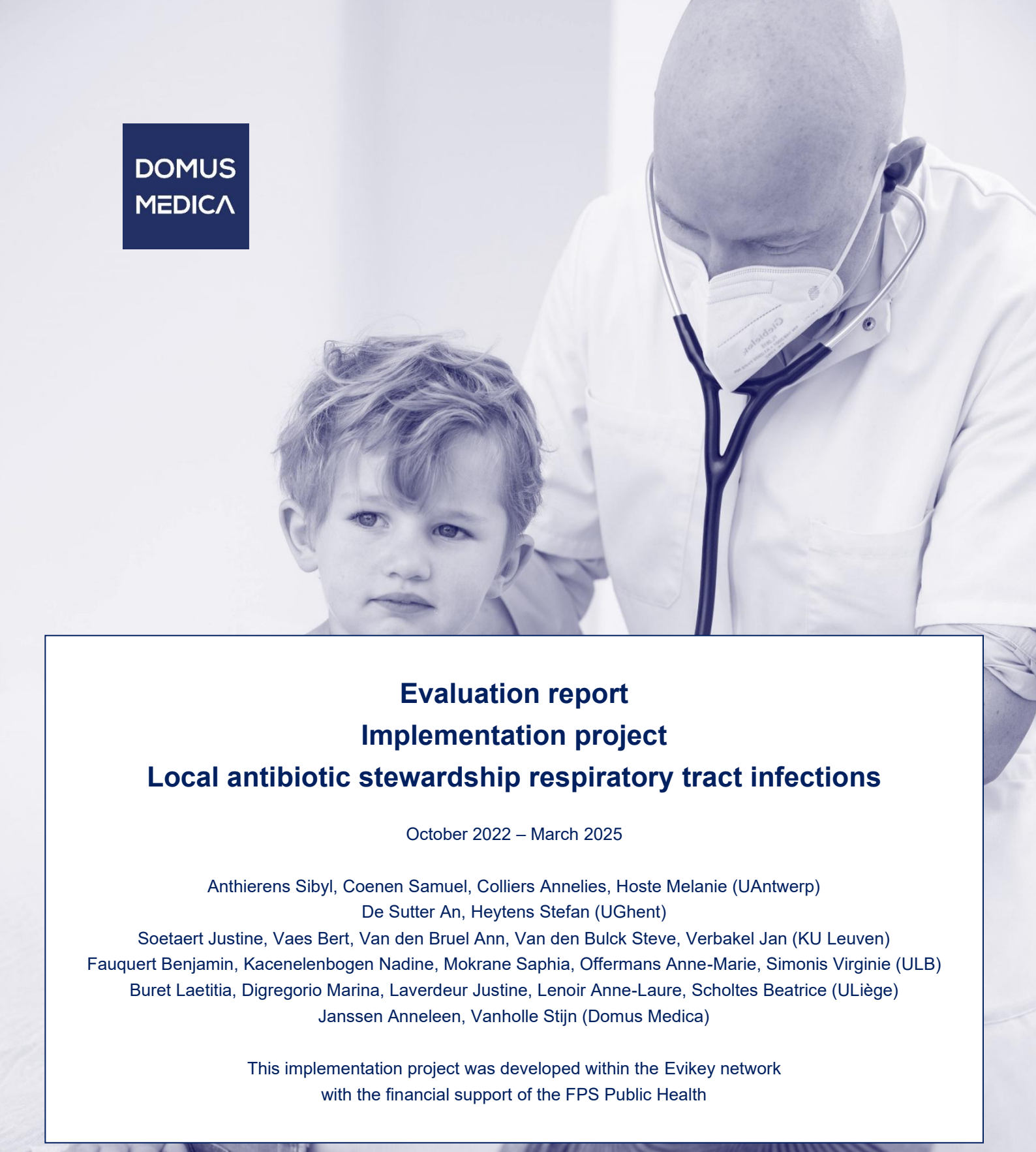


Evaluation report
Implementation project
Local antibiotic stewardship respiratory tract infections

October 2022 – March 2025

Anthierens Sibyl, Coenen Samuel, Colliers Annelies, Hoste Melanie (UAntwerp)
De Sutter An, Heytens Stefan (UGhent)
Soetaert Justine, Vaes Bert, Van den Bruel Ann, Van den Bulck Steve, Verbakel Jan (KU Leuven)
Fauquert Benjamin, Kacenelenbogen Nadine, Mokrane Saphia, Offermans Anne-Marie, Simonis Virginie (ULB)
Buret Laetitia, Digregorio Marina, Laverdeur Justine, Lenoir Anne-Laure, Scholtes Beatrice (ULiège)
Janssen Anneleen, Vanholle Stijn (Domus Medica)

This implementation project was developed within the Evikey network
with the financial support of the FPS Public Health

Content table

Abbreviations

AMR	AntiMicrobial Resistance
AMS	AntiMicrobial Stewardship
APQI	Antibiotic Prescribing Quality Indicators
ATC	Antatomic Therapeutic Chemical Classification
AVIQ	Agence Wallonne pour une VIe de Qualité
CCFFMG	Centre de Coordination Francophone pour la Formation en Médecine Générale
CME	Continuing Medical Education
CMG	Collège de Médecine Générale
CMP	Concertation Médico-Pharmaceutique
CNPQ	Conseil National de Promotion de la Qualité
COM-B	Capacity, Opportunity, Motivation - Behaviour
CRA	Coördinerend Raadgevend Arts
EMR	Electronic Medical record
FePraFo	Fédération des Pratiques médicales de première ligne au Forfait
FMM	Fédération des Maisons Médicales
GLEM	Groupes Locaux d'Evaluation Médicale
GP	General Practitioner
ICHO	Interuniversitair Centrum voor de Huisartsen Opleiding
ICF	Informed Consent Form
ICPC	International Classification of Primary Care
INAMI	Institut national d'assurance maladie-invalidité
IRLM	Implementation Research Logic Model
LC	Local Champion
LOK	LOKale kwaliteitsgroep
MCC	Médecin Coordinateur et Conseiller
MFO	Medisch Farmaceutisch Overleg
NPT	Normalization Process Theory
NRKP	Nationale Raad voor KwaliteitsPromotie
PAQS	Plateforme pour l'Amélioration continue de la Qualité des Soins
PSS	Prescription Search Support
RIZIV	Rijksinstituut voor ziekte- en invaliditeitsverzekering
SSMG	Société Scientifique de Médecine Générale
SWOT	Strengh-Weakness-Opportunity-Threat
TDF	Theoretical Domain Framework
TFE/AMR/H	Task Force Extern/Antimicrobial Resistance/Human pilar
VIKZ	Vlaams Instituut KwaliteitsZorg
VWGC	Vereniging voor Wijkgezondheidscentra
WOREL	Werkgroep Ontwikkeling Richtlijnen Eerste Lijn
WP	Work package

Glossary in the context of this implementation project

Local champion	Local champions are general practitioners (GPs) who have access to a local network of other GPs and can play a leading, exemplary and pioneering role within the project.
Intervision	A structured form of learning among peers. Practical issues are addressed in small groups of people.
Implementation strategy of this implementation project	Intervisions of a local champion (LC) with a group of GPs
Step	Steps to realize this implementation strategy were: - Recruitment of local champions and GPs - Training for local champions - Support session for local champions
Tool	Tools developed in context of this implementation project, that can be used during intervisions to support and facilitate the change in prescribing behaviour - Antibiotic barometer (audit- and feedback) - Digital toolkit - Action plan

Reading guide

This evaluation report of the implementation project “Local antibiotic stewardship respiratory tract infections” includes different sections:

- First you can find a summary of this implementation project. This is a one-pager that presents the broad outline of this implementation project and the major conclusions/recommendations based on the process evaluation. Following this summary is an overview of all conclusions of the different work packages (WP).
- The introduction describes the context, implementation strategy, objectives, different WP and content of the implementation project.
- The following section describes the methodology of the implementation and evaluation plan of this project (process and outcome evaluation).
- Next we describe the steps to realize the implementation strategy (recruitment, training program and support sessions) and the tools used for the implementation strategy (antibiotic barometer, digital toolkit, action plan).
- Finally, we formulate the key findings of the process evaluation and the recommendations for national implementation to end with a general conclusion.
- The attachments provide an overview of all additional documents referred to in this document.

Résumé

PROJET D'IMPLÉMENTATION – GESTION LOCALE DES ANTIBIOTIQUES
INFECTIONS RESPIRATOIRES

STRATEGIE D'IMPLÉMENTATION globale du projet:
4 intervisions d'un référent local (RL) avec un groupe de médecins généralistes (MG)
afin de soutenir une prescription optimale d'antibiotiques

OBJECTIFS

Afin de prévenir la résistance aux antimicrobiens en Belgique, ce projet d'implémentation vise à contribuer à l'optimisation de l'utilisation des antibiotiques dans les soins de santé primaires par:

- **Évaluation** de la stratégie d'implémentation afin de développer ce projet à plus grande échelle (durabilité).
- **Soutien** à une prescription appropriée d'antibiotiques par les MG pour les infections respiratoires.
- **Soutien** à la capacité d'autosoins des patients atteints d'infections.

3 ETAPES

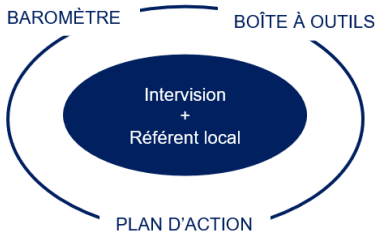
Pour réaliser la stratégie d'implémentation, les étapes préparatoires suivantes ont été effectuées :

- **RECRUTEMENT :** 42 RL + 388 MG
- **FORMATION :** Les RL ont suivi une formation sur la prescription optimale des antibiotiques, les compétences en motivation et communication, ainsi que les principes du changement de comportement.
- **SOUTIEN AU RÔLE DES RL** : Les RL peuvent partager leurs expériences visant un focus optimal sur le soutien au changement de comportement lors des séances d'intervision.

