EUnetHTA Joint Action 3 2016-2020

The 24-hour blood pressure measurement device Mobil-O-Graph® with the built-in pulse wave velocity algorithm ARCSolver® to measure arterial stiffness for the optimization of hypertension treatment and assessment of cardiovascular risk

Project ID: ***OTCA24***

Project description and planning

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Version Log

Version number	Date	Modification	Reason for the modification
V1	02/07/19	Draft Created	First Draft
V2	20/08/19	Draft edit	Internal (main authors) revision
V3	10/09/19	Draft edit	Feedback from Co-authors incorporated
V4	23/09/19	Draft edit	Feedback from Avalia-T incorporated
V5	30/09/19	Draft edit	Feedback from HIQA incorporated
V6	24/10/19	Draft edit	Feedback from Avalia-T and Project Manager included
V7	07/11/19	Draft edit	Further amendments and Second Draft
V8	22/11/19	Draft edit	Comments from Medical Experts

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Abbreviations

ABPM	ambulatory blood pressure measurement
BP	blood pressure
Br-BP	brachial blood pressure
C-BP	central blood pressure
CUR	EUnetHTA domain for health problem and current use
CVD	cardiovascular disease
EFF	EUnetHTA clinical effectiveness domain
GRADE	Grading of Recommendations, Assessment, Development and Evaluation
HTA	health technology assessment
MOGARC	Mobil-O-Graph® with the ARCSolver® algorithm
PWA	pulse wave analysis
SAF	EUnetHTA safety domain
TEC	EUnetHTA domain for description and technical characteristics

1 Project organization

1.1 Participants

Table 1-1: Project participants

	Agency	Role in the project	Country	Distribution of work
Assessment team				
1.	Main Association of Austrian Social Security Institutions, Hauptverband der österreichischen Sozialversicherungsträger **(HVB)**	Author	Austria	• Develop the first draft of the EUnetHTA project plan • Perform the literature search and study selection • Undertake the assessment (data extraction, analysis, synthesis, and interpretation of findings) • Lead on the writing of the draft report • Circulate draft report to dedicated reviewers and external experts, compile and respond to feedback, and edit draft report, as appropriate • Send final document to manufacturers for fact check • Prepare final assessment and write the final summary of the assessment
2.	Universita Cattolica del Sacro Cuore **(UCSC/Gemelli)**	Co-Author	Italy	• Collaboration in the development of the EUnetHTA project plan • Collaboration in undertaking the assessment (data extraction, analysis, synthesis, and interpretation of findings) • Collaboration in writing of the draft report (certain domains) • Check, provide input and endorse all steps (e.g. collaboration in literature selection, data extraction, assessment of risk of bias) • Check, provide input and endorse content of all domains • Collaborate on the writing of the discussion and conclusions, and endorse the same • Review drafts of the assessment, propose amendments where necessary and provide written feedback
3.	Health Information and Quality Authority **(HIQA)**	Dedicated Reviewer	Ireland	• Review draft project plan, propose amendments where necessary and provide written feedback • Rate the relevance of outcomes (GRADE method) • Review assessments, propose amendments where necessary and provide written feedback
4.	Galician Agency for HTA	Dedicated	Spain	• Review draft project plan, propose

	(AVALIA-T)	Reviewer		amendments where necessary and provide written feedback • Rate the relevance of outcomes (GRADE method) Review assessments, propose amendments where necessary and provide written feedback.
Contributors				
5.	Thomas Schuh	External expert cardiology	Austria	
6.	Alfonso Bellia	External expert diabetes	Italy	
7.	TBA	Medical Editor		
8.	Ministry of Health, Croatia **(MoH)**	Project Manager	Croatia	

