vallons, see Box 2). Multidisciplinary inpatient care is offered to children and adolescents at level 2-3 on the EOSS-P scale, which can last from a minimum of 4 weeks to a maximum of 1 year if it is a first admission. If the patient is readmitted after a first- or second-level referral, the length of stay will depend on the goals and may be shorter. Finally, the CEPOs will also have an advisory and expert function to support the first and second level of care.

Box 2 – Recognition and evaluation of the third level of obesity care (the CEPOs)

The **third level of care** is currently supported by **2 residential centres** (in 2000 there were 3 centres; the third centre "Poriniot" in the province of Walloon-Brabant has since ceased its activities). In order to finance the treatment of chronic diseases, each centre signed an individual agreement with the NIHDI in 2000, which defines the admission criteria for treatment, the revalidation programme (including the minimum human resources required), the targeted benefits and/or results of the therapy and the prices and fees of the delivered care by the multidisciplinary team of health care professionals (and the method of payment).[b] In the agreements, the multidisciplinary treatment of obesity is included, but the agreements are not limited to this condition alone, they finance the multidisciplinary treatment of other chronic pathologies as well (for example, respiratory or musculoskeletal diseases).

A first evaluation of this type of inpatient care for children and adolescents with severe obesity in Belgium was carried out by KCE in 2006.[11] Following recommendations were formulated:

- The long-term effectiveness of this care should be evaluated through a long-term prospective study involving all residential centres. The possibility of randomising children and adolescents to long (10 months) or short (3 months) treatment could be considered.

[b] Source: https://www.riziv.fgov.be/fr/themes/cout-remboursement/maladies/enfants/Pages/default.aspx

- In the meantime, the NIHDI contracts for residential centres should include an obligation to produce a standardised annual report. The content should be determined by the centres themselves.
- A few pilot centres specialising in the outpatient treatment of children and adolescents with severe obesity should be identified and funded through a separate agreement, on condition that they are included in a research protocol designed to assess their long-term effectiveness.
- These studies should be conducted **under the responsibility of a scientific team** with the necessary epidemiological skills.

The proposed long-term prospective study to evaluate the long-term effectiveness of the CEPOs has not yet taken place. They do, however, produce a standardised annual report which is still being expanded every year. The current agreement tries to fill in the gap of the 2nd level of care, the PMOCs, that will specialise in outpatient treatment of children and adolescents with overweight and obesity under the responsibility of a scientific multidisciplinary team. Although there is no research protocol established to assess their long-term effectiveness, the development of standardised outcome quality indicators for the PMOCs will allow the NIHDI to monitor the quality of care.

Regardless of the child/adolescent's level of care (1st, 2nd or 3rd level), the evidence from the literature recommends that the EOSS-P level is assessed at least once a year to determine whether the level of care is still corresponding to the child/adolescent's needs.[7, 13] Rather than a global score, it is recommended to describe the score obtained for each of the four health domains in order to adjust the management.

Smooth cooperation between the different levels of care ensures that the therapy for each child or adolescent is optimally adapted to his or her needs: at a higher level, but also at a lower level, so that the right support is offered in a harmonious way for the multidisciplinary treatment of the obesity throughout childhood and adolescence. **Communication between the different levels is essential**, using the support of a coordinator appointed by the PMOC.

The PMOC coordinator is a team member who is given the task of helping to draw up, monitor, evaluate and, if necessary, adjust the care plan. The PMOC coordinator handles communication within the team and between the other levels of care.

The tasks of the PMOC coordinator are:

- organising multidisciplinary consultations within the second level;
- follow-up of medical results and care plan;
- contact with the child or adolescent and the parents;
- transfer medical and psychosocial information between the different levels of care (transmural care), especially when the child or the adolescent is transferred to another level of care;
- setting up active care at different levels of care.

When the care level of the child or adolescent changes, a multidisciplinary consultation must take place. This should include the beneficiary's GP or paediatrician in the first level or third level as well as the PMOC coordinator or paediatrician in charge of the second level. The needs of each child and adolescent an their family are unique and should be identified and addressed. This consultation can be organised physically, digitally or hybrid.

Flexibility in management between the 2nd and 3rd levels of care must be allowed. If inpatient care (level 3) is recommended but the child/adolescent or his/her family refuses inpatient treatment or prefers outpatient care in a PMOC, the preferences of the patient and his/her family must be respected in order not to compromise the care of the child/adolescent. Regardless of the type of treatment, the care model should include lifelong adjustment and follow-up.[5] Follow-up care is usually provided in the 1st and 2nd levels of care, but not in the 3rd one, as the follow-up is always provided on an outpatient basis. The children and adolescents should be followed-up for a longer period of time but with a lower frequency (e.g. every six months).[5] There are social initiatives at the level of the federated entities that can keep access to follow-up care at a low threshold. Moreover, useful tools in follow-up care are mobile health applications and an effective electronic patient record (EPR).

2 SCOPE OF THE PRESENT STUDY

2.1 Target audience

This report is primarily intended for the National Institute for Health and Disability Insurance (NIHDI), as this federal institution asked KCE to develop a set of quality indicators for the monitoring of the Paediatric Multidisciplinary Obesity management Centres (PMOCs). In the second place, this report will be of interest to health care professionals and hospitals that provide care for children and adolescents with overweight or obesity.

2.2 Development of the multidisciplinary care pathway

The design of the multidisciplinary care pathway proposed by the NIHDI aims to provide a comprehensive and integrated management of obesity. To this end, the **NIHDI wishes to sign an agreement with a maximum of 25 second-level centres** that meet the criteria for PMOCs' recognition. As was explained above, PMOCs are second-level care facilities with expertise in overweight and obesity care and must meet well-defined criteria. Specifically, this agreement will define the content of the multidisciplinary care pathway for the management and treatment of overweight and obesity in children and adolescents (2-17 years), the services to be included in the fee schedule, and the method of payment. A beneficiary can be included if his/her BMI is greater than or equal to the percentile that constitutes the obesity threshold for the beneficiary's reference population.

Children and adolescents suffering from eating disorders and overweight or obesity may be included either in the "overweight and obesity agreement" or in another agreement for the management of eating disorders, provided that there is no overlap between the two agreements. It is the care provider's responsibility to refer the children and adolescents to the most appropriate care pathway to provide the best possible support.

The NIHDI intends **to define a set of quality indicators** to monitor the PMOCs.

2.3 Similar agreements with reference centres for children and adolescents with diabetes

The NIHDI has already signed similar agreements with reference centres specialised in the care of children and adolescents (<18 years) with diabetes[c]. This agreement specifies all the eligibility criteria to be recognised as a reference centre and to receive reimbursement for the multidisciplinary programmes for the management of diabetes and for all the material necessary for the self-management of diabetes (e.g. measurement of glycaemia and glycosuria, portable insulin pump). Among the criteria, the composition of the multidisciplinary team and its functioning are well described, as well as accessibility, infrastructure and minimum equipment.

Quality control is described in detail: Sciensano and the reference centres have **set up a dedicated registry** to record and track all epidemiological and biological data, identify complications during follow-up, continuously assess the quality of care provided in the centres and conduct scientific cohort studies. **A public report** is published periodically (since 2013, every two years) to provide an overview of the management of diabetes in children and adolescents and to enable appropriate decisions to be made. Sciensano is responsible for analysing the data and writing the report. This initiative is labelled "Initiative for Quality Improvement and Epidemiology in Children and Adolescents with Diabetes" (IQECAD)[d].[15]

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[c] https://www.inami.fgov.be/SiteCollectionDocuments/convention_diabete_enfants_adolescents.pdf; https://www.inami.fgov.be/SiteCollectionDocuments/convention_diabete_enfants_adolescents_avenant1.pdf ;https://www.inami.fgov.be/SiteCollectionDocuments/convention_diabete_enfants_adolescents_avenant2.pdf

[d] A comparable quality control exists since 2001 for 100 diabetes centres recognised by the NIHDI managing adult patients. This "Initiative for Quality improvement and Epidemiology in Diabetes" (IQED) from Sciensano helps the centres to improve their quality of care by providing regular individualized feed-back for each centre of their data.

The dataset collected was based on the "Basic Information Sheet for Children and Adolescents", referenced in the 2018 ISPAD (International Society for Paediatric and Adolescent Diabetes) recommendations, based on the questionnaires used in the Hvidøre studies and based on parameters included in similar initiatives in Germany, Austria, England and Wales. These data are used to define quality indicators relating to both processes and outcomes of care.[15]

2.4 Set-up of working groups and role of KCE

To draft the agreement, the NIHDI established a **national working group with relevant stakeholders**.

A smaller working group, consisting of **specialists** from the Belgian Association for the Study of Obesity (BASO), the Flemish knowledge centre for eating and weight problems (Eetexpert), the third level of care i.e. Clairs Vallons and Zeepreventorium, **and representatives of the NIHDI and KCE**, has been set up (see 3.3). Within this working group, the NIHDI asked KCE to **provide scientific and methodological support** in the **development of a set of quality indicators** (QIs) to monitor the quality of care delivered the PMOCs.

The implementation of the final set of selected quality indicators, their measurement on the basis of prospectively collected data and the analysis of the quality of care provided by all agreed centres (audit) do not fall within the scope of the current mission. The NIHDI aims to have a final text of the agreement, including QIs, in 2023.

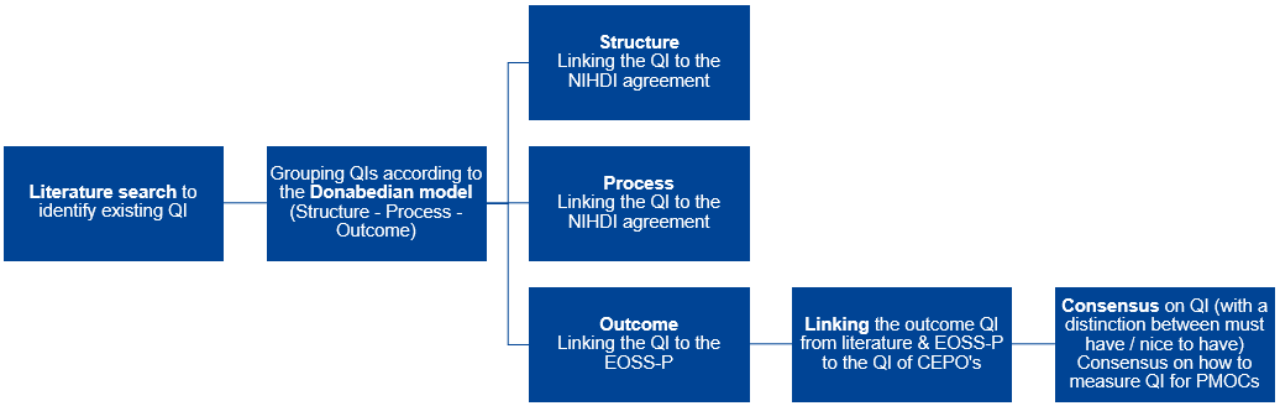
3 METHOD FOR IDENTIFYING QUALITY INDICATORS

3.1 Identification of possible quality indicators

A literature review allows to identify existing indicators that can be used for a scientifically based quality assessment. If the set of existing indicators is too broad to conduct a repeated and pragmatic assessment, a consensus on the selection of indicators must be reached between the scientific team, the authorities and the stakeholders.[16, 17] A participatory approach is therefore recommended to promote a system of co-creation[10] in order to develop an effective and efficient assessment system, generate a good understanding of the expectations of the authorities, increase mutual learning among stakeholders in order to identify possible obstacles in collecting the data needed to develop indicators and build trust between stakeholders and the institutions responsible for developing the indicators and those responsible for the evaluation itself.

There are a number of steps involved in generating a set of quality indicators that are valid and accepted by system actors and stakeholders. A pragmatic procedure was followed (see Figure 2).

Figure 2 – Pragmatic procedure to identify and measure relevant quality indicators



Legend. QI: Quality Indicators; NIHDI: National Institute for Health and Disability Insurance; EOSS-P: The Edmonton Obesity Staging System for Paediatrics; CEPO: Centres of Expertise for Paediatric Obesity Management; PMOC: Paediatric Multidisciplinary Obesity management Centre.

3.1.1 Literature search

As the initial requirement was to gather high quality evidence in a very short timeframe to support the inclusion of quality indicators in the first draft of the agreement (with a time horizon of 3 months), the KCE authors decided to replace a full systematic review by a rapid review of the literature.[18] The scope was focused on the evaluation of (multidisciplinary) interventions on weight loss and health outcomes in children and/or adolescents with overweight or obesity, that are relevant in the second level of care. The search was limited to Medline and started with the most recent publications in a 5-year time window (2018-2023), published in English, French or Dutch. Systematic reviews and meta-analyses were first extracted and were used as the starting point of the whole review. Papers included in meta-analysis (Nordlund et al.[19]) were individually retrieved afterwards.

3.1.2 Addition of guideline-based and pathway-based quality indicators

Beyond the search of papers published in scientific journals, authors also searched (national) reports about pathways and Clinical Practice Guidelines for the evaluation and treatment of children and adolescents with overweight or obesity, whatever the publication language. The search focused on the following countries: Austria, Belgium, Canada, France, Germany, Switzerland, The Netherlands, The United Kingdom, and the Unites States.[13, 20-28]

Annual reports of the Belgian residential centres (Zeepreventorium and Clairs Vallons), where multidisciplinary inpatient care is offered to children and adolescents at stages 2 or 3 on the EOSS-P scale, were also consulted at this step.[5, 29]

3.2 Measuring quality of care

3.2.1 The Donabedian model

A number of models have been advised to assess the quality of health care and the most comprehensive one is the Donabedian model.[8] It was first reported in 1966 and distinguishes three dimensions of quality: structure, process and outcome.[8] Owing to its simplicity and flexibility, this model has been gradually promoted.[9]

Structure indicators relate to the attributes of the settings in which care occurs. This includes material resources (such as facilities, equipment, and financing), human resources (such as the number and qualifications of personnel) and the organizational structure (such as medical staff, organization, methods of peer review, and methods of reimbursement).[30]

Process indicators denote what is actually done in giving and receiving care, i.e. the practitioner's activities in making a diagnosis, recommending or implementing treatment, or other interaction with the patient.[30]

Outcome indicators measure attempts to describe the effects of care on the health status of children and adolescents and populations.[30]

Structure indicators alone are not sufficient for measuring the quality of clinical care. The relationship between structure and process indicators is weak and only poorly understood.[31]

Most process and outcome indicators combine advantages and disadvantages. The major advantage of process indicators is that they relate directly to what providers are doing. They are highly sensitive to differences in the quality of clinical care: outcome indicators can be improved if efforts are made to standardize data collection and case mix adjustment systems are developed and validated. It is argued that this is worth doing only where it is likely that variations in health care might lead to significant variations in health outcome and where the occurrence of the outcome is sufficiently common that the outcome indicator will have the power to detect real differences in quality.[32] Process indicators also allow a data collection while the clinical process is on the way and need a short observation time. Finally, process indicators are straightforward to interpret and they generally do not need complex statistical analysis. However, process indicators have certain limitations and challenges. They require a strong definition of the eligible children and adolescents and they need to be updated according to advances in diagnosis and treatment. Furthermore, the feasibility of process indicators may be overestimated. When one wants to study a process in detail, the data collection may be extensive and time consuming. Above all, process indicators are only a part of the explanatory variables that determine the patient outcomes.[31]

On the other hand, outcome measures are often generic and can be compared across several conditions and processes. They reflect a global overview of all aspects of the health care process and not only the measurable ones. However, this is their major limitation as well, as risk adjustment is needed to filter the influence of confounding factors, such as the natural history of the disease or patient's characteristics.[31]

3.2.2 Linking the Donabedian model and the EOSS-P

The KCE performed a rapid review of the literature to identify the structure indicators relating to the attributes of the settings in which overweight and obesity care for children and adolescents occurs, the processes actually done in overweight and obesity care for children and adolescents and the outcome measures attempting to describe the effects of overweight and obesity care on the health status of these children and adolescents.

All indicators identified in the above mentioned sources were first merged into a long list of indicators. Indicators that referred to the same concept were grouped as a single indicator as much as possible.

Afterwards, the outcome indicators found in this literature search were compared and linked to the risk factors as they were described in the EOSS-P (see Appendix 3).

3.3 Consultation of experts about search results

To ensure that the most relevant references were included, the national group of multidisciplinary experts were consulted from:

- the Belgian Association for the Study of Obesity (BASO);
- the Flemish knowledge centre for eating and weight problems (Eetexpert);
- and the third level of care i.e. Clairs Vallons and Zeepreventorium.

This expert group, called "working group Quality Indicators", was set up by the NIHDI. Four meetings were scheduled between April and July 2023. The objectives assigned to this working group were to:

- discuss the results of the rapid review of the literature in order to confirm the exhaustiveness of the retrieved papers leading to the identification of quality indicators;
- distinguish between 'must have' and 'nice to have' quality indicators (see Box 2);
- reach a consensus on the final set of QIs and instruments to measure them;
- and to discuss and approve the technical datasheets written by KCE researchers describing data collection, technical definitions, and methods to calculate the selected indicators (see description of technical datasheets in Appendix 6).

The experts confirmed the exhaustiveness of the scientific papers retrieved during the rapid review of the literature, which led to the identification of relevant quality indicators for the second level of care.

4 SELECTION OF QUALITY INDICATORS

4.1 Structure and process criteria

Most of the scientific literature consistently advocated multidisciplinary management of children and adolescents with overweight and obesity, involving paediatricians, other paediatric health care providers, health behaviour specialists (e.g. psychologists) and exercise specialists (e.g. physiotherapists), but other structure criteria, such as staffing requirements for a multidisciplinary team in terms of minimum numbers or minimum qualifications were not defined. Similarly, scientific literature advocates combining a healthy diet with regular physical activity, without reaching consensus on the frequency and duration of consultations with dieticians, physiotherapists or sports coaches as process recommendations. In addition, no papers assessed the impact of structure or process as quality indicators on the outcomes of overweight or obesity care for children and adolescents.