3 TOOLS

Pour soutenir le changement du comportement de prescription des antibiotiques, trois outils ont été développés :

- **BAROMÈTRE DES ANTIBIOTIQUES** : benchmark au niveau du cabinet basé sur les APQI (Antibiotic Prescribing Quality Indicators) ; rapport de feedback disponible tous les 3 mois.
- **BOÎTE À OUTILS NUMÉRIQUE** : aperçu des barrières (connaissances, compétences, incertitudes, attentes) + interventions pour les surmonter et soutenir une prescription optimale.
- **PLAN D'ACTION** : modèle pour soutenir le changement de comportement par la formulation d'objectifs et d'actions concrètes.



en moyenne: 1 intervision tous les 3 mois

LIGNE DU TEMPS

- PHASE DE DÉVELOPPEMENT (10/2022 – 10/2023): recrutement, formation, développement des outils.
- PHASE D'IMPLÉMENTATION (10/2023 – 10/2024): 4 intervisions entre RL and MG et accompagnement des RL.
- PHASE D' ÉVALUATION (10/2022 – 03/2025): évaluation du processus au niveau du projet, des RL et des MG.

LESSONS LEARNED

Pour étendre ce projet pilote d'implémentation, les aspects suivants doivent être pris en compte :

- Clarifier l'objectif des trois outils afin de promouvoir le changement du comportement de prescription et améliorer le soutien ainsi que la communication concernant leur utilisation et leur interprétation.
- Renforcer l'engagement et la participation des RL et des MG par le recrutement, des incitations stratégiques, une communication claire, ainsi qu'un renforcement de leur autonomie et de leur flexibilité.
- Optimiser l'implémentation à travers des ateliers interactifs et la promotion de la collaboration multidisciplinaire (approche « One Health »).
- Assurer le suivi et organiser des exercices de réflexion pour évaluer le changement de comportement et mettre en valeur les réussites.

DISCLAIMER: La faisabilité du développement et d'implémentation des 3 ETAPES et des 3 OUTILS est évaluée dans le cadre de la stratégie d'implémentation (intervision d'un RL avec MG afin de soutenir l'optimisation du comportement de prescription). L'effet de ces ETAPES et OUTILS n'est pas évalué séparément.

Samenvatting

IMPLEMENTATIE PROJECT - LOKAAL ANTIBIOTICA STEWARDSHIP
LUCHTWEGINFECTIES

overkoepelende **IMPLEMENTATIESTRATEGIE** van dit project:
4 intervisies van een local champion (LC) met een groep huisartsen (HA)
om optimaal antibiotica voorschrijfgedrag te ondersteunen

DOELSTELLINGEN

Om antimicrobiële resistentie (AMR) in België te voorkomen, wil dit implementatieproject bijdragen aan de optimalisatie van het antibioticagebruik in de eerstelijnsgezondheidszorg door:

- **Evaluatie** van de implementatiestrategie om dit project op te schalen (duurzaamheid).
- **Ondersteuning** van passend antibioticavoorschrijfgedrag door huisartsen bij luchtweginfecties.
- **Ondersteuning** van het zelfzorgvermogen van patiënten met luchtweginfecties.

3 STAPPEN

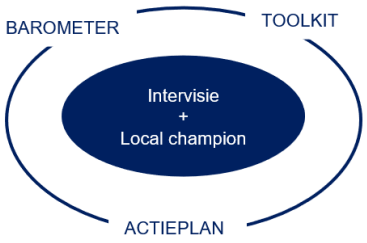
Voor de realisatie van de implementatiestrategie, werden volgende voorbereidende stappen genomen:

- **RECRUTERING:** 42 LC + 388 HA.
- **VORMING:** LC volgde opleiding over optimal voorschrijven van antibiotica, motivatie- en communicatievaardigheden en principes van gedragsverandering.
- **ONDERSTEUNING VAN DE ROL VAN LC:** LC kan ervaring en tips&trics uitwisselen om de focus tijdens de intervisie op ondersteuning van gedragsverandering te optimaliseren.

3 TOOLS

Om de verandering in het voorschrijfgedrag van antibiotica te ondersteunen, werden 3 tools ontwikkeld:

- **ANTIBIOTICA BAROMETER:** benchmark op praktijkniveau op basis van de APQI (Antibiotic Prescribing Quality Indicators); feedback rapport elke 3 maanden beschikbaar.
- **DIGITALE TOOLKIT:** overzicht van barrières (kennis, vaardigheden, onzekerheid, verwachtingen) + interventies om ze te overwinnen e optimal voorschrijfgedrag te ondersteunen.
- **ACTIE PLAN:** sjabloon om gedragsverandering te ondersteunen door het formuleren van concrete doelstellingen en acties.



gemiddeld: 1 intervisie per 3 maanden

TIJDSLIJN

- **ONTWIKKELFASE** (10/2022 – 10/2023): recrutering, vorming, ontwikkeling van tools.
- **IMPLEMENTATIEFASE** (10/2023 – 10/2024): 4 intervisies van LC + HA en ondersteuning van LC.
- **EVALUATIEFASE** (10/2022 – 03/2025): proces evaluatie op niveau van project, LC en HA.

LESSONS LEARNED

Om dit implementatiepilootproject op te schalen, dient rekening worden gehouden met de volgende aspecten:

- Verduidelijk het doel van de drie tools om de verandering in het voorschrijfgedrag te bevorderen en verbeter de ondersteuning en communicatie over het gebruik en de interpretatie van deze tools.
- Vergroot de betrokkenheid en participatie van LC en HA door middel van recrutering, strategische incentives, duidelijke communicatie en versterking van hun autonomie en flexibiliteit.
- Optimaliseer de implementatie door middel van interactieve workshops en bevordering van multidisciplinaire samenwerking (One Health-benadering).
- Zorg voor monitoring en reflectieoefeningen om gedragsverandering te evalueren en succesverhalen onder de aandacht te brengen.

DISCLAIMER: De haalbaarheid van de ontwikkeling en implementatie van de 3 STAPPEN en 3 TOOLS worden geëvalueerd binnen de context van de implementatiestrategie (intervisie van een LC met HA om optimalisatie in voorschrijfgedrag te ondersteunen). Het effect van deze STAPPEN en TOOLS wordt niet afzonderlijk geëvalueerd.

Key recommendations (kernaanbevelingen / recommandations clés)

BELEIDSAANBEVELINGEN VOOR DE TOEKOMST ▪ Voorzie de beschikbaarheid van actuele richtlijnen ▪ Voorzie een nationale coördinatie van verschillende initiatieven ▪ Ondersteun antibiotica stewardship in de ambulante zorg	RECOMMANDATIONS POLITIQUES POUR L'AVENIR ▪ Garantir la disponibilité de lignes directrices actualisées ▪ Mettre en place une coordination nationale pour les différentes initiatives ▪ Soutenir la gestion des antibiotiques dans les soins ambulatoires
AANBEVELINGEN OP PROJECTNIVEAU ▪ Betrek verschillende soorten expertise (kennis en gedrag) ▪ Ontwikkel en actualiseer gebruiksvriendelijke tools en vormingen die gemakkelijk toepasbaar zijn in de dagelijkse praktijk ▪ Voorzie een follow-up strategie (communicatie, monitoring, ondersteuning) ▪ Voorzie voldoende financiering (ontwikkeling + onderzoek) ▪ Voorzie een regionale coördinatie (aanpassing aan de sociaal-culturele context)	RECOMMANDATIONS AU NIVEAU DU PROJET ▪ Intégrer différentes expertises (connaissances et comportements) ▪ Développer et mettre à jour des outils et des formations pratiques, facilement applicables dans la pratique quotidienne ▪ Fournir une stratégie de suivi (communication, suivi, soutien) ▪ Fournir un financement approprié (développement + recherche) ▪ Mettre en place une coordination régionale (adaptation au contexte socioculturel)
AANBEVELINGEN OP HET NIVEAU VAN INTERVISIES ▪ Bied ondersteuning aan local champions (zowel inhoudelijk als operationeel) ▪ Vergroot het tijdsinterval tussen intervisies ▪ Leg het doel en het gebruik van hulpmiddelen uit in functie van het voorschrijfgedrag ▪ Ontwikkel feedbackmechanismen om gedragsverandering te meten	RECOMMANDATIONS AU NIVEAU DES INTERVISIONS ▪ Apporter un soutien aux référents locaux pour les intervisions (contenu et opérationnalisation) ▪ Allonger l'intervalle de temps entre les intervisions ▪ Expliquer l'objectif et l'utilisation des outils en fonction du pratique de prescription ▪ Mettre en place des mécanismes de retour d'information mesurant les déterminants comportementaux