1.2 Project stakeholders

Table 1-2: Project stakeholders

Organisation	Role in the project
Austrian Institute of Technology (Austria)	Developer, Arc-Solver® Algorithm (Noninvasive aortic pressure estimation)
IEM GmbH (Germany)	Manufacturer, Device Mobil-O-Graph® (Noninvasive aortic pressure estimation)
AtCor Medical (Australia)	Manufacturer, Device SphygmoCor® (Noninvasive aortic pressure estimation)
Omron Healthcare Co. Ltd. (Japan)	Manufacturer, Device Omron HEM 9000AI (Noninvasive aortic pressure estimation)
TensioMed (Hungary)	Manufacturer, Device Arteriograph (Noninvasive aortic pressure estimation)
SMT Medical (Germany)	Manufacturer, Device VICORDER® (Noninvasive aortic pressure estimation)
SunTech Medical (USA)	Manufacturer, Device Centron™ cBP301 (Noninvasive aortic pressure estimation)
Uscom (Australia)	Manufacturer, Device PulseCor™ (Noninvasive aortic pressure estimation)
DiaTecne (Italy)	Manufacturer, Device PulsePen® (Noninvasive aortic pressure estimation)
ALAM Medical (France)	Manufacturer, Device Complior Analyse (Noninvasive aortic pressure estimation)
HealthSTATS (Singapore)	Manufacturer, Device A-PULSE™ and BPro® (Noninvasive aortic pressure estimation)

1.3 Milestones and Deliverables

Table 1-3: Milestones and Deliverables

Milestones/Deliverables	Start date	End date
Project duration	**[06/06/2019]**	**[15/05/2020]**

Scoping phase	**[06/06/2019]**	**[02/12/2019]**
Identification of manufacturer(s) and external experts; *optional: identification of patients*	[20/08/2019]	[01/09/2019]
Scoping and development of draft Project Plan incl. preliminary PICO	[02/07/2019]	[20/08/2019]
Share the preliminary PICO with external experts for comments	[09/09/2019]	[13/09/2019]
Internal Scoping e-meeting with the assessment team	[26/9/2019]	[26/09/2019]
Consultation of draft Project Plan with dedicated reviewers	[13/09/2019]	[20/09/2019]
Consultation of draft Project Plan with external experts and fact check by manufacturers	[8/11/2019]	[22/11/2019]
Amendment of draft Project Plan & final Project Plan available	[22/11/2019]	[02/12/2019]
Assessment phase	**[02/12/2019]**	**[15/05/2020]**
Writing first draft rapid assessment	[02/12/2019]	[31/01/2020]
Review by dedicated reviewer(s)	[31/01/2020]	[14/02/2020]
Writing second draft rapid assessment	[14/02/2020]	[06/03/2020]
Review by ≥ 2 external clinical experts and fact check by manufacturers	[06/03/2020]	[20/03/2020]
Writing third draft rapid assessment	[20/03/2020]	[03/04/2020]
Medical editing	[03/04/2020]	[17/04/2020]
Writing of fourth version of rapid assessment	[17/04/2020]	[01/05/2020]
Formatting	[01/05/2020]	[15/05/2020]
Final version of rapid assessment		**[15/05/2020]**

2 Project Outline

2.1 Project Objectives

The rationale of this assessment is to collaboratively produce structured (rapid) core HTA information on other technologies. In addition, the aim is to apply this collaboratively produced assessment in the national or regional context.

Table 2-1: Project objectives

	List of project objectives	Indicator (and target)
1.	To jointly produce health technology assessments that are fit for purpose, of high quality, of timely availability, and cover the whole range of health technologies.	Production of 1 (rapid) relative effectiveness assessment.
2.	To apply this collaboratively produced assessment into the local (e.g. regional or national) context.	Production of ≥2 local (e.g. national or regional) reports based on the jointly produced assessment.

This rapid assessment addresses the research question whether the pulse wave analysis device Mobil-O-Graph® with the ARCSolver® algorithm (MOGARC) in the outpatient setting is more effective and/or safer in patients at risk of cardiovascular events or in diagnosing and monitoring hypertension, compared to current standard practice. For patients at risk of cardiovascular events, both primary and secondary prevention will be examined, comparing MOGARC to other pulse wave analysis devices, conventional 24-hour blood pressure monitoring devices, and risk scores. For diagnosis, treatment and monitoring of hypertension, MOGARC will be compared to other pulse wave devices, and conventional 24-hour blood pressure monitoring devices.

ArcSolver® is a patented algorithm invented in Austria. It uses 24-hour blood pressure values collected by a non-invasive oscillometric central blood pressure estimation device called Mobil-O-Graph® to calculate pulse wave velocity, and thereby indicate arterial stiffness.[1] Arterial stiffness has shown to be related to future cardiovascular events and pulse wave velocity more sensitive to changes due to hypertensive medication.[2] Ischemic heart disease, stroke, hypertensive heart disease, and diabetes are among the top 10 causes of mortality in Austria and diabetes is the third biggest cause of disability.[3] Identifying and treating individuals at risk of cardiovascular events and managing hypertension medication is a priority to improve societal health.[3] This topic was chosen based on a request from the Ministry of Health in Austria who commissioned our agency (Main Association of Austrian Social Security Institutions) to evaluate Mobil-O-Graph® and ARCSolver® algorithm , which measures pulse waves from blood pressure values (a measure of vascular aging, or vascular stiffness)[4] to identify people at risk of cardiovascular events or of hypertension. It is currently unclear if pulse wave analysis in the outpatient and primary care setting achieves better management of hypertension and/or leads to avoidance of cardiovascular events. It is also unclear to what extent the commercially available pulse wave analysis devices are interchangeable.