As a result, the structure and process criteria can only be described as eligibility criteria, which can be used by the NIHDI to assess the compliance of the PMOCs with the agreements' criteria (see Box 3).

Box 3 – The difference between structure and process criteria and indicators

The structure and process criteria are currently described as eligibility criteria in the agreement formalising the **recognition** of PMOCs by the NIHDI and can be used to assess the compliance of the PMOCs with the minimum requirements described in the agreements and to perform an audit, but **currently it is unclear to what extent these structure and process elements contribute to the quality and/or outcomes of the management of children and adolescents with overweight or obesity in PMOCs**. Therefore, they can't be described as quality indicators.

The **structure and process criteria** were grouped per specific component (see Appendix 4 and Appendix 5) and were developed by the NIHDI and the national working group. The **KCE** researchers were **not able to validate these criteria**, based on the literature research.

4.2 Outcome indicators

Almost all indicators found in the rapid review of scientific literature were outcome indicators, which were merged into a long list of indicators. Those that referred to the same concept were grouped as a single indicator as much as possible and linked to the according EOSS-P dimension by KCE researchers. This list was linked to the outcome indicators used by the CEPOs Zeepreventorium and Clairs Vallons, to ensure maximum concordance between the levels of care (see Appendix 3). The final set of outcome indicators, with a distinction between "must have" indicators and "nice to have" outcomes, is the result of a consensus between KCE researchers and the working group QI (see Box 4).

Box 4 – Distinction between 'must have' and 'nice to have' outcome indicators

The prospective collection of data for each child and adolescent represents a substantial amount of data for PMOCs to collect and manage. For this reason, it is appropriate not to overburden the centres by distinguishing between:

- 'must-have' indicators: these are the indicators and measurements necessary to calculate these indicators, that are essential for monitoring the centres and assessing the quality of care provided by the PMOCs;
- and 'nice to have' indicators, which are outcomes collected for research purposes, i.e. not mandatorily collected by the PMOCs under the NIHDI agreement. Additional resources are needed for the collection, analysis and reporting of this type of data.

4.2.1 Must have outcome quality indicators

Five 'must have' outcome quality indicators were selected by the working group QI and were related to the following dimensions: anthropometric parameters, cardiometabolic health, blood pressure, physical activity and quality of life. Only the first outcome indicator, the proportion of children and adolescents with a stabilization or 0.5 diminution of the BMI z-score at 1-year follow-up, is not linked to the EOSS-P (See Appendix 3).

For each of the 5 'must have' outcome quality indicators, a technical datasheet has been developed using a standard template[e] (see Appendix 6).

All technical datasheets provide an overview of the labelling of the outcome indicator, the sources used and their rationale, the data collection to be carried out by the PMOCs in order to calculate the QI, how the measurements are to be carried out by the PMOCs in a standardised manner, the calculations to be carried out by the institute managing the data collection, the technical definitions that apply, the subgroup analyses that are relevant for a specific outcome QI based on the literature, and how the results are to be reported by the PMOCs, the calculations to be performed by the institute that will manage the data collection, the technical definitions to be applied, the subgroup analyses that are relevant for a specific outcome QI based on the literature, how the results should be reported by the PMOCs, the proposed target to be achieved for this outcome QI after one year of follow-up, and a proposal for benchmarking.

4.2.1.1 QI 1: The proportion of children and adolescents with a stabilization or 0.5 diminution of the BMI z-score at 1-year follow-up

The first clinical objective and relevant outcome indicator for assessing and managing overweight and obesity in children and adolescents, to monitor health risks and to determine weight management success remains the **body mass index (BMI) z-score**, which is a derivate of the BMI.[7, 33] To calculate the BMI and the derivate, only the age, gender, weight and height, obtained in a uniform way, are the necessary measurements that the PMOCs need to gather.

The target to reach for this indicator is either a stabilization or a 0.5 diminution of the BMI z-score at 1-year follow-up. For a full description of the outcome quality indicator, see Appendix 7.

4.2.1.2 QI 2: The proportion of children and adolescents with normal blood lipid values at 1-year follow-up

Cardiometabolic health is determined by the risk of developing lipid disorders, which is 2.8 times higher in children and adolescents with obesity (BMI > 90th percentile) than in children with normal body weight.[34] The serum lipids are seen as crucial risk factors for the formation of the atherosclerotic disease in later life. Children and adolescents with obesity exhibit significantly increased values for Triglycerides (TG), Total Cholesterol (TC), Low Density Lipoproteins Cholesterol (LDL-C) compared to children and adolescents with normal weight. Normal weight children and adolescents have in general higher High Density Lipoprotein Cholesterol (HDL-C) levels than children and adolescents with obesity.[34] The determination of the blood lipids is a metabolic parameter in the EOSS-P.[7]

The target to reach for this indicator is (a return to) normal blood lipid values at 1-year follow-up. For a full description of the outcome quality indicator, see Appendix 8.

[e] The 5 technical datasheets for the 'must have' quality indicators are reported in Appendix 7, Appendix 8, Appendix 9, Appendix 10 and Appendix 11

4.2.1.3 QI 3: The proportion of children and adolescents with normal systolic and diastolic blood pressure (SBP and DBP) at 1-year follow-up

Blood pressure is also a clinically relevant outcome indicator in so far as the increasing tendency for obesity to occur in childhood and to persist into adulthood, together with the well-established links between overweight, obesity and hypertension in adults, which means that children and adolescents with obesity with elevated systolic blood pressure (SBP) and/or diastolic blood pressure (DBP) appear to be at particularly high risk of developing hypertension as they grow older.[35, 36] The determination of the blood pressure is a metabolic parameter in the EOSS-P.

The target to reach for this indicator is (a return to) normal SBP and DBP values at 1-year follow-up. For a full description of the outcome quality indicator, see Appendix 9.

4.2.1.4 QI 4: The proportion of children (≥ 6 years old) and adolescents achieving a 10% increase in the distance walked within 6 minutes at 1-year follow-up

Physical activity can be determined by an exercise test, the Six-Minute Walking Test (6-MWT), which can provide a safe, practical means of assessing functional status, monitoring treatment and establishing prognosis.[37] It is highly relevant to reflect the physical activities of daily living as well as cardiopulmonary fitness in both healthy children and adolescents and children and adolescents with various diseases.[37] The determination of the physical activity is a mechanical parameter in the EOSS-P.

The target to reach for this indicator is an achievement of 10% increase in the distance walked within 6 minutes at 1-year follow-up. For a full description of the outcome quality indicator, see Appendix 10. It is crucial that the 6-MWT is performed in a standardised manner, according to very specific instructions. These instructions were added in the Appendix in Dutch and French.

4.2.1.5 QI 5: The proportion of children and adolescents with a positive change in Quality of Life (QoL) scores at 1-year follow-up

Quality of Life can be assessed with the EQ-5D-Y.[38] The EQ-5D-Y is a child-friendly version of the widely used EQ-5D generic measure of health status. The EQ-5D-Y questionnaire is cognitively undemanding, taking only a few minutes to complete. Instructions to respondents are included in the questionnaire. Guidance is provided by EuroQol (https://euroqol.org/) on how the EQ-5D-Y should be applied in different age ranges. The determination of the Quality of Life corresponds to the mental health parameter in the EOSS-P.

The target to reach for this indicator is a positive change in Quality of Life (QoL) scores at 1-year follow-up. For a full description of the outcome quality indicator, see Appendix 11.

In selecting the quality indicators and measurement tools available, the experts expressed their disappointment at not being able to assess more specifically the child's or adolescent's quality of life and decline in self-esteem specifically related to overweight or obesity management. The tools available were either generic, not validated, copyrighted or too lengthy to be used on a large scale as part of routine assessment in many centres.[39] To measure the quality of life in children and adolescents with overweight or obesity, it is difficult to find a specific, validated instrument that is not copyrighted to use in large-scale data collections. The most used tool is the copyrighted Paediatric Quality of Life Inventory (PedsQL)[39], which is used by the CEPOs for research and follow-up. However, when considering the choice for assessing known-group validity, the EQ-5D-Y instrument is recommended. The EQ-5D-Y showed comparable psychometric validity to the PedsQL. Similar items on the PedsQL and the EQ-5D-Y showed high correlations (> 0.5) and related items showed moderate correlations (0.3). PedsQL total score was moderately and significantly associated with the EQ-5D-Y level sum and VAS scores.[39]

4.2.2 Nice to have outcome quality indicators

The must have outcome quality indicators do not cover the four main health domains: metabolic, mechanical, mental health and social milieu (the 4Ms).

The metabolic health domain includes the assessment of comorbidities, such as the determination of diabetes type 2, insulin resistance or liver dysfunction. Insulin resistance, fasting plasma, glycated haemoglobin (HbA1c), after-glucose loading or Alanine Aminotransferase (ALT) can be determined by a venous blood sample, together with the blood lipid profile if this is deemed clinically relevant by the physician or during the (annual) assessment of the EOSS-P score.

The mechanical health domain comprises the assessment of obstructive sleep apnoea (OSA), requiring support for Activities of Daily Living (ADL), limited mobility, Blount's disease, slipped capital femoral epiphysis or osteoarthritis.

Within **the mental health domain**, additional questionnaires to determine depression, anxiety, body image disturbance, binge eating or developmental delay are recommended.

The social milieu domain contains two parts. Firstly, the anamnesis of the child should include question(naire)s to determine if there is a problem concerning bullying, school attendance, the parents, siblings or other family members. Secondly, an anamnesis with the parents or caregivers should be done to investigate of there is a need for info on parenting skills, organizational skills considering the household and of there are medical or physical problems present. The financial situation should be verified. This can be done by determining the socio-economic status (SES).

4.2.3 Measurements consistency and longitudinal follow-up

Not all elements of the EOSS-P are measurable with freely available, validated tools and/or questionnaires or are relevant for the entire population that will be treated in the PMOCs. To ensure that a common set of outcome indicators is measured at the 3 levels of care using the same valid, copyright-free measuring instruments it is advised to use question(naire)s that are already in use in the first or third level of care. This will ensure the consistency of measurements between the levels of care and facilitate the longitudinal follow-up of children and adolescents when they are referred from one level of care to another. This needs to be done for each of the four main health domains: metabolic, mechanical, mental health and social milieu (the 4Ms).

5 DISCUSSION

In order to tackle the trend of growing rates of overweight and obesity among children and adolescents, the NIHDI wants to set up a stepped care model including regular follow-up for children and adolescents between 2 and 17 years old by developing an agreement with PMOCs, which would be hospital sites that will act as secondary care facilities that deliver outpatient care and with expertise to support primary care and will have to meet well-defined criteria.

KCE provided a scientific and methodological support in the development of a set of outcome quality indicators that will be used to monitor the centres. This evaluation was performed in a very short timeframe (with a time horizon of 3 months) to support the inclusion of quality indicators in the first draft of the agreement. For this reason, KCE authors decided to replace a full systematic review by a rapid review of the literature. While we cannot rule out the hypothesis that this accelerated evaluation method certainly had an impact on the results obtained (particularly with regard to the availability of scientific evidence for structural and process indicators), the involvement of experts and professionals in the field helped to mitigate this constraint.

Measuring the effectiveness of complex systems is particularly challenging. Previous KCE reports on assessing the quality of care in oncology and the performance of the health care system have helped to identify some of the challenges, although this is not an exhaustive list.[12, 40]

5.1 Challenges to assess outcome quality indicators

More reflexion on quality indicators has been performed already at KCE in the light of several other projects on quality indicators. For this report, seven challenges have been identified, and formulated as followed. Note that the first of these needs should be addressed as a priority:

- ***Challenge 1: to create a single database from the records kept separately by the PMOCs under the NIHDI agreement***. A single database will make it possible to carry out a prospective evaluation of the multidisciplinary care of children and adolescents with overweight and obesity by 2nd level PMOCs and to compare the results obtained by individual centres. Two options need to be considered:
  - **The preferred one is a single database created and managed by a central owner** (i.e. a federal scientific institution) and fed prospectively and regularly by the PMOCs. An application such as HD4DP (Health Data for Data Provider), developed by the Healthdata.be platform (Sciensano), could be helpful to facilitate data collection, but also to ask PMOC for data correction if a quality check reveals quality defects.
    - In a transition phase, the use of Research Electronic Data Capture (REDCap), a secure web application for building and managing online surveys and databases, is recommended. While REDCap can be used to collect virtually any type of data in any environment (including compliance with the General Data Protection Regulation (GDPR)[41], it is specifically geared to support online and offline data capture for research studies and operations.
    - After the transition period, the direct recording of data in the Electronic Patient File would allow Healthdata.be to perform an automatic extraction of the necessary data for the calculation of quality indicators.
  - **T**he least preferred option is to provide a database template to the centres as soon as the agreement is implemented, so that all the information needed for the assessment can be coded in a uniform way and a file sent to the NIHDI. Once a year, the NIHDI should be able to merge the databases in order to carry out a more complex analysis of the information collected and to evaluate the individual centres and their approach to care. The NIHDI's hospital audit unit could carry out regular audits, as Sciensano does for diabetes conventions. The main disadvantages of this strategy include the lack of control over data quality and the expected high number of missing or abnormal values.
- *Challenge 2:* to use reliable quantitative data that can be extracted from records. Carry out a preliminary search to identify data routinely collected for other purposes (including the follow-up of the patient during the therapeutic process) and to explore the possibilities of linking data related to the use of care (Global Medical File, Minimal Hospital Data sets...).

- *Challenge 3: to propose a quantitative and qualitative evaluation (mixed methods design[f])*, as recommended for the evaluation of complex systems, without being too cumbersome and discouraging for participating PMOC:[10] this challenge can be solved by selecting a reasonable number of topics to be studied (*must have*) taking into account that quantitative indicators and qualitative questionnaires need to be addressed at different time points to children and adolescents and/or their families; and warning the participating centres of the workload in repeatedly assessing the indicators for each patient throughout the course of their care (as soon as the agreement is signed?).
- *Challenge 4: to identify validated instruments and questionnaires, ideally available in various languages (including French and Dutch) and freely available (without copyright).* Use scientific techniques as described in the KCE process book.
- *Challenge 5: to guarantee the respect of privacy to patients*: If longitudinal data are required for the follow-up of patients, a unique identifier will be needed (e.g. the NISS code) to allow data linkage between different health databases. A third party (e.g. the platform healthdata.be) that provides access to pseudonymised data could be involved.
- *Challenge 6: to avoid patient selection bias: if the continuation or termination of the agreement contract is dependent on positive results obtained by the evaluation of the quality of care using a set of quality indicators, there is a risk that some PMOCs prefer to select children and adolescents with higher chances of seeing significant positive changes in a short time, in order to report success stories and maintain the NIHDI agreement.* Assessment of the quality of care must be part of a virtuous non-sanctioned circle of goal setting, implementation of a treatment programme, evaluation and feedback to trigger corrective action where necessary (plan - do - check - act). The inclusion of case-mix factors to compare populations treated in all PMOCs will be essential for relevant benchmarking. Monitoring the evolution of the groups treated in each PMOC should also take into account the risk factors of the target population. An audit report comparing the performance of all PMOCs in terms of process and results needs to be published on a regular basis. This audit report could be anonymous for all centres and coupled with an individual feedback report sent to each PMOC showing its own results compared with the blinded results of the other PMOCs. Or, if transparency is advocated and accepted by all centres, a non-blinded feedback report could be sent to all PMOCs. Whatever the option, lessons learned from all centres need to be shared regularly between participating centres and best practices illustrated by outstanding results need to be shared to create a positive spiral of improvement. Such initiatives have already been undertaken by Sciensano with Reference Centres for Diabetes (see paragraph 2.3).
- *Challenge 7: to draw a link between the management of childhood/teenage obesity in the PMOC and the results obtained*: ideally, questions about the child/adolescent's environment and daily life should be included as case-mix variables, at least at the beginning and end of the management process, to take into account any significant changes that might contribute to or explain weight loss, stabilisation or increase, regardless of the effectiveness of the treatment plan in PMOC. It is essential to reduce the risk to formulate conclusions on the (lack of) effectiveness of the multidisciplinary management of children and adolescents in PMOCs on the basis of short or medium term indicators measured whereas external factors may have a major impact on outcomes, e.g. projects initiated at school, change in access to healthy food and external activities, major changes in the family structure/organization/life (including births, deaths, intrafamilial relationships, move…). Research purposes: to compare the structure, process and outcomes of PMOCs that have signed an agreement with the NIHDI and other PMOCs that operate without NIHDI funding.

[f] Quantitative evaluation is useful for measuring relevant changes, and qualitative evaluation for examining in greater depth what works (or doesn't), under what conditions, why...

5.2 Pitfalls of using outcome indicators

The purpose of developing a set of QI is to measure the quality of care provided and to engage PMOCs in a virtuous circle of quality improvement: the objectives to be achieved must therefore be clearly stated.[12] The absence of sanctions is essential for monitoring a quality improvement project (no witch-hunts), and comparisons between centres are intended to help each other rather than to encourage competition. A period of transition and learning will have to be accepted. The agreement should require centres to record their data rather than penalise them for not meeting targets. Abroad, and in particular in Belgium's neighbouring countries, the indicators are used as "alert thresholds" to initiate discussions with centres that have exceeded the threshold: in France with the vigilance indicators[g], in Germany with the G-IQI[h] (German inpatient quality indicators), in Austria (A-IQI)[i] and in Switzerland (OFSP, CH-IQI)[j].

The set of indicators should not be unchangeable, but should be regularly reassessed. In particular, the relevance of the selected QIs, measurement methods, frequency of data collection, data analysis and benchmarking require a regular evaluation. This could be done by a pilot study. It is essential to monitor the literature and methodological developments in order to identify specific disease or condition indicators, rather than developing generic indicators. For example, a review of the set of indicators every 3 years will allow the replacement of indicators that no longer reflect quality by more discriminant quality indicators (if all centres are high performing, the QIs no longer discriminate since set targets are already reached).

The measurement methods and frequency of the data collection should be developed with a limited workload for healthcare professionals (e.g. a new tool, or a tool used in other populations, or a validated reduced version with fewer questions).