AANBEVELINGEN OP HET NIVEAU VAN LOCAL CHAMPIONS	RECOMMANDATIONS AU NIVEAU DES CHAMPIONS LOCAUX
▪ Stimuleer werving door collega's ▪ Verduidelijk de rol van local champions ▪ Ondersteun interactieve intervisietechnieken ▪ Stimuleer multidisciplinaire samenwerking ▪ Breng succesverhalen onder de aandacht (tijdens intervisies en via communicatie-kanalen) ▪ Ondersteun langdurige betrokkenheid van local champion	▪ Encourager le recrutement par les collègues ▪ Clarifier le rôle du référent local ▪ Soutenir les techniques d'intervision interactive ▪ Encourager la collaboration multidisciplinaire ▪ Présenter les réussites (lors des intervisions et via la communication) ▪ Soutenir l'implication à long terme des référents locaux
AANBEVELINGEN OP HET NIVEAU VAN DEELNEMENDE HUISARTSEN	RECOMMANDATIONS AU NIVEAU DES MÉDECINS GÉNÉRALISTES PARTICIPANTS
▪ Definieer de reikwijdte van de verantwoordelijkheden van local champions ▪ Vergroot het bewustzijn van de waarde van het project ▪ Moedig actieve betrokkenheid bij lokale netwerken aan ▪ Promoot intervisies als reflectiekansen in het algemeen ▪ Pak uitdagingen bij de implementatie aan ▪ Ontwikkel duurzame mechanismen voor gedragsverandering ▪ Verminder belemmeringen voor deelname	▪ Définir clairement l'étendue des responsabilités des référents locaux ▪ Sensibiliser à la valeur du projet ▪ Encourager la participation active aux réseaux locaux ▪ Promouvoir les intervisions en tant qu'espaces de réflexion en général ▪ Relever les défis liés à l’implémentation ▪ Développer des mécanismes durables de renforcement des comportements ▪ Réduire les obstacles à la participation

Overview of all recommendations

GENERAL RECOMMENDATIONS AT PROJECT GROUP LEVEL	
PROJECT COORDINATION AND COLLABORATION	- Engage experts with comprehensive expertise - Promote project results to encourage participation - Allow sufficient time and resources for language adaptation - Install a coordination at a regional level - Develop strategies to overcome local reluctance - Clearly define tasks and roles from the outset
COMMUNICATION	- Develop a communication plan for target audience
FUNDING	- Ensure sufficient budget allocation - Provide financial compensation for key activities - To ensure the successful execution of the project, financial support should be allocated to the following critical areas: o Language adaptation o Recruitment and organizational support o Maintenance and updating of project tools o Support for intervisions o Communication - Ensure sufficient funding for scientific support
TIME	- Adjust expectations and timeframes - Allow sufficient time for training preparation
TIMELINE	- Space intervisions further apart - Extend the length of an implementation cycle
POLICY RECOMMENDATIONS FOR FUTURE	- Ensure availability and regular updates of up-to-date clinical guidelines - Support ambulatory stewardship development - Install national coordination of antibiotic stewardship initiatives (by BAPCOC)

RECOMMENDATIONS AT PROJECT GROUP LEVEL FOR DEVELOPMENT	
RECRUITMENT	- Clarify roles for recruitment and monitoring - Diversify recruitment strategies - Ensure equitable recruitment across regions - Identify suitable profiles for recruitment - Target individuals interested in behavioural change and stewardship
COMMUNICATION	- Explain the goal and use of different tools
TRAINING FOR LOCAL CHAMPIONS	- Expertise: Leverage Train-the-Trainer Expertise
	- Ensure training covers all required topics: o Knowledge of their role as a local champion o Knowledge of tools o Knowledge about the distinction between tools for GPs and intervisions o Knowledge on antibiotic resistance and appropriate prescribing o Knowledge about additional infectious diseases o Communication skills o Skills to support patient communication o Skills to support local champions in their role
	- Format o Adapt systems to the heterogeneity of local champions o Provide practical training for key roles o Consider bilingualism in training
	- Maintenance of content of training o Evaluate training courses for improvement o Update training materials regularly
SUPPORT	- Provide regular support from coordination teams - Support GP-participation - Create structured linkages for expert exchange - Be responsive to feedback - Allocate time for monitoring and follow-up to identify challenges early
ANTIBIOTIC BAROMETER	- Ensure Healthstat Platform is operational - Integrate the barometer in the EMD - Allocate time for a smooth implementation - Ensure data availability and regular updates - Standardize data encoding - Account for seasonal variability - Consider preference of some GPs for individual feedback
DIGITAL TOOLKIT	- Reorganize layout and content to enhance user experience - Allocate time for familiarization - Maintain the toolkit regularly - Evaluate the toolkit
ACTION PLAN	- Provide enough information and explanation on how the action plan can support the change in prescribing behaviour

RECOMMENDATIONS AT LEVEL OF INTERVISIONS LOCAL CHAMPIONS AND GPS		
	LOCAL CHAMPIONS	**GENERAL PRACTITIONERS (GP)**
COHERENCE How do people make sense of the intervention?	- Clarify the role of local champion - Strengthen communication of project - Practical examples in training	- Enhance training and communication - Refine the local champion model - Clearly define the scope of champions' responsibilities - Promote intervisions as reflective spaces in general - Clarify the role of decision-support tools - Increase awareness of the value of the project - *Adapt training for GPs with varying levels of experience* - *Encourage active involvement in local networks*
COLLECTIVE ACTION How do people make it work in practice? What do they need to make it happen?	- Improve session accessibility - Enhance facilitator training - Support interactive intervision techniques - Encourage multidisciplinary collaboration	- Integrate guidelines into clinical systems - Support practice adaptations - Address implementation challenges - Leverage local champions for implementation - Develop sustainable behaviour reinforcement mechanisms
COGNITIVE PARTICIPATION How do people get involved and stay committed?	- Target motivated GPs through existing networks - Encourage peer-led recruitment - Strategically incentivise participation - Support long-term involvement of local champions	- Provide incentives for participation - Foster collaborative network - Reduce participation barriers
REFLEXIVE MONITORING How do people assess whether it's worth the effort? Can improvements be made?	- Establish feedback mechanisms measuring behavioural determinants - Adapt interventions based on participant feedback - Showcase success stories (during intervisions and via communication)	- Establish routine performance feedback - Develop sustainable behaviour reinforcement mechanisms - Ensure long-term sustainability - Expand and scale up the initiative

1. Introduction

Introduction describes:
- Context of this implementation project
- Overarching implementation strategy of this implementation project
- Objectives
- Time-line and cascade of this implementation project

1.1 Context

Antimicrobial resistance (AMR) is a major and increasing problem and a leading cause of death worldwide.[1,2] One of the main causes of AMR is the use of antibiotics in human medicine. In ambulatory care, most antibiotics are prescribed by general practitioners (GPs), often inappropriately.[3] Although acute respiratory infections are generally self-limiting, Belgian GPs (too) often prescribe antibiotics.[4]

Effective and tailored interventions to improve appropriate antibiotic use in primary care are the key to contributing to the prevention of AMR. Despite major efforts to reduce inappropriate antibiotic prescribing in primary care in Belgium, the targets set by the Belgian National Action Plan AMR have not yet been achieved. Focusing exclusively on knowledge of AMR as such is not effective to change antibiotic prescribing behaviour. And while randomized trials have shown that several interventions effectively improve antibiotic prescribing behaviour, the principle that each intervention would work for every GP and every GP-practice is also not sustainable. A customized and tailored approach taking into account the determinants of antibiotic prescribing behaviour in primary care is necessary, since what works in a specific context does not necessarily work in another context.[5–7]

Therefore, there is a clear need to investigate the implementation of strategies that improve antibiotic prescribing in practice and to learn about the barriers and success factors related to their implementation in Belgian primary care.

1.2 Implementation strategy of this implementation project

The overarching implementation strategy that was used in this project are the intervisions of a local champion (LC) with a group of GPs.

To realize this implementation strategy, following steps are taken:
- Recruitment of local champions and GPs
- Training of local champions by which they are able to lead an intervision and use the tools
- Support of local champions during the implementation project to continue the implementation project and to optimize the use of the tools

During the intervisions the local champion supports and facilitates the discussion about appropriate antibiotic prescribing behaviour by the use of following tools developed for this implementation project:

- Antibiotic barometer (audit- and feedback)
- Digital toolkit
- Action plan

These tools cover all the aspects of appropriate antibiotic prescribing behaviour.

These tools can be used both by local champions and GPs participating to the intervisions.

- Local champions will use these tools to support the change in prescribing behaviour by GPs during the intervisions
- GPs can use these tools to change the prescribing behaviour as such

1.3 Objectives

1.3.1 Main Objective

To prevent AMR in Belgium, this implementation project aims to contribute to the optimalisation of antibiotic use in primary healthcare by:

- Evaluation of the implementation strategy in order to scale-up this project (sustainability)

  The major aim of this implementation project is to evaluate the proposed implementation strategy (intervision of local champion with a group of GPs) and the associated steps and tools to consider a larger-scale extension and sustainability over time of this implementation strategy.

1.3.2 Secondary objectives

Secondary objectives are:

- Supporting appropriate antibiotic prescribing behaviour by GPs for respiratory tract infections

  This implementation project conducted a process evaluation at the level of local champions and participating GPs to evaluate whether the implementation strategy of intervisions of a local champion with a group of GPs is able to support the appropriate antibiotic prescribing behaviour by GPs for respiratory tract infections

- Supporting self-care capacity of patients with respiratory tract infections

  Patient information and supporting materials that can help GPs and other healthcare professionals to communicate in a patient-centred way on infection management, self-care and safety netting advice was made available in this implementation project.[8]

  However, we did not include a quantitative/qualitative evaluation of this objective in this project (application). The evaluation of the implementation strategy will only be carried out at the level of the project group, local champions and GPs; not at patient level.

Within this project, primary healthcare corresponds to general practice and does not include residential care and out-of-hours care for following reasons:

- residential care: separate and different setting (multidisciplinary team of GP, nurses, caregivers, …).
- out-of-hours care: various and different context/setting of patients, practitioners, software modalities, … without central engagement/involvement within this implementation project.

These specific settings require different training and skills to change antibiotic prescribing behaviour.

1.4 Implementation project

This implementation project for local antibiotic stewardship, with the aim of optimizing antibiotic prescribing behaviour by GPs for respiratory tract infections consists of 6 work packages, divided in 3 phases (development, implementation and evaluation) (Table 1).