2.2 Project Method and Scope

2.2.1 Approach and Method

Table 2-2: Project approach and method

Project approach and method
For all domains, the selection of assessment elements will be based on the HTA Core Model For Rapid Relative Effectiveness Assessments version 4.2.

Mortality and morbidity associated with hypertension and cardiovascular disease are increasing worldwide and pose a significant threat to public health.[2] The measurement of brachial blood pressure with a sphygmomanometer has become embedded in routine clinical assessment to help diagnose and monitor hypertension and is also part of cardiovascular risk equations.[5-8] Obtaining an accurate measure of blood pressure is important to diagnose and monitor hypertension, including the effectiveness of medications in controlling hypertension.[6] In the last decade, it has become common to take several blood pressure measurements throughout the day with mobile devices to obtain an accurate measurement rather than only once at the doctor's office, because the measurement can be influenced by many factors that vary throughout the day such as coffee and exercise.[5] Additionally, some people experience "dips" in blood pressure during sleep, which can only be identified using a 24-h measurement device.[8]

Recent studies have emerged highlighting the importance of central (aortic or carotid) blood pressure (c-BP) beyond benefits of conventional brachial blood pressure (br-BP).[5] Conventional BP measurements taken in the peripheral arteries are not direct substitutes for central blood pressure because of differences in blood pressure waveforms and values between the central aorta and the peripheral arterial system. Central (aortic and carotid) blood pressure is pathophysiologically more relevant for the pathogenesis of cardiovascular disease (CVD). Using br-BP could thus lead to over- or under-treatment of hypertension or under-assessment of cardiovascular risk.[9, 10] Despite similar effects on brachial pressure, antihypertensives have differential effects on central pressure, which may explain the recent superiority of vasodilating drugs in trials.[11] Pulse wave analysis is a method which uses br-BP measurements taken over a 24-hour period to calculate pulse wave velocity of c-BP to evaluate arterial stiffness.[1] The incremental prognostic value of pulse wave analysis to evaluate arterial stiffness versus conventional blood pressure measures has not been consistently demonstrated in recent literature. [11]

In addition to the management and diagnosis of hypertension, measuring blood pressure is important for the prediction of cardiovascular events such as atrial fibrillation, stroke and myocardial infarction and thereby avoidance through timely treatment.[5, 10, 12] Studies have also explored if certain subgroups for example elderly or those with diabetes are particularly affected by the differential risk stratification from blood pressure measurement versus pulse wave velocity measurement of arterial stiffness.[13] However, there is no consensus on the role of pulse wave analysis in risk equations and due to inconclusive evidence, it has not been considered in guidelines. [11, 14]

Based on the conflicting nature of the available evidence, pulse wave velocity is not currently recommended in either the management of hypertension, nor to measure the risk of CV events.[15]

Mobil-O-Graph® with ARCSolver® algorithm uses br-BP measurements to calculate pulse wave velocity of c-BP over a 24-hour period.[1, 4] It is currently unclear if MOGARC is superior or non-inferior to current risk stratification tools for cardiovascular events and if it is more accurate than or just as accurate as standard practice in diagnosing hypertension and monitoring treatment success. Additionally, it is unclear how MOGARC compares to other pulse wave analysis devices.

TEC and CUR domains

- Table 1-2 lists the known manufacturers of this technology.
- Input from clinical experts on the best available epidemiological data, current use of the technology and current standard care for the patient group will be sought.
- Guidelines will be searched and appropriate information on current recommendations as well as citations of epidemiological data will be extracted.

EFF and SAF domains

The EFF and SAF domains will focus on identifying and monitoring hypertension (response to hypertension therapy) and primary and secondary prevention of cardiovascular events.