Finally, it would be useful to harmonise the selection of QIs, their measurement and coding across different care settings.

6 CONCLUSION

On the request of the NIHDI, the KCE has developed a set of quality indicators for monitoring and evaluating the quality of care provided by the PMOCs. This work was carried out in collaboration with Belgian experts in the management of overweight and obesity in children and adolescents.

Five outcome quality indicators were selected as 'must have', i.e. indicators that are essential for monitoring the centres and assessing the quality of care provided by the PMOCs. All included outcome quality indicators were either evidence-based and/or derived from the scientific literature and/or based on the national guidelines. They were related to the following dimensions: anthropometric parameters, cardiometabolic health, blood pressure, physical activity and quality of life.

In addition to all challenges in creating indicators to assess the quality of care, there are a number of other aspects that need to be taken into account. The management of the data collected by the centres must be organised before the first data collection in order to ensure standardisation between centres. In addition, the first few years should be seen as a testing period during which indicators measurability and interpretability should be tested to allow a further fine-tuning of the indicators.

Possible outcomes of a pilot test are that an indicator is either measurable and interpretable without further adaptation or cannot discriminate between good and bad care. In the latter case, the indicator can be excluded from the indicator set, be reformulated, or be replaced'.[12] It is therefore appropriate to review the set of quality indicators on a regular basis (e.g. every 3 years).

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g https://www.has-sante.fr/jcms/p_3271724/fr/indicateurs-de-vigilance

h Mansky T, Völzke T, Nimptsch U. Improving outcomes using German Inpatient Quality Indicators in conjunction with peer review procedures. Z Evid Fortbild Qual Gesundhwes. 2015;109(9-10):662-70.

i Bundesministerium für Arbeit Soziales Gesundheit und Konsumentenschutz. Austrian Inpatient Quality Indicators (A-IQI). Bericht 2019. Wien: Bundesministerium für Arbeit, Soziales, Gesundheit und Konsumentenschutz,; 2019.

j Office fédéral de la santé publique. Indicateurs de qualité des hôpitaux suisses de soins aigus 2018. Berne: OFSP; 2020.

APPENDICES

APPENDIX 1. THE EDMONTON OBESITY STAGING SYSTEM FOR PEDIATRICS (EOSS-P)

Risk factor	Stage 0	Stage 1	Stage 2	Stage 3
Metabolic	No metabolic abnormalities	Acanthosis nigricans	T2D without diabetes-related complications	T2D with diabetes-related complications, haemoglobin A1c ≥8%
		Impaired glucose tolerance (7.8 mmol/L – 11.0 mmol/L)		
		Impaired fasting glucose (6.1 mmol/L – 6.9 mmol/L)		
		Prehypertension	Hypertension	Uncontrolled hypertension on pharmacotherapy
				Focal segmental glomerulosclerosis
		Lipids at upper end of normal range	Lipids modestly elevated	Elevated lipids requiring pharmacotherapy
		LDL-C or non-HDL-C: 3.4 mmol/L – 4.1mmol/L	LDL-C or non-HDL-C: >4.2 mmol/L	
		HDL-C: 0.8 mmol/L – 1.03 mmol/L	HDL-C: <0.80 mmol/L	
		TG: 1.5 mmol/L– 4.0 mmol/L	TG: >4.0 mmol/L	
		ALT: 1.5–2.0× normal	ALT: 2–3× normal	ALT: >3× normal
		Ultrasound: mild to moderate fatty infiltration of the liver	Ultrasound: severe fatty infiltration of the liver	Liver dysfunction
			PCOS	Cardiomegaly
Mechanical	No functional limitations	Mild OSA not requiring BiPAP or CPAP	OSA requiring BiPAP or CPAP	OSA requiring BiPAP or CPAP and supplementary oxygen overnight; pulmonary hypertension
		Mild MSK pain that does not interfere with activities of daily living	MSK pain and/or complications limiting physical activity;	Limited mobility; Blount's disease; slipped capital femoral epiphysis; osteoarthritis
		Dyspnoea with physical activity not interfering with activities of daily living	Dyspnoea causing moderate limitations in activities of daily living	Dyspnoea when sleeping or sitting
			Gastroesophageal reflux disease	Peripheral oedema

Risk factor	Stage 0	Stage 1	Stage 2	Stage 3
Mental health	No psychopathology	Mild depression or anxiety that does not interfere with functioning	Major depression or anxiety disorder	Uncontrolled psychopathology
		Mild body image preoccupation/concern	Significant body image disturbance	Self/physical loathing
		Mild emotional/binge eating (occasional)	Moderate binge eating (frequent)	Severe binge eating (daily)
		Developmental delay with mild impact on weight management	Developmental delay with moderate impact on weight management	Developmental delay with severe impact on weight management
		ADHD or learning disability		
Social milieu	No parental, familial, or social environment concerns	Occasional bullying at school or at home	Significant bullying at school or at home; poor school attendance	School refusal/absenteeism
		Minor problems in the relationships of the child with one or more family members	Moderate problems with parents, siblings or other family members, frequent arguing, difficulty maintaining positive relationships	Severe problems with parent, siblings or other family members, constant arguing or family violence
		Caregiver is generally knowledgeable of child's needs/strengths but may require information or support in parenting skills	Need for information on parenting skills; current lack of information interfering with ability to parent effectively	Unable to monitor or discipline child
		Caregiver has minimal difficulty organizing household to support needs of child	Moderate difficulty organizing household to support needs of child	Unable to organize household to support needs of child; experienced recent periods of homelessness
		Caregiver is recovering from medical/physical, mental health and/or substance use problems	Medical/physical problems that interfere with parenting; has some mental health, substance use and/or developmental challenges that interfere with parenting	Medical/physical, mental health, substance use or developmental challenges that make it impossible for caregiver to parent effectively
		Mild financial limitations	Moderate financial limitations	Severe financial limitations
				Dangerous home environment; child protection involvement

Legend. EOSS-P: The Edmonton Obesity Staging System for Pediatrics:[7] The EOSS-P can be applied to all children and adolescents with obesity. Individuals are assigned whatever stage is the highest in which they present with any metabolic, mechanical, mental health or social milieu risk factors. ADHD: Attention deficit hyperactivity disorder; ALT: Alanine aminotransferase; BiPAP: Bi-level positive airway pressure; CPAP: Continuous positive airway pressure; HDL-C: High-density lipoprotein cholesterol; LDL-C: Low-density lipoprotein cholesterol; MSK: Musculoskeletal; OSA: Obstructive sleep apnoea; PCOS: Polycystic Ovary Syndrome; T2D: Type 2 diabetes; TG: Triglycerides.

APPENDIX 2. LIST OF SCREENED SCIENTIFIC PAPERS AND GUIDELINES

Scientific papers		
Authors	**Year of publication**	**Title**
Birch	2019	What change in body mass index is associated with improvement in percentage body fat in childhood obesity? A meta-regression[42]
Brown	2019	Interventions for preventing obesity in children (Review)[33]
Butte	2017	Efficacy of a Community- Versus Primary Care–Centered Program for Childhood Obesity: TX CORD RCT[43]
Derwig	2021	A child-centered health dialogue for the prevention of obesity in child health services in Sweden – A randomized controlled trial including an economic evaluation[44]
Ek	2019	A Parent Treatment Program for Preschoolers With Obesity: A Randomized Controlled Trial[45]
Ek	2019	A randomized controlled trial for overweight and obesity in preschoolers: the More and Less Europe study - an intervention within the STOP project[46]
El-Medany	2020	What Change in Body Mass Index Is Required to Improve Cardiovascular Outcomes in Childhood and Adolescent Obesity through Lifestyle Interventions: A Meta-Regression[47]
Flynn	2022	Preventing and treating childhood overweight and obesity in children up to 5 years old: A systematic review by intervention setting[48]
Gallè	2022	Multidisciplinary Treatment for Childhood Obesity: A Two-Year Experience in the Province of Naples, Italy[49]
Hadjiyannakis	2016	The Edmonton Obesity Staging System for Pediatrics: A proposed clinical staging system for paediatric obesity[7]
Kelishadi	2009	Can a Dairy-Rich Diet Be Effective in Long-Term Weight Control of Young Children?[50]
Lanigan	2020	Treatment of childhood obesity: a multidisciplinary approach[51]
Marten	2022	A Multidisciplinary Approach to Pediatric Obesity Shows Improvement Postintervention[52]
Nordlund	2022	Effect of obesity treatment interventions in preschool children aged 2-6 years: a systematic review and meta-analysis[19]
Rifas-Shiman	2017	Two Year Follow-Up of a Primary Care-Based Intervention to Prevent and Manage Childhood Obesity: The High Five for Kids Study[53]
Seo	2019	The Effect of a Multidisciplinary Lifestyle Intervention on Obesity Status, Body Composition, Physical Fitness, and Cardiometabolic Risk Markers in Children and Adolescents with Obesity[54]
Stark	2014	A Pilot Randomized Controlled Trial of a Behavioral Family-Based Intervention With and Without Home Visits to Decrease Obesity in Preschoolers[55]
Stark	2019	Maintenance Following a Randomized Trial of a Clinic and Home-based Behavioral Intervention of Obesity in Preschoolers[56]
Van de Pas	2022	The Effect of a Multidisciplinary Lifestyle Intervention on Health Parameters in Children versus Adolescents with Severe Obesity[57]
Wyse	2022	Evaluating 12 Years of Implementing a Multidisciplinary Specialist Child and Adolescent Obesity Treatment Service: Patient-Level Outcomes[14]
Zolotarjova	2018	Effects of multidisciplinary interventions on weight loss and health outcomes in children and adolescents with morbid obesity[58]

Guidelines and pathways		
Country	**Year of publication**	**Title**
Austria	2016	(Be-)Handlungspfad Übergewicht & Adipositas auf Primärversorgungsebene
Canada	2023	Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents With Obesity [13]
	2015	Recommendations for growth monitoring, and prevention and management of overweight and obesity in children and youth in primary care [59]
France	2022	Guide du parcours de soins : surpoids et obésité de l'enfant et de l'adolescent(e)
Germany	2018	Overweight and obesity among children and adolescents in Germany. Results of the cross-sectional KiGGS Wave 2 study and trends
Switzerland	2014	La prise en charge globale des enfants en surpoids d'après le nouveau modèle suisse
The Netherlands	2018 2022	Obesitas bij kinderen en adolescenten Overgewicht en obesitas bij kinderen: diagnostiek, ondersteuning en zorg voor kinderen met obesitas of overgewicht in combinatie met risicofactoren en/of comorbiditeit
The United Kingdom	2019	Childhood Obesity Care Pathway
The United States	2021	Outpatient Specialty Care and Primary Care Clinical Pathway for Obesity Prevention and Management in Children

APPENDIX 3. LINK BETWEEN EOSS-P STAGES AND OUTCOME INDICATORS

Risk factor	EOSS-P Stage 2	Indicator from literature review	Indicator from CEPOs	Outcome indicators for PMOCs
Metabolic	T2D without diabetes-related complications	• (Fasting) plasma glucose • Insulin resistance: Homeostatic model assessment of insulin resistance (HOMA-IR) • Fasting plasma insulin • Glycated haemoglobin (HbA1c) • Venous blood sample	Zeepreventorium • Comorbidity: Insulin resistance • Comorbidity: (pre-)diabetes Clairs Vallons • Comorbidity: Insulin resistance • Comorbidity: Type 2 diabetes • Comorbidity: blood insulin levels (fasting and after glucose loading)	Appendix 8: Blood Lipids Together with the venous blood sample to determine the lipid profile, the following indicators **could** be measured: • (Fasting) plasma insulin • Glycated haemoglobin (HbA1c) • (Fasting) plasma glucose
	Hypertension	• Blood Pressure (BP): mean value, resting systolic and diastolic blood pressure while sitting	Zeepreventorium • Blood pressure Clairs Vallons • Blood pressure	Appendix 9: Blood Pressure (BP) • With oscillometric and/or auscultatory method
	Lipids modestly elevated	• Dyslipidaemia: venous blood sample to determine (Fasting) total cholesterol (TC) • Abnormal values of TC were determined as ≥ 5.2 mmol/L	Zeepreventorium • Lipid profile Clairs Vallons • Lipid profile	Appendix 8: Blood Lipids • Venous blood sample
	Low-density lipoprotein (LDL-C) or non-HDL-C: >4.2 mmol/L	• Dyslipidaemia: venous blood sample for LDL • Abnormal values of LDL were determined as ≥3.4 mmol/L	Zeepreventorium • Lipid profile Clairs Vallons • Lipid profile	Appendix 8: Blood Lipids • Venous blood sample
	High-density lipoprotein (HDL-C): <0.80 mmol/L	• Dyslipidaemia: venous blood sample for HDL • Abnormal values of HDL were determined as <1.0 mmol/L	Zeepreventorium • Lipid profile Clairs Vallons • Lipid profile	Appendix 8: Blood Lipids • Venous blood sample
	Triglycerides (TG): >4.0 mmol/L	• Dyslipidaemia: venous blood sample for TG • Abnormal values of TG were determined as ≥1.5 mmol/L	Zeepreventorium • Lipid profile Clairs Vallons • Lipid profile	Appendix 8: Blood Lipids • Venous blood sample
	Alanine aminotransferase (ALT): 2–3× normal	• Dyslipidaemia: venous blood sample: to determine ALT	Clairs Vallons • AST blood test • SGPT blood test	Appendix 8: Blood Lipids • Together with the venous blood sample to determine the lipid profile, the

Risk factor	EOSS-P Stage 2	Indicator from literature review	Indicator from CEPOs	Outcome indicators for PMOCs
		• Abnormal values > 22 U/L (0.37 µkat/L) for females and 0.43 µkat/L for males were determined		following indicators could be measured: ALT
	Ultrasound: severe fatty infiltration of the liver	/	Clairs Vallons • Comorbidity: Non-alcoholic steatohepatitis	/
Mechanical	OSA requiring BiPAP or CPAP	/	Zeepreventorium • Comorbidity: obstructive sleep apnoea	/
	MSK pain and/or complications limiting physical activity	Physical Activity (PA): • Accelerometers, with epochs set to 15s were worn for 7 days, with a minimum of 3 days of data required for inclusion in analysis	Zeepreventorium • Functional fitness Bruininks-Oseretsky test of motor skill (BOT2) • Comorbidity: disabling musculoskeletal pain Clairs Vallons • Eurofit test • Comorbidity: musculoskeletal pain	/
	Dyspnoea causing moderate limitations in activities of daily living	Physical Activity (PA): • Average daily minutes of moderate and vigorous activity • Global Physical Activity Questionnaire (GPAQ)	Zeepreventorium • 6-minute walk test (6-MWT) • Incremental shuttle walking test • Cooper test • Behavioural regulation in exercise questionnaire version 2 (BREQ2) • Comorbidities: exertional dyspnoea Clairs Vallons • Eurofit test • Comorbidity: exercise-induced dyspnoea	Appendix 10: Physical Activity (PA) • The 6-MWT needs to be performed as a shuttle test.
Mental health	Major depression or anxiety disorder	• Depression: Children's Depression Inventory (CDI) • Psychosocial status: Quality of life: Parent-reported survey & Self-reported	Zeepreventorium • PedsQL • Youth Self Report (YSR): sum, internalising, externalising • Psychosocial balance	Appendix 11: Quality of Life • The EQ-5D-Y is a child-friendly version of the widely used EQ-5D generic measure of health status and is freely available.