Table 1: Overview of work packages.

Development phase	
WP1	Implementation and evaluation plan
WP2	Development and organization of training for local champions
WP4	Audit- and feedback module (antibiotic barometer)
WP5	Implementation toolkit
Implementation phase	
WP3	Implementation project (intervision of local champion with GPs, support of local champions)
Evaluation phase	
WP6	Evaluation of implementation project

1.4.1 Timeline

1.4.1.1 Development phase

This phase started with a kick-off meeting (project level) on 13/10/2022 and ended with the first data-collection for the antibiotic barometer that was carried out on 23/10/2023 (see Figure 1).

During the development phase the following steps and tools were developed:

- Implementation and evaluation plan
  (presented to the advisory committee on 10/02/2023)
- Development of training material and conduct of training sessions for local champions
  Training session (part I) organized on
  - 19/06/2023 (Flanders)
  - 20/06/2023 (Brussels/Wallonia)
  - 27/06/2023 (Flanders)

  Training session (part II) organized on

    - 28/09/2023 (Flanders)
    - 5/10/2023 (Flanders)
    - 16/11/2023 (Brussels/Wallonia)

  In Flanders 2 extra sessions for local champions who were not able to participate on the above-mentioned training sessions were organized in November 2023 (09/11/2023 and 16/11/2023).
- Development of antibiotic barometer.
    - To validate the quality indicators used for the development of the antibiotic barometer a validation committee was organized by VIKZ (Vlaams Instituut KwaliteitsZorg) on 18/3/2023. Also members of PAQS (Plateforme pour l'Amélioration continue de la Qualité des Soins) were invited.
    - Subscription antibiotic barometer possible in CareConnect: 18/09/2023
    - A webinar to explain the content and technical aspects of the antibiotic barometer was organized on 13/09/2023 in Flanders and 27/11/2023 in Brussels/Wallonia. The target audience for this webinar were both local champions and GPs.
    - First automated data-collection for antibiotic barometer in CareConnect: 23/10/2023 (data collected over previous 15 months for Care Connect users). Feedback reports based on this data-collection were available in Healthstat, the national data visualization platform, by the end of November 2023.
    - Subscription antibiotic barometer possible in other software packages: 12/2023
    - Automated data-collection for antibiotic barometer in all software packages: 21/12/2023 (data collected over previous 3 months)
    - Permanent and periodical automated data-collections (every three months). Data-collections relevant for this implementation project are:
        - 21/03/2024
        - 21/06/2024
        - 21/09/2024
- Development of digital toolkit
    - Available 07/2023 (after training session part I)
- Recruitment period for local champions
    - Start: 05/2023
    - Stop: 06-09/2023
- Recruitment period for GPs
    - Start: 06/2023 (after training session I)
    - Stop: 10/2023 (first data-collection for antibiotic barometer)

During the developmental phase, the IRLM (Implementation Research Logic Model) was used to check and evaluate the content of the different work packages that are developed within this implementation project.[9]

1.4.1.2 Implementation phase

The implementation phase started on 23/10/2023, when the first data for the antibiotic barometer were collected, and ended on 31/10/2024, when almost all active local champions with their group of GPs had finished the implementation trajectory (see Figure 1).

Local champions organized an intervision every 3 months. The planning of these intervisions was aligned as much as possible to the timeline of the availability of the feedback reports of the antibiotic barometer (every three months). The periods in which local champions conducted the intervisions are presented in Table 2.

Table 2: Overview of timeline of different intervisions from local champions with GPs (based on registration for accreditation).

Intervision	Period in which the intervision was carried out by local champion
1	14/11/2023 – 30/01/2024
2	23/01/2024 – 08/05/2024
3	12/04/2024 – 02/10/2024
4	08/08/2024 – 14/11/2024

In addition, 2 support sessions were organized to collect feedback from the local champions, to exchange experiences, to provide tips and tricks to the local champions and to adjust this implementation project for the purpose of further optimalization and future scale-up. The first support session was organized when most local champions had completed 2 intervisions. The second support session was organized when most local champions had organized the third intervision. Table 3 gives an overview of the timeline of these support sessions.

Table 3: Overview of timeline of support sessions.

	Flanders	Brussels/Wallonia
Support session I	27/02/2024	26/02/2024
	29/02/2024	12/03/2024
Support session II	05/06/2024	17/06/2024
	06/06/2024	

1.4.1.3 Evaluation phase

The evaluation phase of this implementation project started during the developmental phase, coincided with the implementation phase and continued afterwards (evaluation phase) (see Figure 1).

During the implementation phase of this project, the following actions for intermediate evaluation were realized:

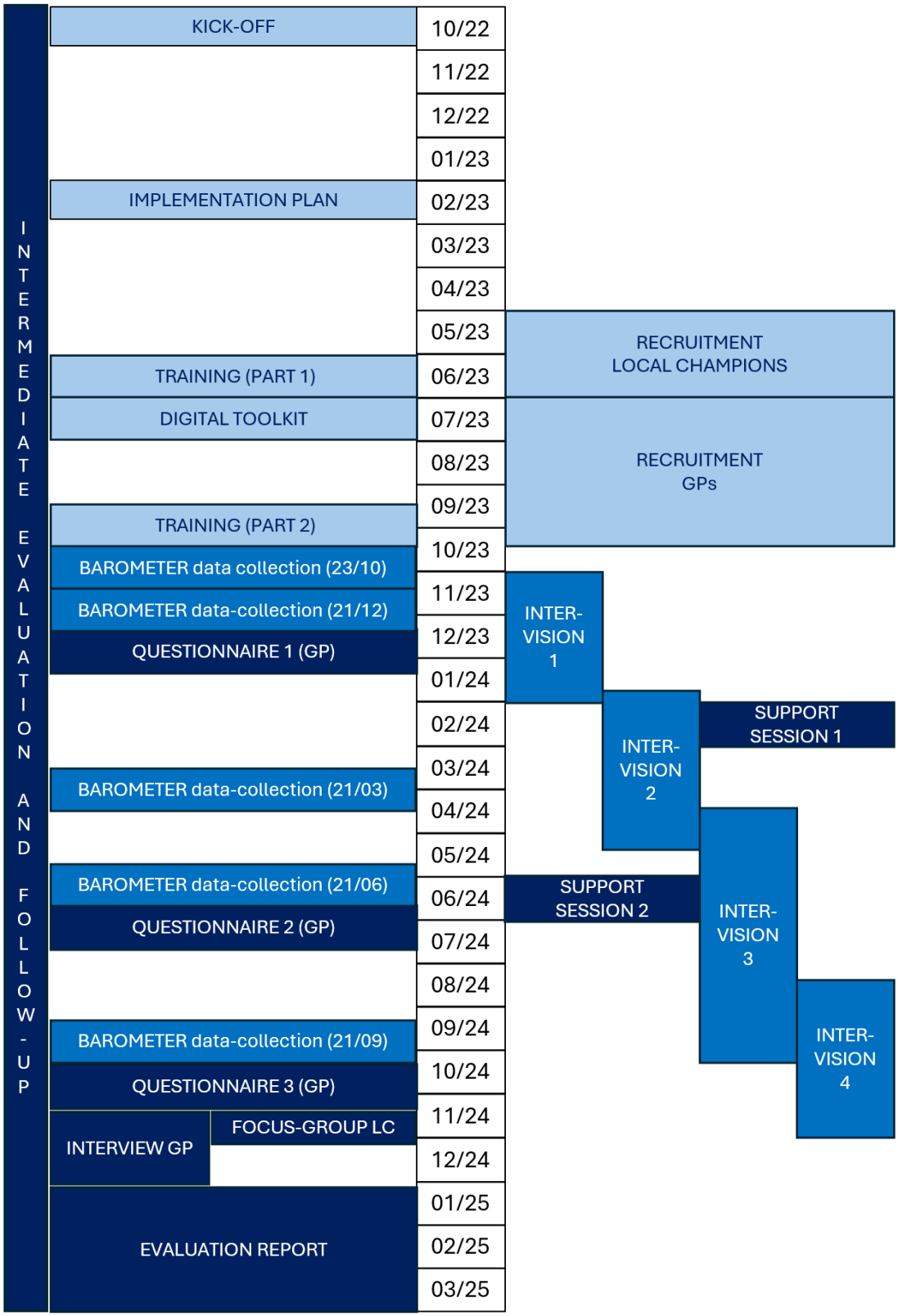
- SWOT-analysis for intermediate evaluation at project level
- A post-intervision survey that local champions completed after each intervision they had organized

- Collect input and feedback of participating local champions and GPs via individual contact (mail, phone)
- Three rounds of a questionnaire for GPs:
    - First questionnaire was sent after most local champions had completed the first intervision: period 18/12/2023 – 15/01/2024
    - Second questionnaire was sent after most local champions had completed the third intervision: period 14/06/2024 – 15/07/2024
    - Third questionnaire was sent after most local champions had completed the fourth intervision: period 28/10/2024 – 25/11/2024

During the evaluation phase of this project, the following actions for evaluation were realized:

- Focus groups with local champions
    - 6/11/2024 (Flanders)
    - 7/11/2024 (Flanders)
    - 13/11/2024 (Brussels/Wallonia)
- Individual interviews with GPs between September 2024 – Januari 2025.

Figure 1: Timeline of antibiotic stewardship implementation project.