Systematic literature review will be conducted to answer the following questions:
Primary Objectives:

1) Is Mobil-O-Graph® with the ARCSolver® algorithm more effective and safer than currently approved 24 hour blood pressure monitoring devices in the diagnosis and monitoring of hypertension?
2) Is Mobil-O-Graph® with the ARCSolver® algorithm more effective and safer than cardiovascular risk equations currently used in routine practice for primary and secondary prevention?

Secondary Objective:

3) Is Mobil-O-Graph® with the ARCSolver® algorithm more effective and safer than other commercially available non-invasive pulse wave analysis devices in primary and secondary hypertension?

Study and outcomes validity and level of evidence will be assessed according to the EUnetHTA guidelines. The Cochrane Risk of bias tool will be used on study and outcome level. The quality of the body of evidence will be assessed using GRADE (Grading of Recommendations, Assessment, Development and Evaluation).

Table 2-3: Planned literature search strategy

Literature search strategy
Sources for CUR and TEC domain specific information: manufacturer documents, manufacturer websites, reviews, guidelines from European and US stakeholders, HTA reports Sources for locating EFF and SAF domain specific information: Embase and Medline databases using Embase.com platform, CRD database, clinicaltrials.gov Search terms: Intervention terms (pulse wave analysis, name of each device and/or algorithm) AND Condition terms (cardiovascular risk, hypertension diagnosis, treatment, and management) AND Study Type Terms (prospective comparative observational studies, systematic literature reviews, and randomized controlled trials) AND comparator terms (cardiovascular risk equations, 24h blood pressure measurement, pulse wave analysis). Time span: The last 10 years of studies will be searched as well as the last 3 years of conference abstracts, and the last 3 years of ongoing randomized controlled trials on clinicaltrials.gov. Language: studies in English will be included. Study types: meta-analyses, diagnostic accuracy studies, prospective comparative observational studies, systematic literature reviews, and randomized controlled trials Inclusion: primary and secondary prevention of cardiovascular events, management, treatment, and diagnosis of hypertension

Exclusion:

1. Studies not conducted in the population of interest will be excluded (the population of interest is patients at risk of cardiovascular disease, diagnosed with hypertension, on hypertension medication, or eligible for cardiovascular event risk stratification).
2. Studies comparing to invasive methods will be excluded
3. Studies prior to 2008

Gray literature will not be examined for the EFF and SAF domains except for conference abstracts indexed in Embase and Medline in the last 3 years and clinical trials registered on clinicaltrials.gov in the last 3 years.

Search strategy (may be amended during the review phase):

Search 1: Mobil-O-Graph compared to other 24-hour blood pressure devices ('mobil-o-graph':ti,ab OR 'mobil-o-graph'/dn OR 'arcsolver':ti,ab) N=487

Search 2: All pulse wave devices or other measures of arterial stiffness and pulse wave velocity (('vascular aging':ti OR 'arterial stiffness':ti OR 'pulse wave':ti) AND ('hypertension'/exp OR 'cardiovascular risk'/exp)) N= 5,393

(minus Search 1, and split into hypertension, cardiovascular risk, and overlapping for easier screening)

Please, consult the EUnetHTA Guideline on Information Retrieval: http://www.eunethta.eu/sites/default/files/Guideline_Information_Retrieval_V1-1.pdf.]

Table 2-4: Plan for data extraction

Planned data extraction
Data will be extracted for the EFF and SAF domain regarding: • Author • Title • Year • Setting • Study Design • Clinical Trial ID or study name • Funding source • Topic (cardiovascular risk or hypertension or both) • Number of devices/algorithms/risk scores compared • Device 1 • Device 2 • Device 3 • Device 4 • Device 5 • Frequency of measurement • Duration of follow-up • N patients • N for each device • Age • Disease area • Subgroups

- Hypertension:
  - Screening for hypertension or monitoring
  - Uncontrolled yes/no
- Cardiovascular risk
  - Replace risk score or blood pressure within risk score
  - Primary or secondary prevention
- Primary outcome
- Secondary outcomes
- Each outcome
- Each outcome result
- Methods
- Loss to follow-up
- Relevant cut-off values
- Conclusion
- Quality assessment (risk of bias)

2.2.2 Project Scope

The EUnetHTA Guidelines, available at https://www.eunethta.eu/methodology-guidelines/ **need to be consulted** throughout the assessment process.