Risk factor	EOSS-P Stage 2	Indicator from literature review	Indicator from CEPOs	Outcome indicators for PMOCs
	Significant body image disturbance	survey: Paediatric Quality of Life Inventory (PedsQL)	Clairs Vallons • Self-esteem Coopersmith test	• It consists of two parts. 1) The first part assesses health in five dimensions (Mobility; Looking After Myself; Doing Usual Activities; Having Pain or Discomfort; Feeling Worried, Sad or Unhappy) 2) The second part of the questionnaire consists of a visual analogue scale (VAS) on which the respondent rates his/her perceived health.
	Moderate binge eating (frequent)	Diet: dietary intake: • 3 random 24-h dietary recalls (2 weekdays and 1 weekend) with the child's parent over a 2-week period using the multiple-pass method • Average daily caloric intake calculated based on dietary intake	Zeepreventorium • Eating Disorder Examination Questionnaire (EDE-Q) Clairs Vallons • Comorbidity with psychiatric disorders (eating disorders)	/
	Developmental delay with moderate impact on weight management	• Developmental and/or pedagogical delays	Zeepreventorium • Developmental and/or pedagogical delays • Demonstrated behavioural and/or emotional disorder Clairs Vallons • WISC (Wechsler Intelligent Scale)	

Risk factor	EOSS-P Stage 2	Indicator from literature review	Indicator from CEPOs	Outcome indicators for PMOCs
Social milieu	Significant bullying at school or at home; poor school attendance Moderate problems with parents, siblings or other family members, frequent arguing, difficulty maintaining positive relationships	• Quality of life: Parent-reported survey & Self-reported survey: Paediatric Quality of Life Inventory (PedsQL) • Psychosocial status: Strengths and Difficulties Questionnaire (SDQ): Generates scores for conduct problems, hyperactivity-inattention, emotional symptoms, peer problems, and prosocial behaviour that are summed to a total difficulties score	Zeepreventorium • Quality of life: Parent-reported survey & Self-reported survey: Paediatric Quality of Life Inventory (PedsQL) • Youth Self Report (YSR): sum, internalising, externalising • Psychosocial balance • Child Behaviour Checklist (CBCL) Clairs Vallons • School attendance • Education delay • Global Assessment of Functioning	Appendix 11: Quality of Life • The EQ-5D-Y is a child-friendly version of the widely used EQ-5D generic measure of health status and is freely available. • It consists of two parts. 1) The first part assesses health in five dimensions (Mobility; Looking After Myself; Doing Usual Activities; Having Pain or Discomfort; Feeling Worried, Sad or Unhappy) 2) The second part of the questionnaire consists of a visual analogue scale (VAS) on which the respondent rates his/her perceived health
	Need for information on parenting skills	• Parenting Styles and Dimensions questionnaire (PSDQ)	Zeepreventorium • Inadequate pedagogical support	/
	Moderate difficulty organizing household to support needs of child	• Parenting Styles and Dimensions questionnaire (PSDQ) • Child Feeding Questionnaire (CFQ)	Zeepreventorium • Parenting Load Questionnaire (OBVL)	/
	Medical/physical problems that interfere with parenting; has some mental	• Child Feeding Questionnaire (CFQ)	Zeepreventorium • Parenting Load Questionnaire (OBVL) Clairs Vallons • /	/

Risk factor	EOSS-P Stage 2	Indicator from literature review	Indicator from CEPOs	Outcome indicators for PMOCs
	health, substance use and/or developmental challenges that interfere with parenting			
	Moderate financial limitations	• Socio-Economic Position (SEP) • Monthly household income • Education level	Zeepreventorium • SES according to EU-SILC criteria Clairs Vallons • Presence of family risk factors	/

Legend. ALT: Alanine aminotransferase; AST: Aspartate aminotransferase; BiPAP: Bi-level positive airway pressure; BOT2: Functional fitness Bruininks-Oseretsky test of motor skills; BMI: Body Mass Index; BP: Blood Pressure; BREQ2: Behavioural regulation in exercise questionnaire version 2; CBCL: Child Behaviour Checklist; CDI: Children's Depression Inventory; CEPO: Centres of Expertise for Paediatric Obesity Management; CFQ: Child Feeding Questionnaire; CPAP: Continuous positive airway pressure; CTFEQr17: Child Three-Factor Eating Questionnaire; EDE-Q: Eating Disorder Examination Questionnaire; EOSS-P: Edmonton Obesity Staging System for Paediatrics; EU-SILC: European Union Statistics on Income and Living Conditions; GPAQ: Global Physical Activity Questionnaire; HbA1c: Glycated haemoglobin; HDL-C: High-density lipoprotein cholesterol; HOMA-IR: Homeostatic model assessment of insulin resistance; LDL-C: Low-density lipoprotein cholesterol; MSK: Musculoskeletal; OBVL: Parenting Load Questionnaire; OSA: Obstructive sleep apnoea; PA: Physical Activity; PedsQL: Paediatric Quality of Life Inventory; PMOC: Paediatric Multidisciplinary Obesity Management Centre; PSDQ: Parenting Styles and Dimensions questionnaire; SDQ: Strengths and Difficulties Questionnaire; SEP: Socio Economic Position; SES: Socio Economic Status; SGT:P serum glutamic-pyruvic transaminase; TG: Triglycerides; T2D: Type 2 diabetes; QI: Quality Indicator; VAS: Visual Analogue Scale; WISC: Wechsler Intelligent Scale; YSR: Youth Self Report; 6-MWT: 6-minute walk test. The elements for which a must have outcome quality indicator (QI) was identified in consensus with the QI working group are indicated in blue.

APPENDIX 4. ELEMENTS OF THE STRUCTURE DESCRIBED AS ELIGIBILITY CRITERIA IN THE NIHDI AGREEMENT (NL/FR)

Component of the structure		Description	
In Dutch	In French	In Dutch	In French
Activiteitsvolume	**Volume d'activité**	Het PMOC streeft bij opstart ten minste 100 rechthebbenden (ouder dan 2 jaar en jonger dan 18 jaar) met obesitas permanent in regelmatige behandeling te hebben. Indien dit cijfer bij opstart niet bereikt kan worden, kan bij wijze van overgangsmaatregel aanvaard worden dat het cijfer van 100 rechthebbenden in behandeling pas vanaf het 2de jaar bereikt wordt. Na een opstartfase van 1 jaar wordt een groei nagestreefd over een periode van 3 jaar, rekende vanaf de datum van toetreding tot de overeenkomst, tot een totaal aantal van 200 rechthebbenden permanent in regelmatige behandeling per PMOC. Het PMOC kan het minimumaantal rechthebbenden per jaar voorleggen aan de Dienst voor geneeskundige evaluatie en controle van het RIZIV. Indien een PMOC gedurende twee opeenvolgende kalenderjaren niet meer aan dit criterium beantwoordt, zal dit –na een evaluatie waaruit ter zake geen goede prognose naar voren komt- een motief vormen om deze overeenkomst op te zeggen, mits een vooropzeg van 6 maanden zodat het PMOC de nodige maatregelen kan nemen om de continuïteit van de zorgverlening te verzekeren. Gedurende deze periode kan het PMOC geen nieuwe rechthebbenden includeren in de overeenkomst.	Dès le départ, le CPMO doit avoir au moins 100 bénéficiaires (de plus de 2 ans et de moins de 18 ans) souffrant d'obésité en permanence en traitement régulier. Si ce chiffre ne peut être atteint au démarrage, il peut être accepté comme mesure transitoire que le chiffre de 100 bénéficiaires en traitement ne soit atteint qu'à partir de la 2ième année. Après une phase de démarrage d'un an, l'objectif est de parvenir à une croissance sur une période de trois ans, à compter de la date de l'entrée en vigueur de la convention, pour atteindre un nombre total de 200 bénéficiaires en permanence en traitement régulier par CPMO. Le CPMO peut soumettre le nombre minimal de bénéficiaires par an au Service d'évaluation et de contrôle médicaux de l'INAMI. Si pendant deux années civiles consécutives, un CPMO ne répond plus à ce critère, ceci constituera un motif de résiliation de la présente convention - après une évaluation dont il ressort que le pronostic n'est pas bon -, moyennant un préavis de six mois afin de permettre au CPMO de prendre les mesures nécessaires pour assurer la continuité des soins. Pendant cette période, le CPMO ne peut pas inclure de nouveaux bénéficiaires dans la convention.
Team-samenstelling	**Composition de l'équipe**	Het PMOC beschikt over een multidisciplinair team met expertise in kinderobesitas en kennis rond preventie van eetstoornissen.	Le CPMO dispose d'une équipe multidisciplinaire possédant une expertise en obésité infantile et des connaissances en prévention des troubles alimentaires.

Component of the structure		Description	
In Dutch	In French	In Dutch	In French
		Bij opstart van het centrum dient elk centrum een basisopleidingsaanbod van 4 dagen te volgen, georganiseerd door de Belgian Association for the Study of Obesity (BASO), het Centre d'Expertise Poids Image du Corps et Alimentation (CEPIA) of Eetexpert. De volgende jaren dient elk lid van het multidisciplinair team (arts, diëtist, psycholoog, kinesitherapeut), met uitzondering van de sociaal werker of sociaal verpleegkundige en de administratief assistent, minstens 8 uur bijscholing per jaar rondom obesitas bij kinderen te volgen. Deze bijscholingsactiviteiten dienen CP of CME goedgekeurde activiteiten te zijn. Binnen het PMOC moet beroep kunnen gedaan worden op de volgende disciplines: • Kinderarts, eventueel gespecialiseerd in endocrinologie of ten minste met een bijzondere expertise in kinderobesitas; • Gespecialiseerde diëtist met ofwel minstens 5 jaar ervaringen in het begeleiden van kinderen van overgewicht ofwel met een opleidingscertificaat afgegeven door een van de bovenstaande opleidingsinstituten; • Psycholoog met ofwel minstens 5 jaar ervaring in het begeleiden van het jonge kind en de adolescent, ofwel gespecialiseerd voor kinderen; én met ofwel minstens 5 jaar ervaringen in het begeleiden van kinderen van overgewicht, ofwel met een opleidingscertificaat afgegeven door een van de bovenstaande opleidingsinstituten. De psycholoog is ook vertrouwd met de aanpak van eetbuien; • Kinesitherapeut met bekwaming in pediatrische kinesitherapie; ▪ Bij kinderen jonger dan 12 jaar: ✓ een kinesitherapeut met bijzondere bekwaamheid pediatrische kinesitherapie ofwel een kinesitherapeut met voldoende ervaring (5 jaar) en/of opleidingen in pediatrische	Lors de la phase de démarrage, chaque centre doit participer à une formation de base de 4 jours organisée par la Belgian Association for the Study of Obesity (BASO), le Centre d'Expertise Poids Image du Corps et Alimentation (CEPIA) ou Eetexpert. Les années suivantes, chaque membre de l'équipe multidisciplinaire (médecin, diététicien, psychologue, kinésithérapeute), à l'exception du travailleur social ou de l'infirmier social et de l'assistant administratif, doit suivre au minimum 8 heures de formation continue en matière d'obésité chez les enfants. Ces activités de formation continue doivent être des activités CP ou CME approuvées. Au sein du CPMO, on doit pouvoir faire appel aux disciplines suivantes : • Un pédiatre, éventuellement spécialisé en endocrinologie ou ayant au moins un intérêt particulier pour l'obésité pédiatrique ; • Un diététicien spécialisé ayant soit au moins 5 ans d'expérience dans l'accompagnement d'enfants en surpoids, soit un certificat de formation délivré par l'un des instituts de formation ci-dessus ; • Un psychologue ayant au moins 5 ans d'expérience dans le conseil aux jeunes enfants et adolescents, ou étant spécialisé auprès des enfants ; et ayant soit au moins 5 ans d'expérience dans l'encadrement d'enfants en surpoids, soit une attestation délivrée par l'un des instituts de formation ci-dessus. Le psychologue a également une connaissance des crises de boulimie. • Un kinésithérapeute porteur d'une qualification en kinésithérapie pédiatrique ; ▪ Chez les enfants de moins de 12 ans : ✓ un kinésithérapeute ayant une qualification particulière en kinésithérapie pédiatrique ou un kinésithérapeute ayant une expérience suffisante (5 ans) et/ou une formation en kinésithérapie pédiatrique, qui a également reçu

Component of the structure		Description	
In Dutch	**In French**	**In Dutch**	**In French**
		kinesitherapie, die tevens een opleiding heeft genoten over overgewicht en obesitas bij kinderen; ▪ Bij kinderen tussen 12 en 18 jaar: ✓ een kinesitherapeut met bijzondere bekwaamheid pediatrische kinesitherapie ofwel een kinesitherapeut met voldoende ervaring (5 jaar) en/of opleidingen in pediatrische kinesitherapie; ✓ ofwel een sportkinesitherapeut die tevens een opleiding heeft genoten over overgewicht en obesitas bij kinderen; ▪ met een expertise in (kinder)obesitas • Sociaal werker of sociaal verpleegkundige; • Administratief assistent; • PMOC-coördinator. Voor een PMOC wordt verwacht dat het beschikt over een omkadering van minstens 1,8 VTE per 100 rechthebbenden die in het kader van obesitas worden opgevolgd. Het multidisciplinair team moet ten minste één keer per trimester vergaderen.	une formation sur le surpoids et l'obésité chez l'enfant ; ▪ Chez les enfants entre 12 et 18 ans : ✓ un kinésithérapeute ayant une qualification particulière en kinésithérapie pédiatrique ou un kinésithérapeute ayant une expérience suffisante (5 ans) et/ou une formation en kinésithérapie pédiatrique ; ✓ Soit un kinésithérapeute du sport qui a également suivi une formation sur le surpoids et l'obésité chez l'enfant ; ▪ avec une expertise dans l'obésité (chez l'enfant) • Un travailleur social ou un infirmier social; • Un assistant administrative; • Un coordinateur CPMO. Pour un CPMO, on attend qu'il dispose d'un encadrement d'au moins 1,8 ETP pour 100 bénéficiaires suivis dans le cadre de l'obésité. L'équipe multidisciplinaire doit se réunir au moins une fois par trimestre.
Voorzieningen	**Installations**	In hetzelfde gebouw: • Individuele consultatie- en gespreksruimten • Ruimte voor groepssessies • Vergaderzaal • Secretariaatsruimte	Dans le même bâtiment : • Espaces de consultation et d'entretien individuels • Espace pour des séances de groupe • Salle de réunion • Secrétariat

Legend. These criteria are extracted from the agreement proposal drafted by the NIHDI and sent to the Working Group on 25 August 2023 for validation

APPENDIX 5. ELEMENTS OF THE PROCESS DESCRIBED AS ELIGIBILITY CRITERIA IN THE NIHDI AGREEMENT (NL/FR)

Component of the process		Description	
In Dutch	In French	In Dutch	In French
Multidisciplinair zorgtraject	**Trajet de soins multidisciplinaire**	Het multidisciplinair zorgtraject dient obligaat steeds de vijf volgende luiken te omvatten, die gerealiseerd worden door het team van de PMOC: 1) De uitgebreide beoordeling van de rechthebbende, inclusief comorbiditeiten, psychosociale context en emotionele stress; 2) Het opstellen van een individueel behandelplan voor de rechthebbende en/of zijn gezin; 3) De sociale en emotionele begeleiding van de rechthebbende en zijn naaste omgeving; 4) Intensieve, gezinsgerichte counseling en leefstijl-/gedragsinterventie organiseren met bevorderen van een gezonde levensstijl (voedingspatroon, beweging, lichaamstevredenheid, zelfbeleving, emotieregulatie en slaap); 5) Het instellen van regelmatige vervolgafspraken ter stimulering en follow-up van de therapietrouw.	Le trajet de soins multidisciplinaire doit obligatoirement toujours comporter les cinq volets suivants, qui sont réalisés par l'équipe du CPMO : 1) L'évaluation détaillée du bénéficiaire, ainsi que des comorbidités, du contexte psychosocial et du stress émotionnel ; 2) La rédaction d'un plan de traitement individuel pour le bénéficiaire et/ou sa famille ; 3) L'accompagnement social et émotionnel du bénéficiaire et de son entourage proche ; 4) Des conseils intensifs axés sur la famille et des interventions sur le mode de vie/comportements visant à promouvoir un mode de vie sain (régime alimentaire, activité physique, satisfaction corporelle, perception de soi, régulation des émotions et sommeil) ; 5) L'organisation de rendez-vous de suivi réguliers pour stimuler et suivre l'adhésion au traitement médical.
Contacten	**Contacts**	Indien de rechthebbende wordt opgevolgd in het tweede niveau, gelden volgende voorwaarden om het multidisciplinair zorgtraject te realiseren: • De rechthebbende heeft bij opstarten van de overeenkomst en vervolgens jaarlijks één multidisciplinair contact met alle disciplines van het PMOC-team. Dit multidisciplinair contact heeft een minimumduur van 20 minuten per rechthebbende. • De overige contactmomenten in de PMOC kunnen met één of meerdere leden van het team zijn. De contactmomenten zijn flexibel inzetbaar en variëren van maandelijks tot minimum om de 3 maanden en zijn met de teamleden, waar de rechthebbende het meeste nood aan heeft.	Si le bénéficiaire est suivi au deuxième niveau, les conditions suivantes s'appliquent pour réaliser le trajet de soins multidisciplinaire : • Un contact multidisciplinaire avec toutes les disciplines de l'équipe CPMO est prévu au début de la convention et puis annuellement. Ce contact multidisciplinaire a une durée minimale de 20 minutes par bénéficiaire. • Les autres moments de contact dans le CPMO peuvent être organisés avec un ou plusieurs membres de l'équipe. Les moments de contact peuvent être planifiés de manière flexible et varient de une fois par mois à au moins tous les 3 mois et sont avec les membres de l'équipe dont le bénéficiaire a le plus besoin. • Un maximum de douze contacts avec un dispensateur de soins de l'équipe sont remboursés par an. Ce

		• Er zijn maximaal twaalf contacten met een zorgverlener van het team per jaar vergoed. Dit maximum geldt voor het geheel van het PMOC en geen maximum voor iedere zorgverlener afzonderlijk.	maximum s'applique à l'ensemble du CPMO et n'est pas un maximum pour chaque dispensateur de soins individuellement.
Verwijzingsproces	**Procédure de référence**	• De rechthebbende wordt doorverwezen door de huisarts of kinderarts uit het eerste niveau of door een arts uit het CLB, ONE, of Kind en Gezin, enz. • De rechthebbende met een inschaling EOSS-P 2 of 3 wordt verder opgevolgd in het PMOC met een multidisciplinair zorgtraject. Zo nodig kan de rechthebbende met EOSS-P 2 of 3 worden doorverwezen naar het derde zorgniveau. • De rechthebbende met een inschaling EOSS-P 0 of 1 wordt in het eerste niveau opgevolgd, maar de behandelend arts uit het eerste niveau kan een advies aanvragen aan een PMOC (cfr. artikel 13). Na een eerste intake kan de rechthebbende die ingeschaald in EOSS-P-2 of meer verder behandeld worden in het PMOC, maar hij wordt terugverwezen naar het eerste niveau indien EOSS-P 0 of 1 bevestigd wordt. Het tweede niveau dient tijdens deze periode het eerste niveau te ondersteunen en adviseren waar nodig.	• Le bénéficiaire est renvoyé par le médecin généraliste, le pédiatre du premier niveau ou par un médecin du CLB, de l'ONE, de Kind en Gezin, etc. • Le bénéficiaire de stade EOSS-P 2 ou 3 continue à être suivi dans le CPMO avec un trajet de soins multidisciplinaire. Si nécessaire, le bénéficiaire de stade EOSS-P 2 ou 3 peut être renvoyé vers le troisième niveau de soins. • Le bénéficiaire de stade EOSS-P 0 ou 1 est suivi dans le premier niveau, mais le médecin traitant peut demander un avis au CPMO (cf. article 13). Après un premier accueil, le bénéficiaire évalué EOSSP-2 ou plus continue à être traité dans le CPMO, mais il est renvoyé vers le premier niveau si l'EOSS-P 0 ou 1 est confirmé. Pendant cette période, le deuxième niveau doit soutenir et conseiller le premier niveau si nécessaire.