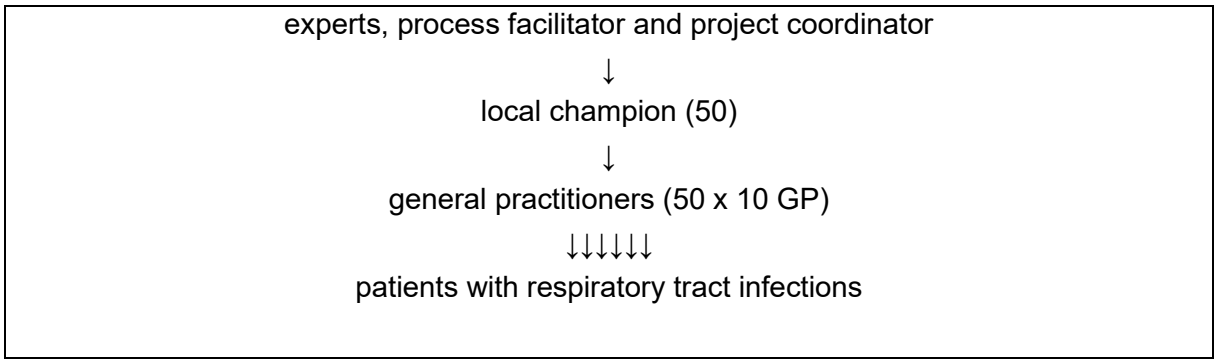
1.4.2 Cascades

Two cascades were set up during the developmental phase of this implementation project:

- a cascade of education
- a cascade of barriers and interventions

1.4.2.1 Cascade of education

To realize this implementation project, experts of 5 consortium partners and a project coordinator (project group members), together with external experts and one process facilitator (Leuven), supported the recruitment and training of around 50 local champions, which each would support around 10 GPs in their own region in identifying barriers and implement interventions during intervisions. Participating GPs were to treat patients with respiratory tract infections and focus on appropriate antibiotic prescribing.



Consortium (project group members)

The consortium is composed of representatives from different scientific and professional associations (Table 4). The members of the consortium (project group members) have the knowledge of both effective interventions for behavioural change in patients and healthcare providers to improve antibiotic prescribing quality, and the evaluation of these types of projects, and, in addition, the experience of implementing existing interventions in the daily practice of the GP. Several of them are also involved in the development and evaluation of successful interventions to improve antibiotic prescribing quality, the drafting of guidelines and active within the Belgian Antibiotic Policy Coordination Committee (BAPCOC). In addition, consortium-partners have access to a large network of GPs and primary care organizations that were necessary to make this project a success, for both French-speaking and Dutch-speaking GPs. Different consortium partners were responsible for different work packages (Table 4).

Table 4: Composition of project group.

INSTITUTION	NAME OF EXPERT	RESPONSABILITY/TASK
University of Antwerp (UA) Department of General Practice & Population Health	Anthierens Sibyl	WP1, WP3, WP6 (inclusive senior-expert)
	Coenen Samuel	
	Colliers Annelies	
	Hoste Melanie	

INSTITUTION	NAME OF EXPERT	RESPONSABILITY/TASK
University of Ghent (UG) Department of Public Health and Primary Care	De Sutter An	WP2, WP3
	Heytens Stefan	
INSTITUTION	NAME OF EXPERT	RESPONSABILITY/TASK
University of Leuven (KU Leuven) Academic Centre for General Practice	Soetaert Justine	WP3, WP4
	Vaes Bert	
	Van den Bruel Ann	
	Van den Bulck Steve	
	Verbakel Jan	
INSTITUTION	NAME OF EXPERT	RESPONSABILITY/TASK
University of Brussels (ULB) Department of General Medicine	Fauquert Benjamin	WP3, WP6
	Kacenelenbogen Nadine	
	Mokrane Saphia	
	Offermans Anne-Marie	
	Simonis Virginie	
INSTITUTION	NAME OF EXPERT	RESPONSABILITY/TASK
University of Liège Department of Clinical Sciences, General Medicine and Primary Care and Health	Buret Laetitia	WP3, WP6
	Digregorio Marina	
	Laverdeur Justine	
	Lenoir Anne-Laure	
	Scholtes Béatrice	
INSTITUTION	NAME OF EXPERT	RESPONSABILITY/TASK
Domus Medica	Janssen Anneleen	WP1, WP3, WP5
	Vanholle Stijn	

External experts

For the development of training material for local champions and for the moderation and support of the support sessions organized for local champions, external experts with specific expertise were involved (Table 5).

Table 5: Overview of external experts involved in this implementation project.

INSTITUTION	NAME OF EXPERT	RESPONSABILITY/TASK
ULiège	Belche Jean-Luc	GP, expert in AMR and behaviour change
ULiège	Henrard Gilles	GP, expert in AMR and behaviour change
ULiège	Joly Louise	GP, expert in AMR
Open University, Utrecht	Lauwerier Emelien	Expert in behaviour change

ICHO	Vandeput Olivia	GP, expert in AMR and moderation of intervisions
University of Brussels (ULB)	Saphia Mokrane	Guideline Sore throat Expert

Process facilitators

The project proposal described the involvement of process facilitators to support training for local champions, recruitment of local champions and guidance of local champions during the implementation project. Different project group members themselves took this role. In addition, one external process facilitator was involved.

INSTITUTION	NAME OF EXPERT	RESPONSABILITY /TASK
GP-practice	Vinkx Dana	Support with regional recruitment, provide input and feedback on developed training material and summarize and analyse the input of local champions during support sessions.
University of Brussels (ULB)	Offermans Anne-Marie, Simonis Virginie	Support with regional recruitment for Brussels/Wallonia and follow-up of local champions
ULiège	Digregorio Marina	Support with regional recruitment for Brussels/Wallonia and follow-up of local champions

Local champions

Local champions are GPs who have access to a local network of other GPs and can play a leading, exemplary and pioneering role within the project. As 'local champions' they show the importance of this topic to the larger group of GPs and are convinced of the need for change and are motivated to support appropriate antibiotic prescribing behaviour. Their knowledge of the context and practical organization can help to set up and use interventions that have already been shown to be effective in improving antibiotic prescribing behaviour.[10,11] Their profile of antibiotic prescribing behaviour is not known and will not be used as a selection criterium.

The responsibility/task of local champions:

- Follow training-program and support sessions
- Moderate intervisions with a group of GPs (around 10 colleagues)
- Provide input for process evaluation

General practitioners

GPs are employed in a GP-practice and have registered on a voluntary basis to participate in this project. They were personally invited by a local champion or were linked to a local

champion based on registration for participation in this project. Their profile of antibiotic prescribing behaviour is not known and will not be used as a selection criterium.

1.4.2.2 Cascade of barriers/interventions

Theoretical frameworks guided the identification of barriers and interventions in the implementation plan. They provided a structured approach to addressing challenges in improving antibiotic prescribing quality. The COM-B model (Capacity, Opportunity, Motivation are 3 key factors capable of changing Behaviour) was used to identify barriers/determinants for appropriate antibiotic prescribing behaviour in primary care.[12] These determinants were subdivided conform the Theoretical Domains Framework (TDF).[13] Additionally, a review of existing evidence-based interventions was carried out to address specific barriers to appropriate antibiotic prescribing behaviour in primary care.

Use of these theoretical frameworks during the development phase of this project, makes verification possible that the different WP of this implementation project covered as much as possible determinants of behaviour change as described in the TDF.

For example, knowledge is a determinant included in the TDF. Knowledge about guidelines and recommendations for appropriate antibiotic prescription for respiratory tract infections is integrated as a learning goal in the training for local champions (WP2). In this way, local champions are able to discuss the determinant knowledge during intervisions (WP3). Additionally, a separate section about knowledge is integrated in the digital toolkit (WP5) in which different guidelines, decision aids and e-learnings are provided to overcome knowledge as a determinant.

Consequently, during the intervisions the most effective intervention(s) to overcome these determinants could be selected based on local needs for behavioural change and goals could be set. By implementing specific and effective interventions in daily GP practice, the aims of this implementation project could be reached.

COM-B (Capacity, Opportunity and Motivation are 3 key factors capable of changing Behaviour) - Theoretical Domains Framework (TDF)

↓

Determinant for prescribing behaviour

↓

Identification of specific barrier for GP

↓

Implementation-action (intervention) to overcome specific barrier

↓

Assessment of intervention

↓

Support appropriate antibiotic prescribing behaviour of GP and self-care capacity of patient

2. Methodology for implementation and evaluation

This section describes the methodology for the implementation and evaluation plan of the implementation project and consists of 3 following items:

- The Implementation Research Logic Model, used to build the implementation strategy of this implementation project
- Methodology for process evaluation of implementation strategy
- Methodology for outcome evaluation of implementation project

2.1 Implementation Research Logic Model (IRLM)

To develop the implementation strategy (intervision of local champion with group of GPs) and to build the steps and tools that make the implementation strategy possible, the Implementation Research Logic Model (IRLM) was used.

This model provides a coherent rationale for the selection, linkage and evaluation of determinants, implementation strategies and outcomes between the core elements involved in this implementation project and:

- supports clearly reporting and specifying how the project is to be conducted;
- serves as a “roadmap” for how the project is to be carried out;
- enhances the transparency and understanding of the connections between determinants, implementation strategies, mechanisms and outcomes for this implementation project;
- improves reproducibility of this implementation project.

The IRLM allows to give an overview and to specify the relationship between (Table 6):

- Determinants of implementation project
  Determinants are the barriers as mentioned in the COM-B and TDF that have an impact on antibiotic prescribing behaviour.

- Implementation strategy of implementation project
  Intervisions of local champions with GPs by using available tools developed in different WP of this implementation project.