Table 2-5(a): Project Scope: PICO for use of MOGARC in diagnosing and monitoring of hypertension

Description	Project Scope
Population	Target population: adult population 18 and over. All patients eligible for diagnosis, treatment, or monitoring of hypertension will be included, and additionally, a subgroup with uncontrolled hypertension will be examined. Further subgroups identified in the literature will also be included. • Setting: outpatient setting, primary care • Intended use of the technology: diagnosis and monitoring • Condition intended to diagnose/monitor: hypertension • Relevant ICD-10 codes: I10-I16 Hypertensive disease • Relevant MeSH-terms: hypertension
Intervention	Pulse wave analysis through Mobil-O-Graph® device and ARCSolver® algorithm. ARCSolver® is a patented algorithm invented in Austria. It uses 24h blood pressure values collected by a non-invasive oscillometric central blood pressure estimation device called Mobil-O-Graph® to calculate pulse wave velocity, and thereby indicate arterial stiffness.
Comparison	Conventional 24-h blood pressure measurement approved for use under "specialist" or "ambulatory blood pressure measurement (ABPM)" will be considered).[16] The rationale for choosing the comparators as such is that it is the current standard of practice in diagnosis of hypertension and monitoring of treatment success. Invasive Pulse wave analysis (PWA) will not be included as a comparator.
Outcomes	EFF: efficacy and effectiveness (reduction in uncontrolled hypertension, reduction in non-diagnosed hypertension, sensitivity and specificity, mortality, morbidity, reduction in cardiovascular risk, reduction of stroke and other cardiovascular events, all effectiveness outcomes measured in included studies)

	SAF: false positives and false negatives, mortality, morbidity, data safety and protection Compliance: compliance in using device, compliance in taking hypertension medication The outcomes have been chosen based on the hierarchical model of efficacy and effectiveness of medical devices [17, 18].
Study design	Diagnostic accuracy studies, meta-analyses, prospective comparative observational studies, systematic literature reviews, and randomized controlled trials

Table 2-6(b): Project Scope: PICO for use of MOGARC in assessment of cardiovascular risk

Description	**Project Scope**

Population	Target population: adult population 18 and over. Primary and secondary prevention will be examined.
	
	• Setting: outpatient setting, primary care
	
	• Intended use of the technology: risk stratification
	
	  • Condition to risk stratify: cardiovascular events
	
	  • Relevant ICD-10 codes: Cardiovascular and Ischaemic Disease
	
	  I25.10 Cardiovascular Disease, Unspecified (ASCVD) I48.91 Atrial Fibrillation I50.9 Congestive Heart Failure I63.9 CVA I63.9 Stroke I65.23 Carotid Artery Occlusion, Bilateral I65.23 Carotid Artery Stenosis, Bilateral I65.29 Carotid Artery Occlusion I65.29 Carotid Artery Stenosis I67.2 Cerebral Atherosclerosis I67.9 Ischaemic Cerebrovascular Disease I73.9 Peripheral Vascular Disease
	
	  • Relevant MeSH-terms: cardiovascular risk

Intervention	Pulse wave analysis through Mobil-O-Graph® device and ARCSolver® algorithm. ArcSolver® is a patented algorithm invented in Austria. It uses 24h blood pressure values collected by a non-invasive oscillometric central blood pressure estimation device called Mobil-O-Graph® to calculate pulse wave velocity, and thereby indicate arterial stiffness.
Comparison	Cardiovascular risk equations listed in a recently published study comparing cardiovascular risk equations.[19] The rationale for choosing this comparator is that they are currently the standard practice and have been evaluated by various HTA organizations.
Outcomes	EFF: efficacy and effectiveness (identification of cardiovascular risk, reduction of cardiovascular risk, reduction/avoidance of cardiovascular events, avoidance of mortality due to cardiovascular events, avoidance of morbidity due to cardiovascular events, sensitivity and specificity, all other effectiveness outcomes measured in included studies) SAF: false positives and false negatives, mortality, morbidity, data safety and protection The outcomes have been chosen based on the hierarchical model of efficacy and

	effectiveness of medical devices[17, 18]
Study design	Diagnostic accuracy studies, meta-analyses, prospective comparative observational studies, systematic literature reviews, and randomized controlled trials

Table 2-7(c): Project Scope: PICO for comparison of MOGARC to other PWA devices.