Legend. These criteria are extracted from the agreement proposal drafted by the NIHDI and sent to the Working Group on 25 August 2023 for validation

APPENDIX 6. CONTENT OF THE TECHNICAL DATASHEET OF THE MUST-HAVE OUTCOME INDICATORS

Title	Labelling of the outcome indicator
Sources	Scientific literature on which the rationale is based and, where data are available, the target to be achieved.
Rationale	Arguments, based on the scientific literature, used to justify the relevance of the selected indicator.
Type of QI	Structure / Process / Outcome
Data collection	• Type of data collection and recording (e.g. data is collected prospectively and recorded in the patient's electronic file). • Frequency and recurrence of data collection (e.g. data is collected systematically when the patient enters the programme and after one year's follow-up. Depending on the indicator, data may be collected every 3 months). • Key data used to couple databases or to ensure a longitudinal follow-up (e.g. The NISS code).
Measurement	Based on the literature, give precise indications on how to measure the indicator and which instrument is recommended.
Calculations	If the indicator is a derivate of certain measurements, the calculations on how to obtain the indicator are given. The PMOCs should only carry out the basic measurements to obtain the indicator. All calculations and derivates can be obtained afterwards.
Technical definitions	Depending on the indicators, some technical definitions may need to be clarified, particularly if the population needs to be distinguished by age or gender.
Subgroup analyses	Depending on the indicators, some sub-group analyses may be relevant.
Reporting of results	Description of the way results will be recorded including units of measurement: • Data are prospectively recorded in the Electronic Patient File at least at entry and at 1-year follow-up. • Units of measurement (cm, kg, etc.)
Target	Target to be reached by PMOCs after one year of monitoring by the NIHDI. For this project where no targets to reach were found in the scientific literature, the targets were defined in consensus with the Working Group QI after having consulted guidelines and reports about the evaluation of multidisciplinary pathways (including the Sciensano audit for diabetic young people).
Benchmarking	Possibility to compare results for children and adolescents managed in PMOCs with other centres e.g. reference centres specialised in the care of children and adolescents (<18 years) with diabetes (audit carried out by Sciensano) or the third level centres (Zeepreventorium and Clairs Vallons)
Comments	Information on data limitations or suggestions for additional data collection or research. Suggestions should be interpreted as 'nice to have' additions. In the definition of outcome indicators, process indicators are implicit[k]. For example, when it is specified that the health outcome of the indicator should be measured at the beginning and then every 3 months and/or at the end, this can be seen as a process indicator, as it enables the process of collecting and recording measurements to be measured.

[k] Comment from an expert during validation process

APPENDIX 7. QI 1 – THE PROPORTION OF CHILDREN AND ADOLESCENTS WITH A STABILISATION OR AT LEAST A 0.5 DIMINUTION OF THE BMI Z-SCORE AT 1-YEAR FOLLOW-UP

Appendix 7.1. Technical sheet

Title	The proportion of children and adolescents with a stabilisation or at least a 0.5 diminution of the Body Mass Index (BMI) z-score at 1-year follow-up
Sources	• Birch (2019)[42] • Cole (2022)[60] • Bryant (2018)[61] • Cole (2012)[62] • Cole (2000)[63] **International guidelines** • The United States: Hampl (2023)[13] • The United Kingdom: Battersby (2019)[20] • Switzerland: Farpour-Lambert (2006)[22] • The Netherlands: Federatie Medisch Specialisten (2022)[23] • France: Haute Autorité de Santé (HAS) (2022)[24] • Canada: Canadian Task Force on Preventive Health (2015)[21] & Johnston (2022)[25] • Germany: Schienkiewitz (2019)[26] • Austria: Siebenhofer-Kroitzsch (2016)[27]
Rationale	During childhood, all measurements over time are complicated by the influence of growth, meaning that cut-offs routinely used in the adult population cannot be used in children and adolescents. However, measured values of body mass index (BMI) can be standardised into z-scores with respect to reference populations. These standardised scores provide a normalised measurement for the degree of obesity in children and adolescents, indicating to what degree an individual Body Mass Index (BMI) lies above or below the median BMI.[42] Abroad, some child and adolescent overweight and obesity pathways use reduction or stabilisation of BMI z-score as a Quality Indicator (QI) outcome.[13, 20-27]
Type of QI	Outcomes
Data collection	• Age (date of birth) and gender are recorded in the Electronic Patient File at entry. • Data of height and weight are prospectively recorded in the Electronic Patient File at least at entry and then at a 3-month interval (0, 3, 6, 9, 12). • The NISS code allows a longitudinal follow-up.

Measurement	• Height : Standard anthropometric procedures[42]
	  ○ Using a stadiometer
	  ○ By child health care professionals
	  ○ Recorded in centimetres and rounded to the nearest 1 decimal point
	  ○ Child needs to be barefoot
	  ○ Same equipment used for each measurement

Title	The proportion of children and adolescents with a stabilisation or at least a 0.5 diminution of the Body Mass Index (BMI) z-score at 1-year follow-up
	○ Replication as quality control • Weight: Standard anthropometric procedures[42] ○ Using a correctly calibrated weight scale ○ By child health care professionals ○ Recorded in kilograms and rounded to the nearest 1 decimal point ○ Child needs to be barefoot ○ Child only wearing underwear or light clothes ○ Same equipment used for each measurement ○ Replication as quality control
Calculations	• The age is derived from the date of birth in years and months. • BMI is calculated as the ratio of weight to height squared (kg/m^2). • The calculation of the BMI and derivates, as well as the benchmarking with international standards, need to be done after collection of the data, at the platform back-end. • **The proportion of children and adolescents with a stabilisation or at lest a 0.5 diminution of the BMI z-score at 1-year follow-up.** • The formula for calculating the BMI z-score according to the World Health Organisation (WHO) is z-score = (X-m)/SD, in which X is the observed value (height, weight or BMI), m and SD are the mean and standard deviation value of the distribution corresponding the reference population.
Technical definitions	The PMOCs will only be asked to obtain the baseline data (age, gender, height and weight). The calculations and benchmarking towards national and international reference values will be done afterwards by the responsible data-analyst. The most pertinent benchmarks: • BMI-for-age Growth Charts: https://www.cdc.gov/growthcharts/extended-bmi.htm ○ For Flanders: https://eetexpert.be/vlaamse-groeicurven/ ○ For Wallonia: https://www.one.be/fileadmin/user_upload/siteone/PRO/Suivi_de_la_sante/carnet_sante_enfant_0-18ans_2019.pdf ○ Calculator: https://mngsbe.github.io/zscore.be/[64] • Reference values for reduction in BMI z-scores: https://www.who.int/tools/growth-reference-data-for-5to19-years/indicators/bmi-for-age
Subgroup analyses	• For BMI: by age. • For BMI z-score: by age: number of SD's from the median value. • By age group[42] ○ Children 0 – 5 years ○ Children 6 – 11 years ○ Adolescents 12 – 18 years
Reporting of results	• Data are prospectively recorded in the Electronic Patient File at least at entry and at 1-year follow-up. • Height: recorded in centimetres and rounded to the nearest 1 decimal point. • Weight: recorded in kilograms and rounded to the nearest 1 decimal point.
Target	• 90% of children and adolescents have a result for this indicator at the start and at 1-year follow-up. • 30% of children and adolescents with a stabilisation or at least 0.5 reduction of the BMI z-score at 1-year follow-up.[42]
Benchmarking	• Percentage of children and adolescents that have a result for this indicator at the start and at 1-year follow-up.

Title	The proportion of children and adolescents with a stabilisation or at least a 0.5 diminution of the Body Mass Index (BMI) z-score at 1-year follow-up
	• Possibility to compare results for children and adolescents managed in Paediatric Multidisciplinary Obesity Centres (PMOCs) with those obtained in reference centres specialised in the care of children and adolescents (<18 years) with diabetes (audit carried out by Sciensano) and with those obtained in third level centres (Zeepreventorium and Clairs Vallons) and with national and international benchmarks and reference tables (see technical definitions).
Comments	To understand interactions between eating and health and to develop nutritional prevention programs in the context of the global obesity epidemic, better in-depth knowledge of all the aspects of the EOSS-P 4Ms is necessary (see 4.2.2 and Appendix 3).

Appendix 7.2. International cut-off points for body mass index for overweight and obesity by sex between 2 and 18 years

Age (years)	Body mass index (overweight)		Body mass index (obesity)	
	Boys	Girls	Boys	Girls
2	18.41	18.02	20.09	19.81
2.5	18.13	17.76	19.80	19.55
3	17.89	17.56	19.57	19.36
3.5	17.69	17.40	19.39	19.23
4	17.55	17.28	19.29	19.15
4.5	17.47	17.19	19.26	19.12
5	17.42	17.15	19.30	19.17
5.5	17.45	17.20	19.47	19.34
6	17.55	17.34	19.78	19.65
6.5	17.71	17.53	20.23	20.08
7	17.92	17.75	20.63	20.51
7.5	18.16	18.03	21.09	21.01
8	18.44	18.35	21.60	21.57
8.5	18.76	18.69	22.17	22.18
9	19.10	19.07	22.77	22.81
9.5	19.46	19.45	23.39	23.46
10	19.84	19.86	24.00	24.11
10.5	20.20	20.29	24.57	24.77
11	20.55	20.74	25.10	25.42
11.5	20.89	21.20	25.58	26.05
12	21.22	21.68	26.02	26.67
12.5	21.56	22.14	26.43	27.24
13	21.91	22.58	26.84	27.76
13.5	22.27	22.98	27.25	28.20
14	22.62	23.34	27.63	28.57
14.5	22.96	23.66	27.98	28.87
15	23.29	23.94	28.30	29.11
15.5	23.60	24.17	28.60	29.29
16	23.90	24.37	28.88	29.43
16.5	24.19	24.54	29.14	29.56
17	24.46	24.70	29.41	29.69
17.5	24.73	24.85	29.70	29.84
18	25.00	25.00	30.00	30.00

International cut off points for body mass index for overweight and obesity by sex between 2 and 18 years, defined to pass through body mass index of 25 and 30 kg/m^2 at age 18, obtained by averaging data from Brazil, Great Britain, Hong Kong, Netherlands, Singapore, and United States.[62]

Appendix 7.3. Relationship between BMI and body fat and the relative effectiveness of interventions to reduce BMI[42]

Children aged 0 to 5 years

- There is moderate-certainty that diet combined with physical activity interventions, compared with control, reduced BMI (mean difference (MD) -0.07 kg/m^2, 95% confidence interval (CI) -0.14 to -0.01).
- Neither diet (moderate-certainty evidence) nor physical activity interventions alone (high-certainty evidence) compared with control reduced BMI (physical activity alone: MD -0.22 kg/m^2, 95%CI -0.44 to 0.01).
- There is moderate-certainty that diet combined with physical activity interventions, compared with control, reduced BMI z-score (MD -0.11, 95% CI -0.21 to 0.01).
- Neither diet (moderate-certainty evidence) nor physical activity interventions alone (high-certainty evidence) compared with control reduced BMI z-score (diet alone: MD -0.14, 95% CI -0.32 to 0.04; physical activity alone: MD 0.01, 95% CI -0.10 to 0.13).

Children aged 6 to 11 years

- There is moderate-certainty that physical activity interventions, compared with control, reduced BMI (MD -0.10 kg/m^2, 95% CI -0.14 to -0.05).
- There is moderate-certainty evidence that physical activity interventions had little or no effect on BMI z-score (MD -0.02, 95% CI -0.06 to 0.02).
- There is low-certainty that diet combined with physical activity interventions, compared with control, reduced BMI z-score (MD -0.05 kg/m^2, 95% CI -0.10 to -0.01).
- There is high-certainty evidence that diet interventions, compared with control, had little impact on BMI z-score (MD -0.03, 95% CI -0.06 to 0.01) or BMI (-0.02 kg/m^2, 95% CI -0.11 to 0.06).

Adolescents aged 12 to 18 years

- There is very low-certainty evidence that physical activity interventions, compared with control reduced BMI (MD -1.53 kg/m^2, 95% CI -2.67 to -0.39).
- There is low-certainty evidence that diet combined with physical activity interventions, compared with control, had no effect on BMI (MD -0.02 kg/m^2, 95% CI -0.10 to 0.05).
- There is low-certainty evidence that physical activity interventions, compared with control reduced BMI z-score (MD -0.2, 95% CI -0.3 to -0.1).
- There is low-certainty evidence that diet combined with physical activity interventions, compared with control, had no effect on BMI z-score (MD 0.01, 95% CI -0.05 to 0.07).

Overall changes in BMI-SDS needed to see any significant effect

- Reduction in mean BMI-SDS of >0.6 to reduce adiposity.
- Reduction in mean BMI-SDS of >0.7 to reduce Triglycerides (TG).
- Reduction in mean BMI-SDS of >1.0 to reduce Systolic Blood Pressure (SBP).
- Reduction in mean BMI-SDS of >1.2 to reduce Low-Density Lipoprotein Cholesterol (LDL-C).
- Reduction in mean BMI-SDS of ≥0.25 and ≥0.5 (doubled effect) after 3, 6, and 12 months.

APPENDIX 8. QI 2 – THE PROPORTION OF CHILDREN AND ADOLESCENTS WITH NORMAL BLOOD LIPID VALUES AT 1-YEAR FOLLOW-UP

Appendix 8.1. Technical sheet

Title	The proportion of children and adolescents with normal blood lipids values at 1-year follow-up
Sources	• Nielsen (2017)[34] • Gujral (2023)[65] • de Simone (2022)[66] • Umer (2017)[67] • Dathan-Stumpf (2016)[68] • Lee (2012)[69] • Kavey (2003)[70]
Rationale	While in the general paediatric population the presence of abnormal lipid values is estimated at 8–20%, depending on the population, accepted norms and age, it was shown that in the population of lean children and adolescents the prevalence of dyslipidaemia is lower than in children and adolescents with obesity, in whom it ranges from 20% to over 40%.[34, 67, 68] The risk of developing lipid disorders is 2.8 times higher in children and adolescents with obesity (BMI > 90th percentile) than in children and adolescents with normal body weight.[34] Co-occurrence of excess body weight and lipid disorders was assessed in many populations.[34, 67, 68] The serum lipids are seen as crucial risk factors for the formation of the atherosclerotic disease in later life. Children and adolescents with obesity exhibit significantly increased values for Triglycerides (TG), Total Cholesterol (TC) and Low Density Lipoproteins Cholesterol (LDL-C) compared to children and adolescents with normal weight. Normal weight children and adolescents have in general higher High Density Lipoprotein Cholesterol (HDL-C) levels than children and adolescents with obesity. The concentration of HDL-C decreases in prepubertal children and adolescents with progressive weight gain and developmental stage.
Type of QI	Outcomes
Data collection	• Data are prospectively recorded in the Electronic Patient File at least at entry and at 1-year follow-up. • The NISS code allows a longitudinal follow-up.
Measurement	• Venous blood sample • A lipid panel should ideally be done after fasting for 8-9 hours. A fasting sample is ideal because food intake can alter triglyceride levels; the differences between fasting and non-fasting TC and HDL-C are not clinically significant.[65] • TG, TC and HDL-C should be measured in mmol/dl or in mg/dl (both metrics are used routinely by laboratories, and it is preferable to be able to record both metrics and then convert them in a standardised way in the back office).
Calculation	• A complete lipid panel includes direct measurement of TC, HDL-C, and TG. • LDL-C is calculated in the lipid profile using the Friedewald formula (LDL-C = Total cholesterol - (Triglyceride / 5) - HDL-C). • The Friedewald formula can only be used if the TG levels are lower than 400 mg/dl. If the TG levels are higher than 400 mg/dl, LDL-C must be measured directly (Direct LDL-C). • Non-HDL-C is calculated by subtracting HDL cholesterol from total cholesterol and includes all atherogenic particles, including LDL-C, VLDL-C, IDL-C, and lipoprotein(a).

Title	The proportion of children and adolescents with normal blood lipids values at 1-year follow-up
Technical definitions	**Table 3 – Reference values for TC, LDC-C, Non-HDL-C, TG and HDL-C in mg/dl and mmol/l**

Category	Acceptable mg/dL (mmol/L)	Borderline mg/dL (mmol/L)	High mg/dL (mmol/L)
TC	< 170 (4.4)	170 - 199 (4.4 - 5.2)	≥ 200 (5.2)
LDL-C	< 110 (2.8)	110 - 129 (2.8 - 3.3)	≥ 130 (3.4)
Non-HDL-C	< 120 (3.1)	120 - 144 (3.1 - 3.7)	≥ 145 (3.8)
TG 0 to 9 years	< 75 (0.8)	75 - 99 (0.8 - 1.1)	≥ 100 (1.1)
TG 10 to 19 years	< 90 (1.0)	90 - 129 (1.0 - 1.5)	≥ 130 (1.5)
HDL-C	> 45 (1.2)	40 - 45 (1.0 - 1.2)	< 40 (1.0)

Legend. Dl: decilitre; HDL: High Density Lipoprotein; L: Litre; LDL: Low Density Lipoprotein; mg: milligram; mmol: millimole; non-HDL: non-High Density Lipoprotein; TC: Total Cholesterol; and TG: Triglycerides.