- Mechanisms (steps and tools) of implementation project
  Based on the different WP, we can make an inventarisation of steps and tools to realize and support the implementation strategy.
  - Steps to realize the implementation strategy are:
    - Recruitment of local champions and GPs
    - Training of local champions
    - Support of local champions
  - Tools that can be used during the intervisions are:
    - Antibiotic barometer

- Digital toolkit
- Action plan

- Implementation outcomes of implementation project
  The implementation outcomes of this implementation project relate to the different phases and WP of the implementation project:
  - Development phase of the project (WP1, 2, 4, 5)
    Deliverables of the different work packages (checked by the IRLM) are the implementation outcomes. They are related to the steps and tools that make the implementation strategy possible (see methodology, IRLM)
  - Implementation and evaluation phase of the project (WP3)
    Process evaluation at project level via a SWOT-analysis and process evaluation of the implementation strategy via SWOT- and NPT-analysis (Normalization Process Theory) at level of local champions and GPs.

Table 6: Implementation Research Logic Model (IRLM).

Determinants	Implementation strategy	Mechanisms (steps and tools)	Implementation outcomes
Determinants conform the COM-B and TDF	Intervision of local champion with GPs	STEPS Recruitment Training and support of local champions TOOLS Antibiotic barometer Digital toolkit Action plan	Availability and realisation of mechanisms (related to different WP) at project level via SWOT-analysis Process evaluation of implementation strategy via SWOT- and NPT-analysis

By this IRLM the consistency, accuracy, reproducibility and transparency of the development of the steps and tools that make the implementation strategy possible was checked and evaluated.

2.2 Process evaluation

DISCLAIMER: The different steps that are carried out and tools that are developed to make the implementation strategy possible, are not evaluated as such. Within this implementation project it is evaluated how these steps and tools have been used within the implementation strategy (intervisions of local champions with GPs). The feasibility/adaptability to the Belgian primary care context to support the change in prescribing behaviour were evaluated, not the efficacy in terms of improving antibiotic prescribing behaviour as such.

Process evaluation of this implementation project was done at three different levels (Table 7):

- Level of implementation project as such
- Level of local champions conducting the intervisions with GPs
- Level of GPs participating to the intervisions with local champion

Process evaluation was carried out by using 2 different methodologies (Table 7):

- SWOT-analysis is used
    - at the project level to evaluate whether this project covers all steps and tools to make the implementation strategy possible
    - at the level of participating local champions
- The Normalization Process Theory (NPT) is used to evaluate the implementation strategy[14]:
    - at the level of local champions to evaluate whether local champions can support the change in prescribing behaviour by GPs during the intervisions
    - at the level of GPs to evaluate whether GPs are able to change prescribing behaviour as such

    The NPT identifies, characterizes and explains key mechanisms that promote and inhibit the implementation, especially the embedding and integration of complex interventions. There are four main domains of NPT:
    - Coherence
      How do people make sense of the intervention?
    - Collective action
      How do people make it work in practice? What do they need to make it happen?
    - Cognitive participation
      How do people get involved and stay committed?
    - Reflexive monitoring
      How do people assess whether it's worth the effort? Can improvements be made?

As additional method input from surveys and logbooks was used in a narrative way for process evaluation (Table 7):

- the post-intervision survey that local champions completed after each intervision (local champions)
- the registration form for participation to the implementation project (local champions and GPs)
- the registration form for participation to support sessions organized in Flanders (local champions)
- feedback of participating local champions and GPs via individual contact registrated in a logbook

was used for process evaluation both at the level of project and the level of implementation strategy (local champions and GPs).

Table 7: Overview of process evaluation.

Level of evaluation	Method of evaluation	Source of data	Topic
Project	SWOT-analysis	Input from SWOT-survey and project group meetings	Recruitment, coordination, status and alignment of the content of different WP
	Additional method	Surveys and logbook and input from project meetings	All remarks and questions of local champions and GPs linked to this implementation project
Local champions	NPT-analysis	Focus groups (qualitative)	Implementation strategy with associated steps and tools and other topics mentioned by local champions
	NPT-analysis	Support sessions (qualitative)	Implementation strategy with associated steps and tools and other topics mentioned by local champions
	SWOT-analysis	Input from SWOT-survey for recruitment and project group meetings	Recruitment, training, follow-up.
	Additional method	Surveys and logbook and input from project meetings	Commitment, participation, level, format and duration of intervision, starting point for intervision, use of action plan
GPs	NPT-analysis	Questionnaire for GPs (quantitative)	Implementation strategy with associated steps and tools and other topics mentioned by local champions
	NPT-analysis	Individual interviews with GPs (qualitative)	Implementation strategy with associated steps and tools and other topics mentioned by local champions

2.3 Outcome evaluation

Outcome parameters of this implementation project include:

- number and profile of participating local champions and GPs (see section 3.1. Recruitment)
- number of participating local champions to training sessions (see section 3.2. Training for local champions)
- number of organized intervisions and participating GPs (see section 5.1. Characteristics of Intervisions)
- number of participating local champions to support sessions (see section 3.3. Support sessions for local champions)

- general number (not linked to this implementation project as such) of GP-practices and GPs that registered for the antibiotic barometer (see section 4.1. Antibiotic barometer)
- number of website views (see section 4.2. Digital toolkit)

A quantification of (appropriate) antibiotic prescribing behaviour within this implementation project is measurable via the Healthstat feedback reports of the antibiotic barometer. For the following reasons, these quantitative data will not be used for outcome evaluation of this project:

- This implementation project was not designed as a controlled trial
    - The results of the antibiotic barometer could be influenced by simultaneous external interventions (comparison between an intervention group and a control group is not possible). Therefore, the association between the results of barometer and the evaluation of the implementation strategy could be biased and the relevance of (small) improvements linked to this project is not clear.
    - Improvement of correct coding could influence on the results of the barometer without any change in antibiotic prescribing behaviour.
    - Multiple considerations are essential to interpret/evaluate barometer results within this implementation project on short term (link between diagnosis and prescription, correct coding, clinical aspects (for example: comorbidities and contra-indications) and the fact that data are aggregated at GP-practice level).
    - There is a selection bias in the recruitment of participants (selection of motivated people and early adopters who are already convinced of the relevance of appropriate antibiotic prescribing behaviour; high prescribers are unlikely to be reached by this implementation project).
    - This implementation project is carried out with a limited number of participants during a limited period of time. The short period of the implementation phase of this project (4 unique seasons) does not allow comparison between equal seasons. A minimum period of 2 years is required to compare between equal seasons and to eliminate at least the effect of seasonality. But even then, variability in the intensity of flu and respiratory tract infections for consecutive seasons has to be taken into account.
- Recruitment of participants was organised at the level of individual GPs, the results of antibiotic barometer are aggregated at the level of a GP-practice. In addition, the group of participants is a heterogenous group with different participation level to the intervisions. This implementation project has a cyclic, and not a linear, approach at the level of the local champions and GPs
    - Each intervision cycle can be seen as a learning cycle at the level of the local champions beside the learning cycle at level of GPs.

    - Change in prescribing behaviour at level of GPs is not measurable on short term (process-evaluation is the first step, outcome evaluation is the next step)
- The main goal of the antibiotic barometer is to support qualitative antibiotic prescribing behaviour at GP-practice level (support tool) and to monitor longitudinal follow-up. The antibiotic barometer is not developed as a tool to measure effectiveness and quantitative change in prescribing behaviour of this antibiotic stewardship implementation project (control tool).

Quantitative outcome evaluation can evaluate the impact of this implementation project. In addition, systematically provided feedback to participants and stakeholders could reinforce behavioural change and support long-term sustainability. This is only possible in the future via correct study-design and longitudinal follow-up.

Nevertheless, the project group aims to meet the actual demand for a quantitative analysis to assess the impact of this implementation project on participants' antibiotic prescribing behaviour.
An observational, retrospective analysis will be conducted to monitor trends in the antibiotic prescribing among participating GPs' practices over two consecutive seasons, based on aggregated and anonymized data analysis. To this end, GP-practices involved in this antibiotic stewardship implementation project will be compared to a control group of non-participating GP-practices with similar characteristics concerning the practice type, number of GPs and other relevant demographic variables.
To conduct this analysis, a formal amendment will be submitted to the KU Leuven Ethics Committee for ethical review and approval. Since this data analysis is out-of-scope of this antibiotic stewardship implementation project and will only be carried out after ethics approval is granted, its results will not be published in this final report.

ATTACHMENT
- WP1: Implementation plan
- WP1: Overview of determinants and link with WP (IRLM)
- WP3: overview of input of participants via registration forms

3. Steps for implementation strategy

This section describes the following steps that are required to realize the implementation strategy (intervisions of local champion with GPs):
- Recruitment
- Training for local champions
- Support sessions for local champions

3.1 Recruitment and profile of participants (WP3)

To achieve the objectives of the implementation project, recruitment of sample of 50 local champions and 500 GPs, respectively, was set, resulting in intervision groups consisting of one local champion with 10 GPs. This sample size was divided by region in order to achieve the best possible geographical distribution. Therefore 30 local champions were aimed to be recruited from the Flemish region and 20 from the Walloon region and Brussels.

3.1.1 Recruitment

A separate flyer for the recruitment of local champions and GPs was developed and distributed to/via:

- Network of participating academic centres (UAntwerp, UGhent, KU Leuven, ULB, ULiège)
- Network of the members of the TFE/AMR/H (Task Force Extern/Antimicrobial Resistance/Human pilar);
- LOK/GLEM-moderators;
- GPs who have a coordination role within nursing homes (CRA: coördinerend raadgevend arts/MCC: Médecin Coordinateur et Conseiller);
- Participants of a train-the-trainer session to moderate an MFO (Medisch Farmaceutisch Overleg) in Flanders;
- Newsletter of Evikey and EBpracticenet;
- Domus Medica (participants to external expert groups, website, newsletter);
- SSMG (Société Scientifique de Médecine Générale);
- CMG (Collège de Médecine Générale);
- Organizations linked to medical houses (VWGC: Vereniging voor Wijkgezondheidscentra ; Geneeskunde van het Volk ; FMM: Fédértion des maisons médicales);
- FePraFo (Fédération des pratiques médicales de première ligne au forfait);
- FMM (Fédération des maisons médicales)
- CCFFMG (Centre de Coordination Francophone pour la Formation en Médecine Générale);
- ICHO (Interuniversitair Centrum voor de Huisartsen Opleiding);
- Coordinators of “kring/cercle”;
- CareConnect users (this software was selected because the project call described availability of antibiotic barometer in CareConnect as a deliverable);
- The webinar about the antibiotic barometer organized by KU Leuven (13/09/2023);
- AVIQ-symposium (2023).