Description	**Project Scope**
Population	Target population: adult population 18 and over
Intervention	Pulse wave analysis through Mobil-O-Graph® device and ARCSolver® algorithm. ARCSolver® is a patented algorithm invented in Austria. It uses 24h blood pressure values collected by a non-invasive oscillometric central blood pressure estimation device called Mobil-O-Graph® to calculate pulse wave velocity, and thereby indicate arterial stiffness.
Comparison	Non-invasive pulse wave analysis methods
Outcomes	EFF: efficacy and effectiveness (reduction in uncontrolled hypertension, reduction in non-diagnosed hypertension, sensitivity and specificity, mortality, morbidity, reduction in cardiovascular risk, reduction of stroke and other cardiovascular events, all effectiveness outcomes measured in included studies) SAF: false positives and false negatives, mortality, morbidity, data safety and protection Compliance: compliance in using device, compliance in taking hypertension medication The outcomes have been chosen based on the hierarchical model of efficacy and effectiveness of medical devices[17, 18].
Study design	Diagnostic accuracy studies, meta-analyses, prospective comparative observational studies, systematic literature reviews, and randomized controlled trials

3 Communication and collaboration

Table 3-1: Communication

Communication Type	Description	Date	Format	Participants/ Distribution
Scoping	To internally discuss and reach consensus on the scoping.	*September 26, 2019*	E-meeting	Author(s), co-author(s), dedicated reviewers, observers, project manager (external experts, patients)
	Unveil final project plan and discuss next steps.	*November 27, 2019*	*Additional e-meetings may be planned whenever needed*	*Author(s), Co-author(s), dedicated reviewer(s), project manager*
	As needed	*TBA*	*Additional e-meetings may be planned whenever needed*	*Author(s), Co-author(s), dedicated reviewer(s), project manager*
First draft of the rapid assessment	*To discuss comments of dedicated reviewers*	*After 14/2/2020*	*E-meetings may be planned*	*Author(s), co-author(s), dedicated reviewers*
Second draft of the rapid assessment	*To discuss comments from ≥ 2 external clinical experts and manufacturers*	*After 20/3/2020*	*E-meetings may be planned*	*Author(s), co-author(s), dedicated reviewers; external experts, manufacturers*

3.3 Dissemination plan

The final rapid assessment will be published on the EUnetHTA website: http://eunethta.eu/rapid-reas/ .

All stakeholders and contributors are informed about the publication of the final assessment by the project manager.

Publication in a journal and presentation at a conference are foreseen.

3.4 Collaboration with stakeholders

The manufacturer will fact check the project plan and the rapid assessment.

3.5 Collaboration with EUnetHTA WPs

For the individual rapid assessment, some collaboration with other WPs is planned: WP7 [Implementation] will be informed of the project, in order to prepare activities to improve national uptake of the final assessment. Feedback on the WP4 REA process will be asked from the involved parties by WP6 [Quality Management], and this information will be processed by WP6 to improve the quality of the process and output.

3.6 Conflict of interest and confidentiality management

Conflicts of interest will be handled according to the EUnetHTA Conflict of Interest Policy. All individuals participating in this project will sign the standardised "Declaration of Interest and Confidentiality Undertaking" (DOICU) statement.

Author, co-author(s) and dedicated reviewers who declare a specific conflict of interest will be excluded from the whole work under this specific topic. However, they still may be included in other assessments.

For external experts, patients or other stakeholders involved, conflict of interest declarations are collected. External experts or patients who declare a specific conflict of interest will be excluded from parts of or the whole work under this specific topic. However, they still may be included in other assessments.

Manufacturer(s) will sign a Confidentiality Undertaking (CU) form regarding the specific project.

4 References

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5 Appendix A

5.1 Selected Assessment Elements

The table shows the assessment elements and the translated research questions that will be addressed in the assessment. They are based on the assessment elements contained in the 'Model for Rapid Relative Effectiveness Assessment'. Additionally, assessment elements from other HTA Core Model Applications (for medical and surgical interventions, for diagnostic technologies or for screening) have been screened and included/ merged with the existing questions if deemed relevant.