Subgroup analyses	• By gender: scientific literature has shown that average HDL-C is significantly higher in boys than in girls and TG and LDL-C is significantly higher in girls than in boys in children and adolescents with obesity.
	• By age group:
	  ○ Children 6 – 11 years
	  ○ Adolescents 12 – 17 years

Reporting of results	• Data are prospectively recorded in the Electronic Patient File at least at entry and at 1-year follow-up for children and adolescents with a normal lipid profile and should be reported in mmol/L or in mg/dL. • Data are prospectively recorded in the Electronic Patient File at least at entry and then at a 3-month interval (0, 3, 6, 9, 12) for children and adolescents with an abnormal lipid profile and should be reported in mmol/dl or in mg/dl.
Targets	• 90% of children and adolescents have a result for this indicator at the start and at 1-year follow-up. • 75% of children and adolescents with normal TG values at 1-year follow-up (<100 or 130 mg/dl) • 30% of children and adolescents with normal TC values at 1-year follow-up (<200 mg/dl)
Benchmarking	• Percentage of children and adolescents that have a result for this indicator at the start and at 1-year follow-up. • Possibility to compare results for children and adolescents managed in Paediatric Multidisciplinary Obesity Centres (PMOCs) with those obtained in reference centres specialised in the care of children and adolescents (<18 years) with diabetes (audit carried out by Sciensano) and with those obtained in third level centres (Zeepreventorium and Clairs Vallons).
Comments	Childhood obesity is associated with an increased likelihood for having impaired glucose tolerance and diabetes. When clinically indicated, an HbA(1c), (fasting) plasma insulin of (fasting) plasma glucose determination can be done with the same venous blood sample that is taken for the blood lipides. An HbA(1c) value of 40 mmol/mol (5.7%) should be used as a screening tool to identify children and adolescents with impaired glucose tolerance.[69]

Appendix 8.2. Percentiles for fasting plasma concentrations of TC, LDL, HDL, non-HDL, and TG for boys

Blood lipid	Percentile	Age (Years)													
		6	7	8	9	10	11	12	13	14	15	16	17	18	19
TC (mmol/L)	2.5th	2.6	2.7	2.7	2.7	2.8	2.8	2.7	2.6	2.5	2.4	2.4	2.4	2.4	2.5
	5th	2.8	2.8	2.9	2.9	2.9	2.9	2.9	2.8	2.6	2.6	2.5	2.5	2.6	2.6
	10th	3.0	3.0	3.1	3.1	3.1	3.1	3.1	3.0	2.8	2.8	2.7	2.7	2.7	2.8
	50th	3.7	3.8	3.8	3.9	3.9	3.9	3.9	3.7	3.5	3.4	3.4	3.4	3.4	3.5
	90th	4.6	4.6	4.7	4.8	4.8	4.8	4.8	4.6	4.3	4.2	4.2	4.2	4.2	4.3
	95th	4.9	4.9	5.0	5.1	5.1	5.1	5.1	4.9	4.6	4.5	4.5	4.4	4.5	4.6
	97.5th	5.2	5.2	5.3	5.3	5.4	5.4	5.4	5.1	4.9	4.8	4.7	4.7	4.7	4.8
LDL (mmol/L)	2.5th	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	1.0
	5th	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.1	1.1
	10th	1.3	1.3	1.4	1.4	1.4	1.4	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2
	50th	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8
	90th	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.7	2.6	2.5	2.5	2.5	2.5	2.6
	95th	3.0	3.0	3.1	3.1	3.1	3.1	3.0	2.9	2.8	2.7	2.7	2.7	2.8	2.8
	97.5th	3.3	3.3	3.3	3.4	3.4	3.4	3.3	3.2	3.0	3.0	3.0	3.0	3.0	3.1
HDL (mmol/L)	2.5th	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.8	0.8	0.8	0.8	0.8
	5th	1.0	1.1	1.1	1.1	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.9
	10th	1.1	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.9
	50th	1.5	1.5	1.6	1.6	1.6	1.6	1.5	1.5	1.4	1.3	1.3	1.2	1.2	1.2
	90th	2.0	2.0	2.0	2.1	2.1	2.0	2.0	1.9	1.8	1.7	1.6	1.6	1.6	1.6
	95th	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	1.9	1.8	1.8	1.7	1.7	1.8
	97.5th	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.2	2.1	2.0	1.9	1.9	1.9	1.9
Non-HDL (mmol/L)	2.5th	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.3
	5th	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.4	1.4	1.4

Blood lipid	Percentile	Age (Years)													
		6	7	8	9	10	11	12	13	14	15	16	17	18	19
	10th	1.6	1.6	1.6	1.6	1.7	1.7	1.6	1.6	1.6	1.6	1.5	1.5	1.6	1.6
	50th	2.2	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2
	90th	3.0	3.1	3.1	3.2	3.2	3.2	3.2	3.1	3.1	3.0	3.0	3.0	3.0	3.0
	95th	3.3	3.3	3.4	3.4	3.5	3.5	3.5	3.4	3.3	3.3	3.3	3.2	3.3	3.3
	97.5th	3.5	3.6	3.6	3.7	3.7	3.7	3.7	3.6	3.6	3.5	3.5	3.5	3.5	3.5
TG (mmol/L)	2.5th	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	5th	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4
	10th	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	50th	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7
	90th	0.8	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.1	1.1	1.2	1.2
	95th	0.9	1.0	1.0	1.0	1.0	1.1	1.1	1.2	1.3	1.3	1.3	1.4	1.4	1.4
	97.5th	1.1	1.1	1.1	1.2	1.2	1.3	1.4	1.4	1.5	1.5	1.6	1.6	1.6	1.7

Legend. HDL: High Density Lipoprotein; L: Litre; LDL: Low Density Lipoprotein; non-HDL: non-High Density Lipoprotein; TC: Total Cholesterol; and TG: Triglycerides.

Appendix 8.3. Percentiles for fasting plasma concentrations of TC, LDL, HDL, non-HDL, and TG for girls

Blood lipid	Percentile	Age (Years)													
		6	7	8	9	10	11	12	13	14	15	16	17	18	19
TC (mmol/L)	2.5th	2.9	2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.8
	5th	3.1	3.1	3.0	3.0	3.0	3.0	2.9	2.9	2.8	2.8	2.9	2.9	2.9	2.9
	10th	3.3	3.3	3.2	3.2	3.2	3.2	3.1	3.1	3.0	3.0	3.0	3.1	3.1	3.1
	50th	4.0	4.0	4.0	4.0	4.0	3.9	3.9	3.8	3.8	3.7	3.8	3.8	3.8	3.9
	90th	5.0	5.0	5.0	4.9	4.9	4.8	4.8	4.7	4.6	4.6	4.7	4.7	4.7	4.8
	95th	5.3	5.3	5.3	5.3	5.2	5.2	5.1	5.0	4.9	4.9	5.0	5.0	5.1	5.1
	97.5th	5.6	5.6	5.6	5.6	5.5	5.5	5.4	5.3	5.2	5.2	5.3	5.3	5.4	5.4
LDL (mmol/L)	2.5th	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.1	1.1	1.1
	5th	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	10th	1.5	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.3	1.3	1.4	1.4	1.4	1.4
	50th	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.1
	90th	3.1	3.1	3.1	3.0	3.0	2.9	2.8	2.7	2.7	2.7	2.7	2.8	2.8	2.9
	95th	3.4	3.4	3.4	3.3	3.3	3.2	3.1	3.0	3.0	3.0	3.0	3.1	3.1	3.2
	97.5th	3.8	3.7	3.7	3.7	3.6	3.5	3.4	3.3	3.3	3.3	3.3	3.4	3.4	3.5
HDL (mmol/L)	2.5th	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
	5th	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	10th	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
	50th	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.4
	90th	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8
	95th	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	97.5th	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1
Non-HDL (mmol/L)	2.5th	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.4
	5th	1.6	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.6	1.6

Blood lipid	Percentile	Age (Years)													
		6	7	8	9	10	11	12	13	14	15	16	17	18	19
	10th	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8
	50th	2.5	2.5	2.5	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5
	90th	3.4	3.4	3.4	3.4	3.4	3.3	3.3	3.2	3.2	3.2	3.3	3.3	3.4	3.4
	95th	3.8	3.8	3.8	3.7	3.7	3.7	3.6	3.5	3.5	3.5	3.6	3.6	3.7	3.8
	97.5th	4.1	4.1	4.1	4.1	4.0	4.0	3.9	3.9	3.8	3.8	3.9	4.0	4.0	4.1
TG (mmol/L)	2.5th	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	5th	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4
	10th	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5
	50th	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.8	0.8
	90th	0.9	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3
	95th	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.5	1.5	1.5	1.6
	97.5th	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.7	1.7	1.7	1.8	1.8

Legend. HDL: High Density Lipoprotein; L: Litre; LDL: Low Density Lipoprotein; non-HDL: non-High Density Lipoprotein; TC: Total Cholesterol; and TG: Triglycerides.

APPENDIX 9. QI 3 – THE PROPORTION OF CHILDREN AND ADOLESCENTS WITH NORMAL SBP AND DBP AT 1-YEAR FOLLOW-UP

Appendix 9.1. Technical sheet

Title	The proportion of children and adolescents with normal Systolic and Diastolic Blood Pressure (SBP and DBP) at 1-year follow-up
Sources	• Wright (2001)[35] • Juonala (2011)[36] • de Simone (2022)[66] • Genovesi (2020)[71] • Jensen (2020)[72] • Lurbe (2016)[73] • Sundin (2014)[74] • Carrico (2013)[75] • O'Brien (2013)[76] • Erlingsdottir (2010)[77] • Toschke (2010)[78] • Tirosh (2010)[79] • Campana (2009)[80] • Chen (2008)[81] • National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents (2004)[82] • Wuhl (2002)[83]
Rationale	Previous studies have shown that elevated BP in childhood is the strongest predictor of adult hypertension (HTN), and that the increase in risk of adult HTN is driven by adolescents in the highest BP percentiles.[78, 79, 81] Increases in Systolic Blood Pressure (SBP) of 15 or 30 mmHg above 90 mmHg in 15-year-olds are associated with probabilities of having hypertension at 35 years of age of 0.18 and 0.33, respectively, for boys. These probabilities are lower for girls, 0.04 and 0.08, respectively, with boys having a 4.25 higher risk than girls.[66, 75] In a longitudinal study, BP in adolescence, even in the low-normal range, linearly predicted progression to hypertension in young adulthood.[79] This progression was shown to be gender dependent, being three to four times higher in males than in females across all BP categories. BP levels in adolescence may also be predictors of cardiovascular risk other than hypertension. After 17 years of follow-up, BP levels in young people show a significant association with cardiometabolic risk[80] and may also predict coronary heart disease in adulthood.[77] Similarly, BP levels in adolescence are independent predictors of end-stage renal disease in middle-aged men.[74] The increasing tendency for obesity to occur in childhood and to persist into adulthood, together with the well-established links between obesity, diabetes mellitus type 2 and hypertension in adults, means that children and adolescents with obesity appear to be at particularly high risk of developing diabetes and hypertension as they grow older.[35, 36, 66]

Type of QI	Outcomes
Data collection	• Data are prospectively recorded in the Electronic Patient File at least at entry and then at a 3-month interval (0, 3, 6, 9, 12). • The NISS code allows a longitudinal follow-up.
Measurement	The main issue about how to measure BP in children and adolescents is whether to use the auscultatory or the oscillometric method. Reference values for defining BP categories (see Appendix 9.2 and Appendix 9.3) have been obtained by the auscultatory method. Values obtained with oscillometric equipment are considerably higher than the auscultatory ones. Therefore, if hypertension (HTN) is detected by the oscillometric method, it must be confirmed by the auscultatory one. Specific recommendations for office BP measurement: • To make sure the patient is **sitting** or **relaxed for 3–5 min** before beginning blood pressure measurements. • To use the appropriate cuff size according to bladder width (40% of the arm circumference) and length (4 cm x 8 cm, 6 cm x 12 cm, 9 cm x 18 cm, 10 cm x 24 cm), to cover 80–100% of the individual's arm circumference. • To measure blood pressure **three times** with an **interval of 3 min** between measurements and use the average of the last two. • The **auscultatory method is recommended** and phase I and V (disappearance) Korotkoff sounds are used to identify SBP and DBP, respectively. • If the oscillometric method is used, the model used needs to be validated. If HTN is detected by the oscillometric method, it needs to be confirmed using the auscultatory method. • To measure blood pressure in **both arms at first visit** to detect possible differences. In this instance, take the arm with the higher value as the reference.
Calculations	• Proportion of children and adolescents having had a BP measurement at least at entry and at 1-year follow-up. • BP percentiles for each sex, age from 1 to 17 years and for the height percentile categories (see Appendix 9.2 to Appendix 9.4).

Technical definitions	• Children and adolescents (< 16 years)
	  ○ Hypertension is defined as SBP and/or DBP persistently at least 95th percentile for sex, age and height measured on at least three separate occasions.
	  ○ High-normal BP is defined as average SBP and/or DBP at least 90th percentile, but less than 95th percentile.
	• Adolescents (≥ 16 years): use of absolute cut-off used for adults
	  ○ Hypertension (>140/90 mmHg)
	  ○ High-normal blood pressure (130–139/85–89 mmHg)

Subgroup analyses	• Children and adolescents < 16 years old
	  ○ SBP: proportion of children and adolescents < 90th percentile **AND** DBP: proportion of children and adolescents < 90th percentile
	• Adolescents ≥ 16 years old
	  ○ Proportion of adolescents with TA <130/85

Table 4 – Classification of hypertension in children and adolescents

Category	0–15 years SBP and/or DBP percentile	16 years and older SBP and/or DBP values (mmHg)
Normal	<90th percentile	<130/85
High-normal	~90th to <95th percentile	130–139/85–89
Hypertension	~95th percentile	~140/90
Stage 1 hypertension	95th percentile to the 99th percentile plus 5 mmHg	140–159/90–99
Stage 2 hypertension	>99th percentile plus 5 mmHg	160–179/100–109
Isolated systolic hypertension	SBP ~95th percentile **and** DBP <90th percentile	~140/<90

Legend. DBP: Diastolic Blood Pressure; mmHg: millimetre of mercury; SBP: Systolic Blood Pressure; European Society of Hypertension guidelines for the management of high blood pressure in Children and Adolescents[71, 73]

- Children and adolescents < 16 years old: SBP: proportion of children and adolescents P90th – < P95th **AND** DBP: proportion of children and adolescents P90th – < P95th.
- Adolescents ≥ 16 years old: proportion of adolescents with arterial hypertension 130–139/85–89.

Reporting of results

- Data are prospectively recorded in the Electronic Patient File at least at entry and at 1-year follow-up for children and adolescents with a normal SBP and DBP and should be reported in mmHg.
- Data are prospectively recorded in the Electronic Patient File at least at entry and then at a 3-month interval (0, 3, 6, 9, 12) for children and adolescents with abnormal SBP or DBP and should be reported in mmHg.

Targets

- 90% of children and adolescents have a result for this indicator at the start and at 1-year follow-up.
- 70% of children and adolescents with a normal SBP at 1-year follow-up.
- 80% of children and adolescents with a normal DBP at 1-year follow-up.

Benchmarking

- Percentage of children and adolescents that have a result for this indicator at the start and at 1-year follow-up.
- Possibility to compare results for children and adolescents managed in Paediatric Multidisciplinary Obesity Centres (PMOCs) with those obtained in reference centres specialised in the care of children and adolescents (<18 years) with diabetes (audit carried out by Sciensano) and with those obtained in third level centres (Zeepreventorium and Clairs Vallons).

Comments

- BP measurement in the more meaningful context of daily real-life conditions (ambulatory blood pressure) is now increasingly recognised as providing extremely useful information in the diagnosis of HTN. Values obtained from 24-hour ambulant blood pressure monitoring (ABPM, see Appendix 9.4 and Appendix 9.5) have a slightly better relationship with the presence of organ damage and a higher reproducibility than those obtained from office BP.[66, 76]
- Due to the continued lack of European reference values that take into account age, sex and height across the paediatric age range, the 2016 ESH Guidelines refer to normative data on auscultatory clinic measurements provided by the US Task Force[82], which provide BP percentiles for each sex, age from 1 to 17 years and for seven height percentile categories. Advancements have been made, with directions on how to apply European and American Guidelines on High Blood Pressure in Children and Adolescents[71], the call that HTN guidelines in children should be universal[72] and a consensus document from the ESC Council on HTN in children and adolescents.[66]

Appendix 9.2. Blood pressure for boys by age and height percentiles

Age (years)	BP percentile	SBP (mmHg) percentile of height							DBP (mmHg) percentile of height						
		5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
1	90th	94	95	97	99	100	102	103	49	50	51	52	53	53	54
	95th	98	99	101	103	104	106	106	54	54	55	56	57	58	58
	99th	105	106	108	110	112	113	114	61	62	63	64	65	66	66
2	90th	97	99	100	102	104	105	106	54	55	56	57	58	58	59
	95th	101	102	104	106	108	109	110	59	59	60	61	62	63	63
	99th	109	110	111	113	115	117	117	66	67	68	69	70	71	71
3	90th	100	101	103	105	107	108	109	59	59	60	61	62	63	63
	95th	104	105	107	109	110	112	113	63	63	64	65	66	67	67
	99th	111	112	114	116	118	119	120	71	71	72	73	74	75	75
4	90th	102	103	105	107	109	110	111	62	63	64	65	66	66	67
	95th	106	107	109	111	112	114	115	66	67	68	69	70	71	71
	99th	113	114	116	118	120	121	122	74	75	76	77	78	78	79
5	90th	104	105	106	108	110	111	112	65	66	67	68	69	69	70
	95th	108	109	110	112	114	115	116	69	70	71	72	73	74	74
	99th	115	116	118	120	121	123	123	77	78	79	80	81	81	82
6	90th	105	106	108	110	111	113	113	68	68	69	70	71	72	72
	95th	109	110	112	114	115	117	117	72	72	73	74	75	76	76
	99th	116	117	119	121	123	124	125	80	80	81	82	83	84	84
7	90th	106	107	109	111	113	114	115	70	70	71	72	73	74	74
	95th	110	111	113	115	117	118	119	74	74	75	76	77	78	78
	99th	117	118	120	122	124	125	126	82	82	83	84	85	86	86
8	90th	107	109	110	112	114	115	116	71	72	72	73	74	75	76
	95th	111	112	114	116	118	119	120	75	76	77	78	79	79	80
	99th	119	120	122	123	125	127	127	83	84	85	86	87	87	88
9	90th	109	110	112	114	115	117	118	72	73	74	75	76	76	77
	95th	113	114	116	118	119	121	121	76	77	78	79	80	81	81
	99th	120	121	123	125	127	128	129	84	85	86	87	88	88	89