Project group members personally contacted and invited potential local champions within their GP-network associated with the university or personal network.

In addition, local champions were invited to recruit GPs within their own network. Approaches initiated by local champions were:

- contacting GPs within their own GP-practice;
- contacting colleagues within their own network;
- circulating announcements through GP-associations (kring/cercle);
- communication via their LOK/GLEM.

Because the project call described the availability of the antibiotic barometer in CareConnect as a deliverable, use of CareConnect was mentioned in a first communication and selection round as an advantage at the level of the participating GPs. In a second communication and selection round, this was less emphasized because there was a clear perspective that the antibiotic barometer would be available in all software packages by the end of 2023.

The recruitment period started in June 2023 (after the first training session for local champions) and was open until 22/10/2023. After this date some additional GPs were added to a specific intervision group. This occurred after the first intervision was organized and participating GPs invited colleagues from the same of neighbouring GP-practice to participate as well.

At level of the local champions, a total of 62 GPs was registered in a first step (40 for Flanders and 22 for Brussels/Wallonia). Before the start of the training 11 of these candidates dropped out (5 for Flanders and 6 for Brussels/Wallonia). After training sessions for local champions, 9 candidates in Flanders indicated that they are not able to start the implementation project. Despite several attempts to contact them to ask for the reason for drop-out, we have received little or no input about their motivation to stop. At the end of the recruitment period 42 local champions started the implementation project (26 for Flanders and 16 for Brussels/Wallonia). This is 84% of the target goal of 50 local champions at the start of this implementation project.

Table 8 gives an overview of the results of this recruitment for local champions.

Table 8: Overview of the results of recruitment for local champions.

	Flanders	Brussels and Wallonia
Total number registered	40	22
Drop-outs before start of project (training)	5	6
Drop-outs after training	9	0
Number of local champions that started the implementation project	26	16

At level of the GPs, a total of 484 GPs was registered in a first step (329 for Flanders and 155 for Brussels/Wallonia). For Flanders, the recruitment resulted in a total of 329 registrations of GPs of which 182 were recruited by their local champion and 147 without knowing their local champion. In order to allocate these uncoupled GPs to a local champion, the project group carried out a two-step strategy. A first step consisted of contacting (by phone) local champions who did not recruit 10 GPs yet, asking whether they wanted to include additional GPs within their intervision group. A second step consisted of the invitation of uncoupled GPs to take the

role as a local champion and start their own intervision group with registered GPs. This two-step strategy led to additional coupling of 58 GPs to a local champion, leaving 89 GPs uncoupled that could not participate to a Flemish intervision group. For Brussels/Wallonia 148 GPs were linked to a local champion and 7 GPs could not be assigned to an intervision group. At the end of the recruitment period 388 GPs started the implementation project (240 for Flanders and 148 for Brussels/Wallonia). This is 77% of the target goal of 500 GPs for this implementation project.

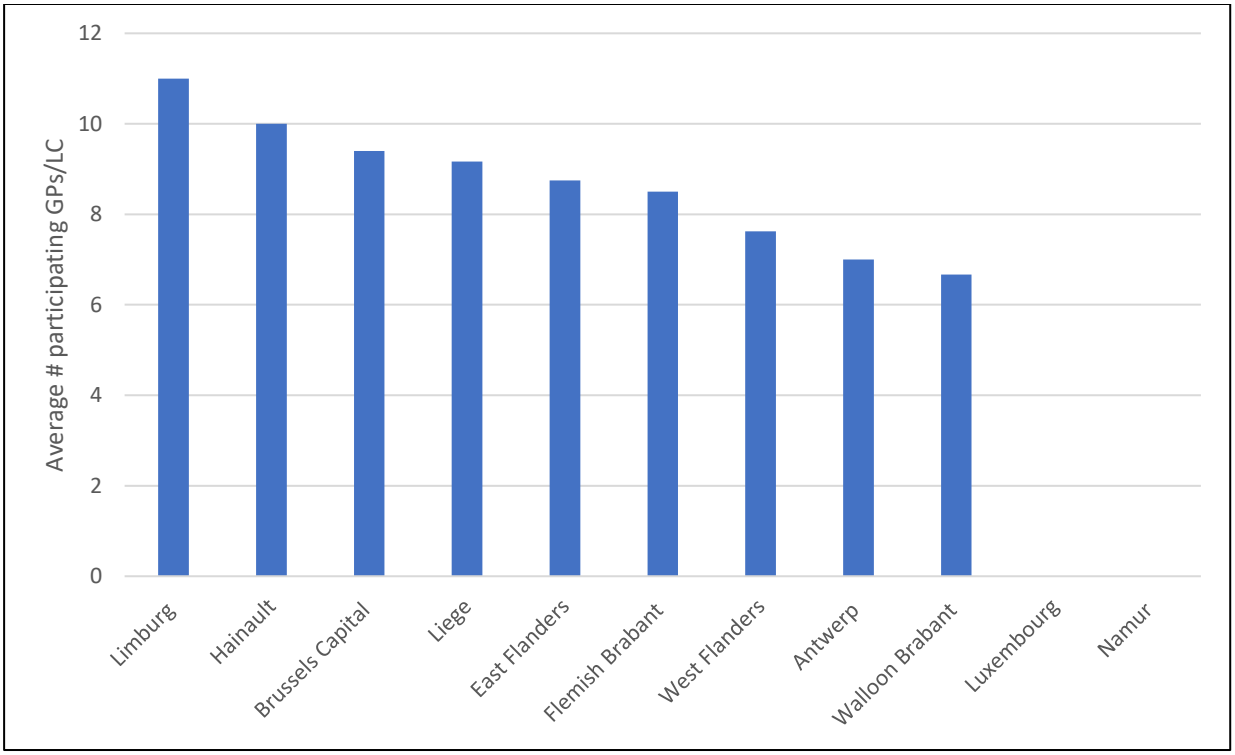
Table 9 gives an overview of the results of this recruitment for GPs.

Table 9: Overview of the results of recruitment for GPs.

	Flanders	Brussels and Wallonia
Total number registered	329	155
Registered GPs that were recruited via the local champion	182	148
Registered GPs without knowing their local champion	147	7
Number of GPs that could not be linked to a local champion	89	7
Number of GPs that started the implementation project	240	148

There was a different distribution of GPs that started the implementation project across the different provinces. The average number of participating GPs per local champion in the different provinces is represented in Figure 2.

Figure 2: Average number of participating GPs per local champion per province.



3.1.2 Local champions

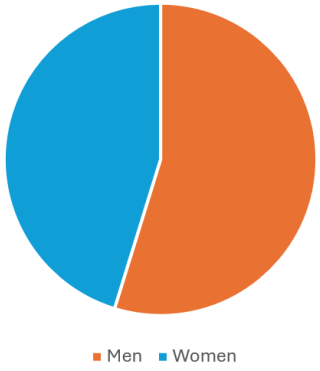
3.1.2.1 Profile of local champions

Figure 3 below represent local champions' gender, province in which they work, age, years of practice, type of practice and whether CareConnect is used or not.

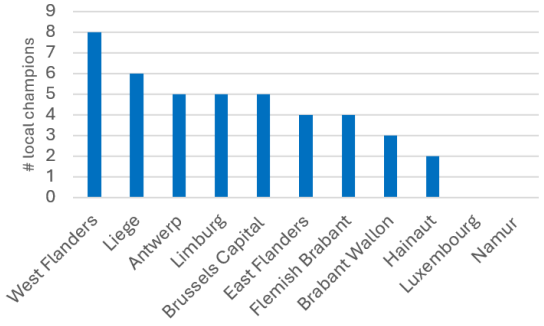
Figure 3: Overview of profile of local champions.

Profile of local champions
(gender, province, age, years of practice, type of practice, CareConnect

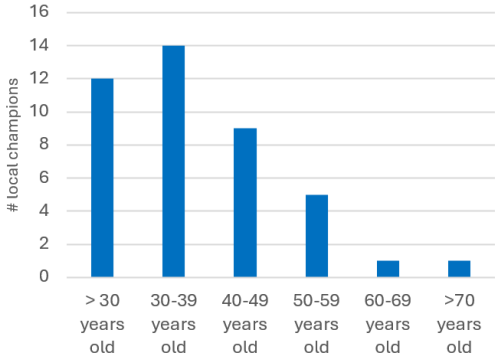
gender of local champion



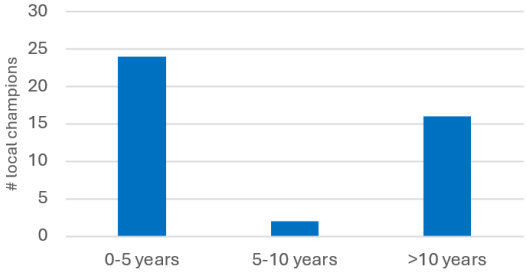
province in which local champion works



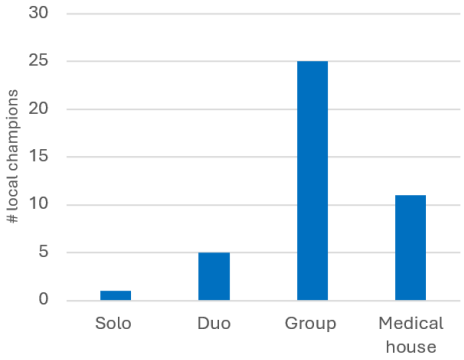
age of local champion



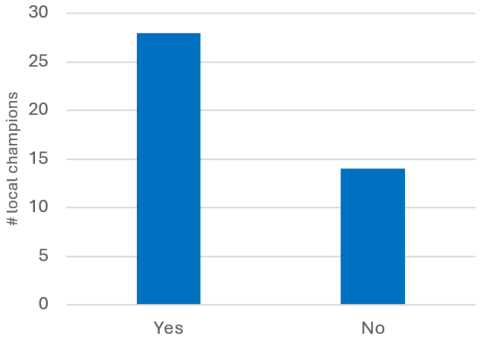
years of experience of local champion



type of practice of local champion



CareConnect user



CareConnect: Because availability of the antibiotic barometer in CareConnect software was described as a deliverable in this project, we also measured how many of the participating local champions used CareConnect at the beginning of this project.