Table 5-1: Selected Assessment Elements

ID	Topic	Topic Issue	Relevance in this assessment [**Yes – critical**, **Yes** or **No**]	Mandatory (M) or non-mandatory (NM)	Research question(s) or reason for non-relevance of 'mandatory' elements
Description and technical characteristics of technology					
B0001	Features of the technology and comparators	What is the technology and the comparator(s)?	Yes	M	What is pulse wave analysis through Mobil-O-Graph® device and ARCSolver® algorithm? What are the conventional 24-h blood pressure measurement devices approved for use under "specialist" or "ambulatory blood pressure measurement (ABPM)"? What are cardiovascular risk equations? What are other non-invasive pulse wave analysis devices?
A0020	Regulatory Status	For which indications has the technology received marketing authorisation or CE marking? [This assessment element can be placed either in the TEC OR in the CUR domain]	Yes	M	For which indications has the Mobil-O-Graph® device and ARCSolver® algorithm received marketing authorisation or CE marking?
B0002	Features of the technology and comparators	What is the claimed benefit of the technology in relation to the comparator(s)?	Yes	M	What is the claimed benefit of pulse wave analysis through Mobil-O-Graph® device and ARCSolver® algorithm in relation to conventional 24-h blood pressure measurement devices approved for use under "specialist" or "ambulatory blood pressure measurement (ABPM)"? What is the claimed benefit in relation to cardiovascular risk equations? What is the claimed benefit in relation to non-invasive pulse wave analysis methods?
B0003	Features of the technology	What is the phase of development and implementation of the technology and the comparator(s)?	Yes	NM	In what phase of development and implementation is the Mobil-O-Graph® device and ARCSolver® algorithm, conventional 24-h blood pressure measurement approved for use under "specialist" or "ambulatory blood pressure measurement (ABPM)", cardiovascular risk equations, and other non-invasive

ID	Topic	Topic Issue	Relevance in this assessment [**Yes – critical**, **Yes** or **No**]	Mandatory (M) or non-mandatory (NM)	Research question(s) or reason for non-relevance of 'mandatory' elements
					pulse wave analysis methods?
B0004	Features of the technology	Who administers the technology and the comparator(s) and in what context and level of care are they provided?	Yes	M	In what setting and context, and by which medical professionals is the Mobil-O-Graph® device and ARCSolver® algorithm, conventional 24-h blood pressure measurement approved for use under "specialist" or "ambulatory blood pressure measurement (ABPM)" , cardiovascular risk equations and other non-invasive pulse wave analysis devices used?
B0008	Investments and tools required to use the technology	What kind of special premises are needed to use the technology and the comparator(s)?	Yes	NM	What kind of special premises are needed for the use of Mobil-O-Graph® device and ARCSolver® algorithm, conventional 24-h blood pressure measurement approved for use under "specialist" or "ambulatory blood pressure measurement (ABPM)", cardiovascular risk equations and other non-invasive pulse wave analysis methods?
B0009	Investments and tools required to use the technology	What equipment and supplies are needed to use the technology and the comparator(s)?	Yes	NM	What equipment and supplies are needed to use the Mobil-O-Graph® device and ARCSolver® algorithm, conventional 24-h blood pressure measurement approved for use under "specialist" or "ambulatory blood pressure measurement (ABPM)", cardiovascular risk equations, and other non-invasive pulse wave analysis methods?
A0021	Regulatory Status	What is the reimbursement status of the technology? [This assessment element can be placed either in the TEC OR in the CUR domain]	Yes	NM	What is the reimbursement status of the Mobil-O-Graph® device and ARCSolver® algorithm?
Health problem and current use of technology					
A0002	Target Condition	What is the disease or health condition in the scope of this assessment?	Yes	M	What is hypertension and what is cardiovascular disease?
A0003	Target Condition	What are the known risk factors for the disease or health condition?	Yes	NM	What are the known risk factors for hypertension and cardiovascular disease?
A0004	Target Condition	What is the natural course of the disease or health condition?	Yes	M	What is the natural course of hypertension and cardiovascular disease?
A0005	Target Condition	What are the symptoms and the burden of disease or health condition for the patient?	Yes	M	What is the burden of hypertension and cardiovascular disease and what are their symptoms?
A0006	Target Condition	What are the consequences of the disease or health condition for the	Yes	NM	What are the societal consequences of hypertension and cardiovascular disease?