Age (years)	BP percentile	SBP (mmHg) percentile of height							DBP (mmHg) percentile of height						
		5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
10	90th	111	112	114	115	117	119	119	73	73	74	75	76	77	78
	95th	115	116	117	119	121	122	123	77	78	79	80	81	81	82
	99th	122	123	125	127	128	130	130	85	86	86	88	88	89	90
11	90th	113	114	115	117	119	120	121	74	74	75	76	77	78	78
	95th	117	118	119	121	123	124	125	78	78	79	80	81	82	82
	99th	124	125	127	129	130	132	132	86	86	87	88	89	90	90
12	90th	115	116	118	120	121	123	123	74	75	75	76	77	78	79
	95th	119	120	122	123	125	127	127	78	79	80	81	82	82	83
	99th	126	127	129	131	133	134	135	86	87	88	89	90	90	91
13	90th	117	118	120	122	124	125	126	75	75	76	77	78	79	79
	95th	121	122	124	126	128	129	130	79	79	80	81	82	83	83
	99th	128	130	131	133	135	136	137	87	87	88	89	90	91	91
14	90th	120	121	123	125	126	128	128	75	76	77	78	79	79	80
	95th	124	125	127	128	130	132	132	80	80	81	82	83	84	84
	99th	131	132	134	136	138	139	140	87	88	89	90	91	92	92
15	90th	122	124	125	127	129	130	131	76	77	78	79	80	80	81
	95th	126	127	129	131	133	134	135	81	81	82	83	84	85	85
	99th	134	135	136	138	140	142	142	88	89	90	91	92	93	93
16	90th	125	126	128	130	131	133	134	78	78	79	80	81	82	82
	95th	129	130	132	134	135	137	137	82	83	83	84	85	86	87
	99th	136	137	139	141	143	144	145	90	90	91	92	93	94	94
17	90th	127	128	130	132	134	135	136	80	80	81	82	83	84	84
	95th	131	132	134	136	138	139	140	84	85	86	87	87	88	89
	99th	139	140	141	143	145	146	147	92	93	93	94	95	96	97

Legend. BP: Blood Pressure; DBP: Diastolic Blood Pressure; mmH:g millimetre of mercury; SBP: Systolic Blood Pressure; modified from Task Force on High Blood Pressure in Children and Adolescents.[82]; boxed area (in blue) corresponds to reference values of boys 16 years or older in which the reference values for adults are recommended.[66, 71, 73]

Appendix 9.3. Blood pressure for girls by age and height percentiles

Age (years)	BP percentile	SBP (mmHg) percentile of height							DBP (mmHg) percentile of height						
		5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
1	90th	97	97	98	100	101	102	103	52	53	53	54	55	55	56
	95th	100	101	102	104	105	106	107	56	57	57	58	59	59	60
	99th	108	108	109	111	112	113	114	64	64	65	65	66	67	67
2	90th	98	99	100	101	103	104	105	57	58	58	59	60	61	61
	95th	102	103	104	105	107	108	109	61	62	62	63	64	65	65
	99th	109	110	111	112	114	115	116	69	69	70	70	71	72	72
3	90th	100	100	102	103	104	106	106	61	62	62	63	64	64	65
	95th	104	104	105	107	108	109	110	65	66	66	67	68	68	69
	99th	111	111	113	114	115	116	117	73	73	74	74	75	76	76
4	90th	101	102	103	104	106	107	108	64	64	65	66	67	67	68
	95th	105	106	107	108	110	111	112	68	68	69	70	71	71	72
	99th	112	113	114	115	117	118	119	76	76	76	77	78	79	79
5	90th	103	103	105	106	107	109	109	66	67	67	68	69	69	70
	95th	107	107	108	110	111	112	113	70	71	71	72	73	73	74
	99th	114	114	116	117	118	120	120	78	78	79	79	80	81	81
6	90th	104	105	106	108	109	110	111	68	68	69	70	70	71	72
	95th	108	109	110	111	113	114	115	72	72	73	74	74	75	76
	99th	115	116	117	119	120	121	122	80	80	80	81	82	83	83
7	90th	106	107	108	109	111	112	113	69	70	70	71	72	72	73
	95th	110	111	112	113	115	116	116	73	74	74	75	76	76	77
	99th	117	118	119	120	122	123	124	81	81	82	82	83	84	84
8	90th	108	109	110	111	113	114	114	71	71	71	72	73	74	74
	95th	112	112	114	115	116	118	118	75	75	75	76	77	78	78
	99th	119	120	121	122	123	125	125	82	82	83	83	84	85	86
9	90th	110	110	112	113	114	116	116	72	72	72	73	74	75	75
	95th	114	114	115	117	118	119	120	76	76	76	77	78	79	79
	99th	121	121	123	124	125	127	127	83	83	84	84	85	86	87

Age (years)	BP percentile	SBP (mmHg) percentile of height							DBP (mmHg) percentile of height						
		5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
10	90th	112	112	114	115	116	118	118	73	73	73	74	75	76	76
	95th	116	116	117	119	120	121	122	77	77	77	78	79	80	80
	99th	123	123	125	126	127	129	129	84	84	85	86	86	87	88
11	90th	114	114	116	117	118	119	120	74	74	74	75	76	77	77
	95th	118	118	119	121	122	123	124	78	78	78	79	80	81	81
	99th	125	125	126	128	129	130	131	85	85	86	87	87	88	89
12	90th	116	116	117	119	120	121	122	75	75	75	76	77	78	78
	95th	119	120	121	123	124	125	126	79	79	79	80	81	82	82
	99th	127	127	128	130	131	132	133	86	86	87	88	88	89	90
13	90th	117	118	119	121	122	123	124	76	76	76	77	78	79	79
	95th	121	122	123	124	126	127	128	80	80	80	81	82	83	83
	99th	128	129	130	132	133	134	135	87	87	88	89	89	90	91
14	90th	119	120	121	122	124	125	125	77	77	77	78	79	80	80
	95th	123	123	125	126	127	129	129	81	81	81	82	83	84	84
	99th	130	131	132	133	135	136	136	88	88	89	90	90	91	92
15	90th	120	121	122	123	125	126	127	78	78	78	79	80	81	81
	95th	124	125	126	127	129	130	131	82	82	82	83	84	85	85
	99th	131	132	133	134	136	137	138	89	89	90	91	91	92	93
16	90th	121	122	123	124	126	127	128	78	78	79	80	81	81	82
	95th	125	126	127	128	130	131	132	82	82	83	84	85	85	86
	99th	132	133	134	135	137	138	139	90	90	90	91	92	93	93
17	90th	122	122	123	125	126	127	128	78	79	79	80	81	81	82
	95th	125	126	127	129	130	131	132	82	83	83	84	85	85	86
	99th	133	133	134	136	137	138	139	90	90	91	91	92	93	93

Legend. BP: Blood Pressure; DBP: Diastolic Blood Pressure; mmH:g millimetre of mercury; SBP: Systolic Blood Pressure; modified from Task Force on High Blood Pressure in Children and Adolescents.[82]; boxed area (in blue) corresponds to reference values of boys 16 years or older in which the reference values for adults are recommended.[66, 71, 73]

Appendix 9.4. Systolic and diastolic ambulatory blood pressure (SBP/DBP) values for age (boys)

Age (years)	24-hours				Day				Night			
	50th	75th	90th	95th	50th	75th	90th	95th	50th	75th	90th	95th
5	105/65	109/69	113/72	116/74	111/72	116/76	120/79	123/81	95/55	99/59	103/62	106/65
6	106/66	110/69	115/73	118/75	112/72	116/76	121/79	124/81	96/55	100/59	105/63	108/66
7	106/66	111/70	116/73	119/75	112/73	117/76	122/80	125/82	96/56	101/60	106/64	110/67
8	107/66	112/70	117/73	120/75	112/73	117/76	122/80	125/82	97/56	102/60	108/64	111/67
9	108/67	113/70	118/73	121/75	113/72	118/76	123/80	126/82	97/56	103/60	109/64	112/67
10	109/67	114/70	119/73	123/75	113/72	119/76	124/80	127/82	98/56	104/60	110/64	113/67
11	110/67	116/71	121/74	125/76	115/72	121/76	126/80	129/82	99/56	105/60	111/64	115/67
12	113/67	118/71	124/74	127/76	117/72	123/76	128/80	132/82	101/56	107/60	113/64	116/67
13	115/67	121/71	126/74	130/76	120/72	126/76	131/80	135/82	103/56	109/60	115/64	119/67
14	118/68	124/71	129/75	133/77	122/73	129/77	134/80	138/82	106/57	112/61	118/64	121/67
15	121/68	127/72	132/75	136/77	125/73	132/77	137/81	141/83	108/57	114/61	120/64	123/66
16	123/69	129/72	135/76	138/78	128/74	135/78	140/81	144/84	111/57	117/61	123/64	126/66

Legend. The values are in mmHg. Data from Wuhl et al. (2002)[66, 71, 73, 83]

Appendix 9.5. Systolic and diastolic ambulatory blood pressure (SBP/DBP) values for age (girls)

Age (years)	24-hours				Day				Night			
	50th	75th	90th	95th	50th	75th	90th	95th	50th	75th	90th	95th
5	103/66	108/69	112/72	115/74	108/73	114/77	118/80	121/82	95/56	100/61	105/66	108/69
6	104/66	109/69	114/72	116/74	110/73	115/77	120/80	122/82	96/56	101/61	106/65	110/68
7	105/66	110/69	115/72	118/74	111/72	116/77	121/80	123/82	96/56	102/60	107/65	111/67
8	107/66	112/69	116/72	119/74	112/72	117/76	122/80	124/82	97/55	103/60	108/64	112/67
9	108/66	113/70	117/73	120/74	112/72	118/76	122/80	125/82	98/55	103/59	109/64	112/67
10	109/66	114/70	118/73	121/75	113/72	119/76	123/79	126/81	98/55	104/59	110/64	113/67
11	110/66	115/70	119/73	122/75	114/72	120/76	124/79	127/81	99/54	105/59	110/63	114/66
12	111/67	116/70	120/74	123/76	115/72	121/76	125/80	128/82	100/54	105/59	110/63	114/66
13	112/67	117/71	121/74	124/76	116/72	122/77	126/80	129/82	101/54	106/59	111/63	114/66
14	113/67	118/71	122/74	125/76	118/73	123/77	127/80	130/82	101/55	106/59	111/63	114/65
15	114/68	118/71	123/75	125/77	119/73	124/77	128/80	130/82	102/55	107/59	111/63	114/65
16	115/68	119/71	123/75	126/77	120/74	124/77	129/80	131/82	103/55	107/59	111/63	114/65

Legend. The values are in mmHg; Data from Wuhl et al. (2002);[66, 71, 73, 83]

APPENDIX 10. QI 4 – THE PROPORTION OF CHILDREN (≥ 6 YEARS OLD) AND ADOLESCENTS ACHIEVING A 10% INCREASE IN THE DISTANCE WALKED WITHIN 6 MINUTES AT 1-YEAR FOLLOW-UP

Appendix 10.1. Technical sheet

Title	The proportion of children (≥ 6 years old) and adolescents achieving a 10% increase in the distance walked within 6 minutes at 1-year follow-up
Sources	• Makni (2020)[37] • Cacau (2016)[84] • Maheffey (2016)[85] • Mylius (2016)[86] • Vanhelst (2013)[87] • Morinder (2009)[88] • A.T.S. Committee on Proficiency Standards for Clinical Pulmonary Function Laboratories (2002)[89,90]
Rationale	Submaximal exercise tests, such as walking tests, can provide a safe, practical means of assessing functional status, monitoring treatment and establishing prognosis. The 6-Minute Walk Test (6-MWT) has shown good validity and reliability and is one of the most commonly used exercises **in clinical practice**. It is considered to be a highly relevant test that reflects the physical activities of daily living as well as cardiopulmonary fitness in both healthy children and adolescents and children and adolescents with various diseases. This test provides valuable information on the child's movement patterns, posture, ankle and knee joint position, level of pain, endurance, etc., which is important in clinical practice with children and adolescents with obesity, as these aspects may influence the physical activity recommendations given to the child.[88] The reproducibility and the validity of the 6-MWT in children and adolescents with obesity was confirmed in previous studies.[85, 87, 88] The distance covered by children and adolescents with obesity depends on various factors, among which age, height, BMI and hip circumference are the most determinant ones.[37] We can expect children and adolescents with obesity to walk, on average, **about 80% of the distance that normal weight children** of the same age can walk.[37] As example, six-minute walk distance (mean, standard deviation) in the **children and adolescents with obesity was 571 m** (65.5), and in the normal-weight children and adolescents, 663 m (61.1).[88] Close results were reported in a more recent study.[37]
Type of QI	Outcomes
Data collection	• Data are prospectively recorded in the Electronic Patient File at least at entry and then at a 1-year interval. • The NISS code allows a longitudinal follow-up.
Measurement	• The 6-MWT is performed as a shuttle test, which is conducted at the hospital on a flat surface in a 10-, 30-, or 50-metre-long covered corridor to determine the **number of Metres (m) walked during 6 minutes**. • Children and adolescents are instructed to **walk as far as possible at their own pace, without running, during the allotted 6 minutes**. • Participants are informed that **they may stop and rest at any time during the test**, but are instructed that if they do, they must resume walking as soon as they feel able to do so.

Title	The proportion of children (≥ 6 years old) and adolescents achieving a 10% increase in the distance walked within 6 minutes at 1-year follow-up
	• **Standardised encouragements** (e.g. 'Carry on', 'You are doing well') and the announcement of the remaining are given to the children and adolescents every minute. • The technical procedure is described in French (see Appendix 10.2) and Dutch (see Appendix 10.3).
Calculations	1) Proportion of children and adolescents (≥ 6 years old) having had a 6-MWT at least at entry and at 1-year follow-up. 2) By sex and age from 6 to 17 years
Technical definitions	-
Subgroup analyses	• By gender and age groups: ○ 6 to < 12 years old ○ 12 to 17 years old • By weight status (overweight, obesity class, BMI z-score, etc.) at baseline.
Reporting of results	Results are prospectively recorded in Metres in the Electronic Patient File at least at entry and at 1-year follow-up.
Targets	• 90% of children and adolescents have a result for this indicator at the start and at 1-year follow-up. • 70% of children and adolescents with a 10% increase of the distance covered with the 6-MWT at 1-year follow-up.
Benchmarking	• Percentage of children and adolescents that have a result for this indicator at the start and at 1-year follow-up. • The reference value for the Six-Minute Walking Distance (6MWD) in the 6-MWT in children and adolescents ranges substantially from studies in different countries. A reference equation was not provided in all studies, but the ones available took into account well established variables in the context of exercise performance, such as height, heart rate, age and weight.[84] The prediction equation for a healthy population on the 6MWD = (4.63*height(cm))-(3.53*weight(kg))+(10.42*age)+56.32 yields the highest R^2 value (0.6). It is impossible to present a single best reference value. Consensus regarding testing procedures should lead to an update and stricter application of the current guidelines.[86]

Table 5 – A possible reference table for children and adolescents with obesity

	6-MWD (m)					
Age (Years)	**6-7**	**8-9**	**10-11**	**12-13**	**14-15**	**16-18**
Girls	425 ± 37	458 ± 50	557 ± 24	593 ± 20	597 ± 63	604 ± 66
Boys	429 ± 63	507 ± 61	570 ± 29	605 ± 45	638 ± 55	668 ± 41

Based on Makni 2020[37]; M meters; MWD minute walking distance.

Comments	Countries (such as Belgium) that did not establish reference values for the 6-MWT should be encouraged to do because it would help their clinicians and researchers have a more precise interpretation of the test.

Appendix 10.2. Recommendations to perform the test (in French)

Source : https://www.irbms.com/test-de-marche-de-six-minutes-6-MWT/

Le 6-MWT est un test simple qui exige un parcours de 30 mètres, au calme, en intérieur, plat, idéalement dans un couloir rectangulaire rectiligne. Quelques études ont utilisé des couloirs de 20 et 50m. Le trajet doit être balisé tous les 3 mètres par des marques de couleur.

Le demi-tour doit être visualisé avec un cône. Il est souhaitable de matérialiser la ligne de départ par une bande de couleur. Une check-list permet de préparer le matériel nécessaire à la réalisation du test.

Les instructions

Selon le protocole de l'American Thoracic Society (ATS) les instructions doivent être données aux enfants et adolescents de la manière suivante :

Le but de ce test est de marcher le plus possible pendant 6 minutes. Vous marcherez aller et retour dans ce couloir. Marcher six minutes est un temps long et donc vous devez faire un effort. Vous allez sûrement vous sentir hors d'haleine ou fatigué, vous pouvez donc ralentir, vous arrêter et vous reposer si nécessaire. Vous pouvez vous appuyer contre le mur pour vous reposer. Mais reprenez la marche dès que vous en êtes capable. Vous passerez de part et d'autre des cônes, vous parcourez le couloir aller et retour en tournant autour des cônes rapidement et en continuant dans l'autre sens sans hésitation.

Au cours du test

Commencez le test en demandant au patient de Commencez à marcher maintenant.

Mais :

- La piste de marche devrait être la même disposition pour tous les tests pour les enfants et adolescents: le terrain doit être plat sans obstacle et d'un revêtement agréable et confortable. La longueur sans virage doit être d'au moins 20-25 mètres.
- La température ambiante et l'humidité doivent être supportables autour de l'habitude pour la saison.
- Puis : surveillez le patient et l'apparition de signes ou symptômes indésirables.

Encouragez-le pendant le test :

- 1 minute : Cinq minutes de la fin (le nom du patient). Faites de votre mieux !
- 2 minutes : Quatre minutes de la fin (le nom du patient). Vous vous débrouillez très bien !
- 3 minutes : A mi-chemin – trois minutes de la fin (le nom du patient). Faites de votre mieux !
- 4 minutes: Deux minutes de la fin (le nom du patient). Vous vous débrouillez très bien !
- 5 minutes: Une minute de la fin (le nom du patient). Faites de votre mieux !

À la fin du test

- Demandez au patient de poser le marqueur sur la distance parcourue ou relevez celle-ci de suite.
- Le patient peut continuer à marcher lentement ou se reposer immédiatement.

Appendix 10.3. Recommendations to perform the test (in Dutch)

Bron: https://www.timtakken.nl/wp-content/uploads/2015/09/Takken_stimulus_6-MWT.pdf

De 6-MWT is een eenvoudige test waarvoor een rustig, vlak indoorparcours van 30 meter nodig is, idealiter in een rechte rechthoekige gang. Sommige studies hebben banen van 20 en 50 meter gebruikt. Het parcours moet om de 3 meter gemarkeerd zijn met gekleurde markeringen.