ID	Topic	Topic Issue	Relevance in this assessment [**Yes – critical**, **Yes** or **No**]	Mandatory (M) or non-mandatory (NM)	Research question(s) or reason for non-relevance of 'mandatory' elements
		society?			
A0024	Current Management of the Condition	How is the disease or health condition currently diagnosed according to published guidelines and in practice?	Yes	M	How are hypertension and cardiovascular disease currently diagnosed according to published guidelines and how does that translate in practice?
A0025	Current Management of the Condition	How is the disease or health condition currently managed according to published guidelines and in practice?	Yes	M	How should hypertension and cardiovascular disease be managed according to current published guidelines and how are they managed in practice?
A0007	Target Population	What is the target population in this assessment?	Yes	M	What is the target population in this assessment?
A0023	Target Population	How many people belong to the target population?	Yes	M	What is the prevalence and incidence of the relevant target population and subgroups?
A0011	Utilisation	How much are the technologies utilized?	Yes	M (NM for diagnostics)	To what extent is Mobil-O-Graph® device and ARCSolver® utilized?
Clinical effectiveness					
D0001	Mortality	What is the expected beneficial effect of the intervention on mortality?	Yes	M	What is the expected benefit of using the Mobil-O-Graph® device and ARCSolver® algorithm on mortality?
D0005	Morbidity	How does the technology affect symptoms and findings (severity, frequency) of the disease or health condition?	Yes	M	How does Mobil-O-Graph® and ARCSolver® affect symptoms and findings (severity, frequency) of hypertension and cardiovascular disease?
D0006	Morbidity	How does the technology affect progression (or recurrence) of the disease or health condition?	Yes	M	How does Mobil-O-Graph® and ARCSolver® affect progression (or recurrence) of hypertension and cardiovascular disease?
D0011	Function	What is the effect of the technology on patients' body functions?	Yes	M	How does Mobil-O-Graph® device and ARCSolver® affect the patients' body functions?
D0016	Function	How does the use of technology affect activities of daily living?	No	NM	
D0012	Health-related quality of life	What is the effect of the technology on generic health-related quality of life?	Yes	M	How does Mobil-O-Graph® and ARCSolver® affect generic health-related quality of life?
D0013	Health-related quality of life	What is the effect of the technology on disease-specific quality of life?	Yes	M	How does Mobil-O-Graph® and ARCSolver® affect disease specific quality of life?
D0017	Patient satisfaction	Were patients satisfied with the technology?	No	NM	

ID	Topic	Topic Issue	Relevance in this assessment [**Yes – critical**, **Yes** or **No**]	Mandatory (M) or non-mandatory (NM)	Research question(s) or reason for non-relevance of 'mandatory' elements
Safety					
C0008	Patient safety	How safe is the technology in relation to the comparator(s)?	Yes	M	How safe is Mobil-O-Graph® and ARCsolver ® in relation to the comparators?
C0002	Patient safety	Are the harms related to dosage or frequency of applying the technology?	No	NM	
C0004	Patient safety	How does the frequency or severity of harms change over time or in different settings?	Yes	M	How does the frequency or severity of harms change over time or in different settings?
C0005	Patient safety	What are the susceptible patient groups that are more likely to be harmed through the use of the technology?	Yes	M	What are the patient groups that are more likely to be harmed through the use of the technology?
C0007	Patient safety	Are the technology and comparator(s) associated with user-dependent harms?	No	NM	
B0010	Safety risk management	What kind of data/records and/or registry is needed to monitor the use of the technology and the comparator(s)?	Yes	M for medical devices NM for screening and diagnostics	What kind of data/records and/or registry is needed to monitor the use of Mobil-O-Graph® device and ARCSolver®, conventional 24-h blood pressure measurement approved for use under "specialist" or "ambulatory blood pressure measurement (ABPM)", cardiovascular risk equations, and other non-invasive pulse wave analysis methods?

5.2 Checklist for potential ethical, organisational, patient and social and legal aspects

1. Ethical	
1.1. Does the introduction of the new technology and its potential use/non-use instead of the defined, existing comparator(s) give rise to any new ethical issues?	No
1.2. Does comparing the new technology to the defined, existing comparators point to any differences that may be ethically relevant?	No
2. Organisational	
2.1. Does the introduction of the new technology and its potential use/non-use instead of the defined, existing comparator(s) require organisational changes?	No

2.2. Does comparing the new technology to the defined, existing comparator(s) point to any differences that may be organisationally relevant?	No
3. Social	
3.1. Does the introduction of the new technology and its potential use/non-use instead of the defined, existing comparator(s) give rise to any new social issues?	No
3.2. Does comparing the new technology to the defined, existing comparator(s) point to any differences that may be socially relevant?	No
4. Legal	
4.1. Does the introduction of the new technology and its potential use/non-use instead of the defined, existing comparator(s) give rise to any legal issues?	No
4.2. Does comparing the new technology to the defined, existing comparator(s) point to any differences that may be legally relevant?	No