De U-bocht moet worden aangegeven met een kegel. De startlijn moet gemarkeerd worden met een gekleurde strook. Er wordt een checklist gebruikt om de uitrusting voor de test voor te bereiden.

Instructies

Volgens het protocol van de American Thoracic Society (ATS) moeten patiënten de volgende instructies krijgen:

Het doel van deze test is om 6 minuten lang zo ver mogelijk te wandelen. Je wandelt deze gang op en neer. Zes minuten lopen is lang, dus je moet je inspannen. Je zult je waarschijnlijk buiten adem of moe voelen, dus je kan vertragen, stoppen of rusten als dat nodig is. Je kan tegen de muur leunen om uit te rusten, maar hervat het wandelen zodra je daartoe in staat bent. Je passeert aan weerszijden van de kegels, wandelt snel heen en weer rond de kegels en gaat zonder aarzelen weer de andere kant op.

Tijdens de test

Begin de test door de patiënt te vragen om nu te beginnen met wandelen.

Maar:

- Het wandelparcours moet dezelfde lay-out hebben voor alle patiënttesten: het terrein moet vlak zijn zonder obstakels en van een aangenaam, comfortabel oppervlak. De lengte zonder bochten moet minstens 20-25 meter zijn.
- De omgevingstemperatuur en luchtvochtigheid moeten draaglijk zijn voor het seizoen.
- Vervolgens: controleer de patiënt en het verschijnen van ongewenste tekenen of symptomen.

Moedig hem/haar aan tijdens de test:

- 1 minuut: Vijf minuten tot aan het einde (de naam van de patiënt). Doe je best!
- 2 minuten: Nog vier minuten te gaan (naam van de patiënt). Je doet het heel goed!
- 3 minuten : Halverwege - nog drie minuten te gaan (naam patiënt). Doe je best!
- 4 minuten: Nog twee minuten te gaan (naam patiënt). Je doet het geweldig!
- 5 minuten: Nog één minuut te gaan (naam patiënt). Doe je best!

Aan het einde van de test

- Vraag de patiënt om de afgelegde afstand te markeren, of noteer deze meteen.
- De patiënt kan langzaam verder lopen of meteen rusten

APPENDIX 11. QI 5 – THE PROPORTION OF CHILDREN AND ADOLESCENTS WITH A POSITIVE CHANGE IN QUALITY OF LIFE SCORES AT 1-YEAR FOLLOW-UP

Appendix 11.1. Technical sheet

Title	Proportion of children and adolescents with a positive change in Quality of Life (QoL) scores at 1- year follow-up
Sources	• Bianchini (2017)[1] • Hoare (2014)[2] • Sanderson (2011)[4] • Hadjiyannakis (2016)[7] • Dewilde (2022)[38] • Hayes (2023)[91] • Diao (2020)[92] • Germain (2019)[93] • Ravens-Sieberer (2007)[94]
Rationale	Having overweight or obesity can affect both physical and psychological health, increasing children and adolescents' susceptibility to depression, anxiety, emotional and mood disorders.[1, 3] Children and adolescents with overweight or obesity are more likely to suffer from depression than their normal weight counterparts or to suffer from mood disorders during a substantial part of their life.[2, 4] In summary, having overweight or obesity can adversely impact the Quality of Life (QoL) of children and adolescents, and obesity-related interventions can improve QoL in children and adolescents with overweight or obesity. However, children and adolescents often have difficulty maintaining the behaviours introduced during these intervention efforts.[92] Measuring QoL, especially in children and adolescents with chronic conditions is important, not only to describe their actual situation and health care needs, but also to evaluate clinical interventions.[94] The importance of understanding the impact of illness and treatment on children and adolescents's Health-Related Quality of Life (HRQoL) has led to the increasing use of child self-report and observer or proxy instruments. However, the measurement of HRQoL remains particularly challenging, specifically for children under six years of age. A number of generic and disease-specific HRQoL questionnaires exist for use with children and/or proxies, and both guidelines and reviews on paediatric HRQoL have been published.[93]
Type of QI	Outcomes
Data collection	• Data are prospectively recorded in the Electronic Patient File at least at entry and then at 1-year follow-up. • The NISS code allows a longitudinal follow-up.
Measurement	**EQ-5D-Y (Youth)** • The EQ-5D-Y is a **child-friendly version of the widely used EQ-5D generic measure of health status**. It consists of two parts. 1) The first part (the descriptive system) assesses health in **five dimensions** (Mobility; Looking After Myself; Doing Usual Activities; Having Pain or Discomfort; Feeling Worried, Sad or Unhappy), each of which has **three levels of response** (no problems/no pain/not worried, some problems/some pain/a bit worried, a lot of problems/a lot of pain/very worried). This part of the EQ-5D-Y questionnaire provides a description of the respondent's health that can be used to generate a health state profile. *For example, a patient in health state 11223 would have no problems with mobility or looking after him/ herself, some problems doing usual activities, some pain or discomfort, and would feel very worried, sad or unhappy. Each health state can potentially be assigned a summary index score based on societal preference weights for the health state. These weights, sometimes referred to as 'utilities', are often used to compute QALYs for use in health economic analyses. Health state index scores generally range from <0 (where 0 is the value of a health state equivalent to dead; negative values representing values as worse than dead) to 1 (the value of full health), with higher scores indicating higher health utility. The health state preferences often represent national or regional values and can therefore differ between countries/regions.*

Title	Proportion of children and adolescents with a positive change in Quality of Life (QoL) scores at 1- year follow-up

2) The second part of the questionnaire consists of a **visual analogue scale (VAS)** on which the respondent rates his/her perceived health from 0 (the worst imaginable health) to 100 (the best imaginable health).

- The EQ-5D-Y questionnaire is cognitively undemanding, taking only a **few minutes to complete**. Instructions to respondents are included in the questionnaire.
- Guidance is provided by EuroQol on how the EQ-5D-Y should be applied in different age ranges.
- The follow-up in the PMOCs only includes young people from the age of 2 until 17 years old. Therefore **it is recommended that the EQ-5D-Y is used for the entire population, with the proxy version of the EQ-5D-Y for children until 7 years old**.

Table 6 – Recommended age range of users of the EQ-5D-Y version

Age range (years)	Recommendation
0 – 3	• **No EQ-5D-Y version is available for this age range.**
4 – 7	• **For children ages 4 – 7, a proxy version should be used.** • No self-reported EQ-5D-Y is available for this age range at present.
8 – 11	• **Use EQ-5D-Y** • The EQ-5D-Y is more understandable for children in this age range than an adult version of the EQ-5D.
12 – 15	• **Both the EQ-5D-Y and adult EQ-5D versions can be used.** • An overlapping area. Generally, EQ-5D-Y is recommended. However, depending on study design, it might also be appropriate to use one of the EQ-5D adult versions. For example, if a study includes both adult respondents and respondents between the ages of 12 and 15, the study team might prefer to use just one version of EQ-5D across the whole study population.
16 and older	• **Use an adult version (EQ-5D-3L or EQ-5D-5L)** • A possible exception would be a study that only includes children up to age 18. In this case, it may be preferable to use EQ-5D-Y across the full age range to avoid using two different versions of EQ-5D.

Source: EQ-5D-Y User Guide (https://euroqol.org/publications/user-guides/).

Calculations

- Proportion of children and adolescents having had a measurement at least at entry and at 1-year follow-up.
- A health profile should be generated for each patient at **baseline and at 1-year**.
  - Summary statistics will be derived, including numbers and proportions of children and adolescents reporting each level of severity in each EQ-5D-Y dimension in each visit.
  - If relevant (i.e. if results are to be used in an economic evaluation of the intervention under investigation), a health state index value will be calculated from individual health profiles.
  - Mean, SD, minimum, median, and maximum EQ-5D-Y index scores will be provided for the study population and relevant subgroups by visit.
  - The EQ VAS score (between 0 and 100) will be summarised using mean, SD, minimum, median and maximum scores by visit.
  - Mean, SD, minimum, median and maximum changes on the EQ-5D-Y index and VAS will be provided from baseline to time points (e.g. Week 12, Week 24) and final assessment (e.g. Week 52).

Technical definitions

- Each question corresponds to a value from 1 (no problem) to 3 (a lot of problems).
- The younger patient is asked to indicate his/her health state by ticking the box next to the most appropriate statement in each of the five dimensions. This decision results in a 1-digit number that expresses the level selected for that dimension.
- The digits for the five dimensions can be combined into a 5-digit number that describes the younger patient's health state (see Appendix 11.2).

Title	Proportion of children and adolescents with a positive change in Quality of Life (QoL) scores at 1- year follow-up

	• Data collected using EQ-5D-Y can be presented in various ways. A basic subdivision can be made according to the structure of the EQ-5D-Y (see User Guide: https://euroqol.org/publications/user-guides/):
	  ○ Presenting results from the EQ-5D-Y descriptive system as a health profile.
	  ○ Presenting results of the EQ VAS as a measure of overall self-rated health status.
	  ○ Presenting results from the EQ-5D-Y index value.

Subgroup analyses	• By age and by gender
	• By weight status (overweight, obesity class) at baseline.
	• By age group:
	  ○ Children 4 – 7 years
	  ○ Children 8 – 11 years
	  ○ Adolescents 12 years and older
	• By weight status (overweight, obesity class, BMI z-score, etc.) at baseline.

Reporting of results	Results are prospectively recorded in the Electronic Patient File at least at entry and at 1-year follow-up.
Targets	• 90% of children and adolescents have a result for this indicator at the start and at 1-year follow-up. • 30% of children and adolescents with a positive change in QoL scores at 1-year follow-up.
Benchmarking	• Percentage of children and adolescents that have a result for this indicator at the start and at 1-year follow-up. • Possibility to compare the obtained results for children and adolescents (8 – 15 years) managed in Paediatric Multidisciplinary Obesity Centres (PMOCs) with those from the Value Set for Belgium.[38]
Comments	• All age groups are not necessarily covered by all instruments while some of them offer a self-report for adolescents and a parent report for children under the age of five. The most used ones are **PedsQL** (https://www.PedsQL.org/about_PedsQL.html) and **DISABKIDS** (https://eprovide.mapi-trust.org/instruments/chronic-generic-module-long-version-self-reported-version). Unfortunately, **both instruments are protected by copyright**, and substantial fees need to be paid annually for large non-commercial organization research and evaluation (including use in hospitals or healthcare systems that will include a large number of children and adolescents and/or centres); such cost can include a license fee per study, an annual license fee and/or an annual fee for Patient Registry. **Therefore, the KCE proposes to use the widely validated EQ-5D-Y**.[38] • Users of EQ-5D-Y can attach a value to each health state reflecting how good or bad that state is according to the preferences of the general population of a country/region, known as an EQ-5D-Y index. The collection of index values for all possible EQ-5D health states is called a value set. The value set enables the calculation of quality-adjusted life-years in children and adolescents, allowing a cost-effectiveness evaluation of health technologies and their youth-specific price setting. Such a value set already exists for Belgium.[38] **Additional information** • Website: https://euroqol.org/ • Video with information about the Youth version: https://euroqol.org/euroqol-launches-a-new-whiteboard-animation-eq-5d-y/ • Link towards demo: https://euroqol.org/eq-5d-instruments/sample-demo/ (also available in REDCap) • Population norms (= value sets): https://euroqol.org/eq-5d-instruments/eq-5d-y-about/population-norms/ à in the meantime, a value set for Belgium has been published for the Y-version[38] • How to obtain the questionnaire: https://euroqol.org/support/how-to-obtain-eq-5d/

Title	Proportion of children and adolescents with a positive change in Quality of Life (QoL) scores at 1- year follow-up
	• Available versions: https://euroqol.org/eq-5d-instruments/all-eq-5d-versions/ EQ-5D-Y is available in more than **100 languages (including French and Dutch)** and in **various modes of administration** (including paper, digital devices, REDCap, Qualtrics). Its use is **free of charge**.

Appendix 11.2. EQ-5D-Y Health Questionnaire (English version)

Under each heading, please tick the ONE box that best describes your health TODAY.

MOBILITY *(walking about)*
- I have no problems walking about ☐
- I have some problems walking about ☐
- I have a lot of problems walking about ☑

LOOKING AFTER MYSELF
- I have no problems washing or dressing myself ☐
- I have some problems washing or dressing myself ☑
- I have a lot of problems washing or dressing myself ☐

DOING USUAL ACTIVITIES *(for example, going to school, hobbies, sports, playing, doing things with family or friends)*
- I have no problems doing my usual activities ☐
- I have some problems doing my usual activities ☐
- I have a lot of problems doing my usual activities ☑

HAVING PAIN OR DISCOMFORT
- I have no pain or discomfort ☐
- I have some pain or discomfort ☐
- I have a lot of pain or discomfort ☑

FEELING WORRIED, SAD OR UNHAPPY
- I am not worried, sad or unhappy ☐
- I am a bit worried, sad or unhappy ☐
- I am very worried, sad or unhappy ☑

This example identifies the health state '12333'.

Levels of perceived problems are coded as follows:

☐ ☐ ☑ Level 1 is coded as a '1'

☐ ☑ ☐ Level 2 is coded as a '2'

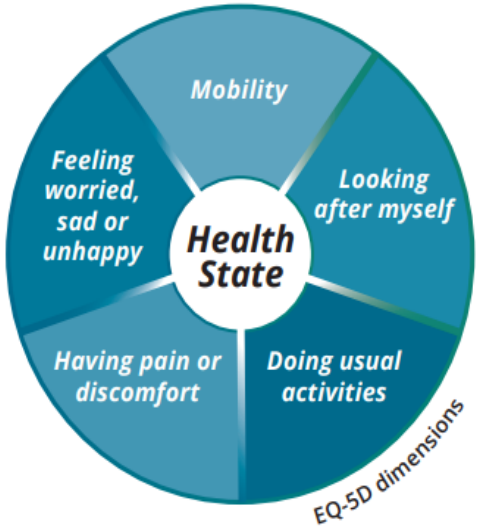
☐ ☐ ☑ Level 3 is coded as a '3'

Each of the five dimensions comprising the EQ-5D descriptive system is divided into three levels of perceived problems:

LEVEL 1: indicating no problem
LEVEL 2: indicating some problems
LEVEL 3: indicating a lot of problems

A unique health state is defined by combining one level from each of the five dimensions.

A total of 243 possible health states is defined in this way. For example, working clockwise from the top of the diagram, state 11223 indicates no problems with mobility or looking after myself, some problems doing usual activities, having some pain or discomfort and feeling very worried, sad or unhappy. State 11111 indicates no problems on any of the five dimensions.



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Colophon

Titre:	Développer un ensemble d'indicateurs de qualité pour surveiller la qualité des soins dispensés par les centres pédiatriques multidisciplinaires de l'obésité (CPMO)
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Validateur externe:	Quentin Schoonvaere (PAQS)
Intérêts déclarés KCE:	Le KCE est une institution fédérale financée par l'INAMI, par le Service public fédéral Santé, Sécurité de la chaîne alimentaire et Environnement, et par le Service public fédéral Sécurité sociale. La mission du KCE est de conseiller les décideurs politiques sur les décisions relatives aux soins de santé et à l'assurance maladie sur la base de recherches scientifiques et objectives. Il doit identifier et mettre en lumière les meilleures solutions possibles, dans le cadre d'un système de soins de santé accessible et de qualité, en tenant compte de la demande croissante et des contraintes budgétaires. Le KCE n'a aucun intérêt dans les entreprises (commerciales ou non commerciales, c'est-à-dire les hôpitaux et les universités), les associations (par exemple les associations professionnelles, les syndicats), les individus ou les organisations (par exemple les groupes de pression) qui pourraient être affectés positivement ou négativement (financièrement ou de toute autre manière) par la mise en œuvre des recommandations. Tous les experts ayant participé à la rédaction du rapport ou au processus d'examen par les pairs ont rempli un formulaire de déclaration d'intérêts. Les informations relatives aux conflits d'intérêts potentiels sont publiées dans le colophon du présent rapport. Tous les membres de l'équipe d'experts du KCE remplissent des déclarations d'intérêts annuelles et de plus amples détails à ce sujet sont disponibles sur demande.
Intérêts déclarés externes :	Tous les experts et stakeholders consultés pour ce rapport ont été sélectionnés en raison de leur implication dans le domaine de la prise en charge du surpoids et de l'obésité chez les enfants et les adolescents . A ce titre, il est possible que chacun d'eux présente, jusqu'à un certain point, un inévitable conflit d'intérêt.
Layout :	Ine Verhulst
Disclaimer :	• **Les experts externes ont été consultés sur une version (préliminaire) du rapport scientifique. Leurs remarques ont été discutées au cours des réunions. Ils ne sont pas co-auteurs du rapport scientifique et n'étaient pas nécessairement d'accord avec son contenu.** • **Une version (finale) a ensuite été soumise au validateur. Le validateur n'est pas co-auteur du rapport scientifique et il n'était pas nécessairement d'accord avec son contenu.**

- **Finalement, ce rapport a été approuvé à l'unanimité par le Conseil d'administration (voir http://kce.fgov.be/fr/content/le-conseil-dadministration-du-centre-dexpertise).**
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Numéro de projet :	2023-52
Date de publication :	26 octobre 2023
Domaine :	Health Services Research (HSR)
MeSH :	Quality of health care, Quality indicators, Pediatric obesity, Pediatric overweight, Multidisciplinary health care
Classification NLM :	QU 248
Langue :	Français
Format :	Adobe® PDF™ (A4)
Dépot légal :	D/2023/10.273/30
ISSN :	2466-6440

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https://doi.org/10.57598/R372BS



Comment citer ce rapport ? Primus-de Jong C, Sabbe K, Stordeur S. Développer un ensemble d'indicateurs de qualité pour surveiller la qualité des soins dispensés par les centres pédiatriques multidisciplinaires de l'obésité (CPMO). Health Services Research (HSR). Bruxelles: Centre Fédéral d'Expertise des Soins de Santé (KCE). 2023. KCE Reports 372Bs. D/2023/10.273/30.

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