Type of practice: In a medical house, a multidisciplinary team of health care professionals provides primary health care that is reimbursed by the mandatory insurance for medical care. The care in a medical house is reimbursed in a specific and fixed way.

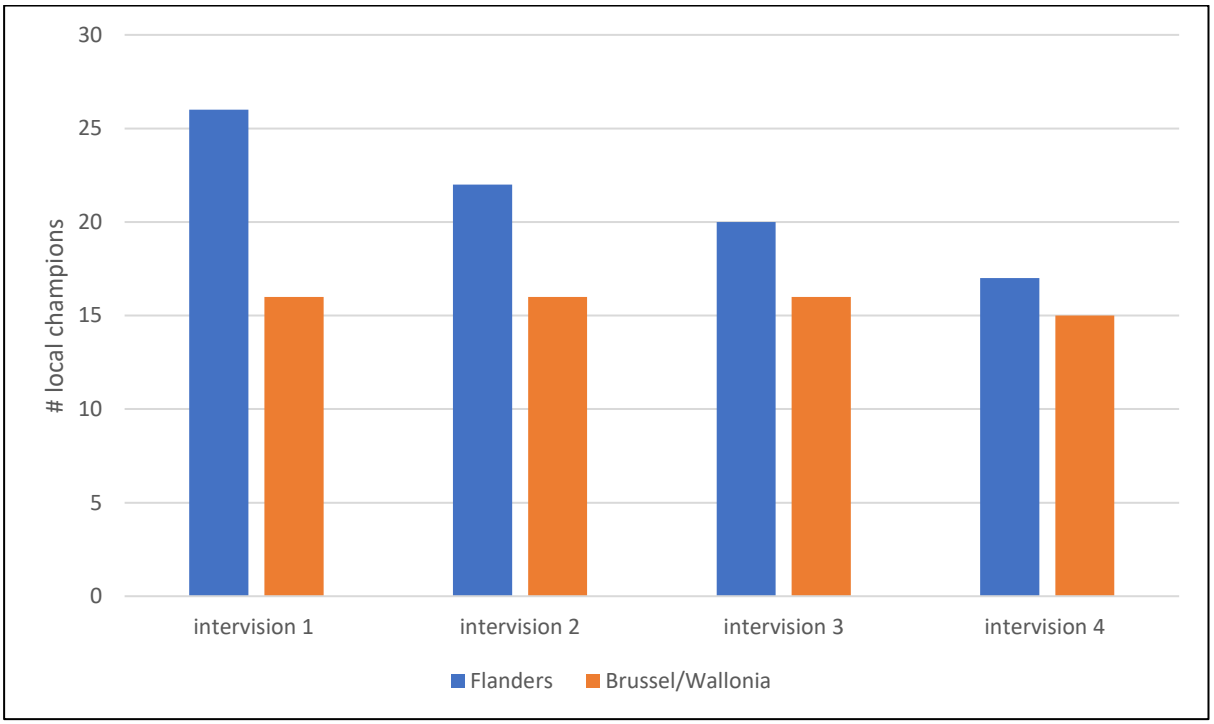
3.1.2.2 Drop-outs at level of local champions

From the total of 42 local champions that were engaged at the start of this implementation project, there were 26 Flemish and 16 Brussels/Walloon local champions. .

From the 26 Flemish local champions that organized their first intervision, 22 and 20 local champions organized a second and third intervision, respectively. A total of 17 Flemish local champions successfully completed all four intervisions (Figure 4).

All 16 local champions in Brussels/Wallonia organized their first three intervisions. Only one local champion did not organize the 4th intervision (Figure 4).

Figure 4: Number of local champions that carried out intervision 1, 2, 3 and 4.



In order to try to determine the underlying reason for drop-out of the local champion, we invited these participants to provide oral or written feedback with their motivation for drop-out. Even though we emphasized that their input was important and of added value for this implementation project to learn for future, large-scale implementation and that this was not intended to persuade them, we received very little response to this invitation, neither by email nor by telephone.

Possible reasons for drop-out at level of local champions were:

- Reasons linked to this project
    - No access to or availability of the Healthstat feedback report
    - Difficulties to engage the group for participation to the 4th intervision despite many efforts and reminders of the local champion
- Reasons not linked to this project

- Pregnancy
- Time constraints due to private reasons or changes in practice staffing
- Other priorities

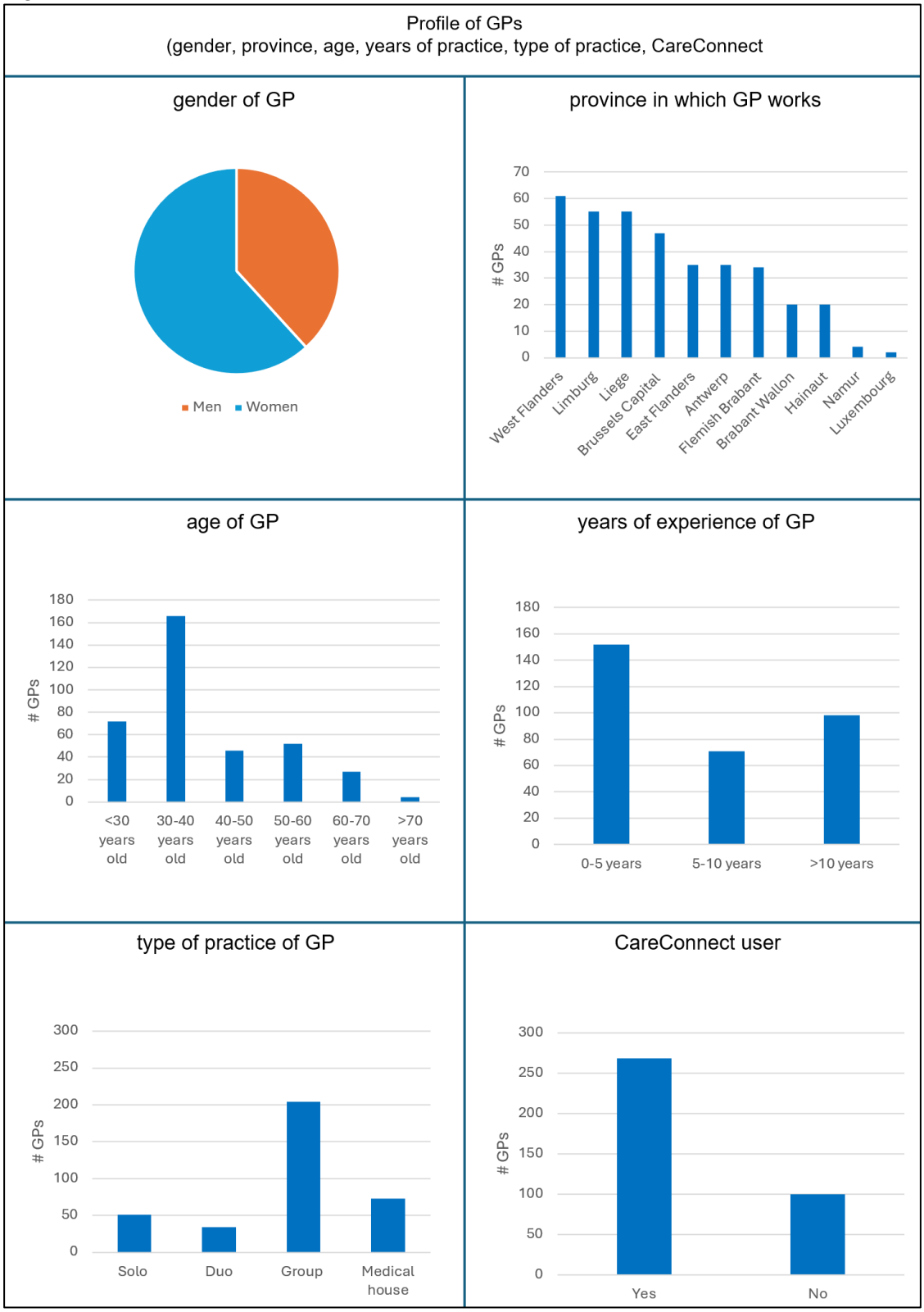
There are no data available to link the profile of the dropouts to the profile of antibiotic prescribing. A larger number of participants is needed to identify systematic reasons for drop-out linked to this project.

3.1.3 General practitioners

3.1.3.1 Profile of GPs

Figures 5 below present the participating GPs' gender, age, years of practice, type of practice and province in which they work.

Figure 5: Overview of profile of GPs.



CareConnect: Because availability of the antibiotic barometer in CareConnect software was described as a deliverable in this project, we also measured how many of the participating local champions used CareConnect at the beginning of this project.

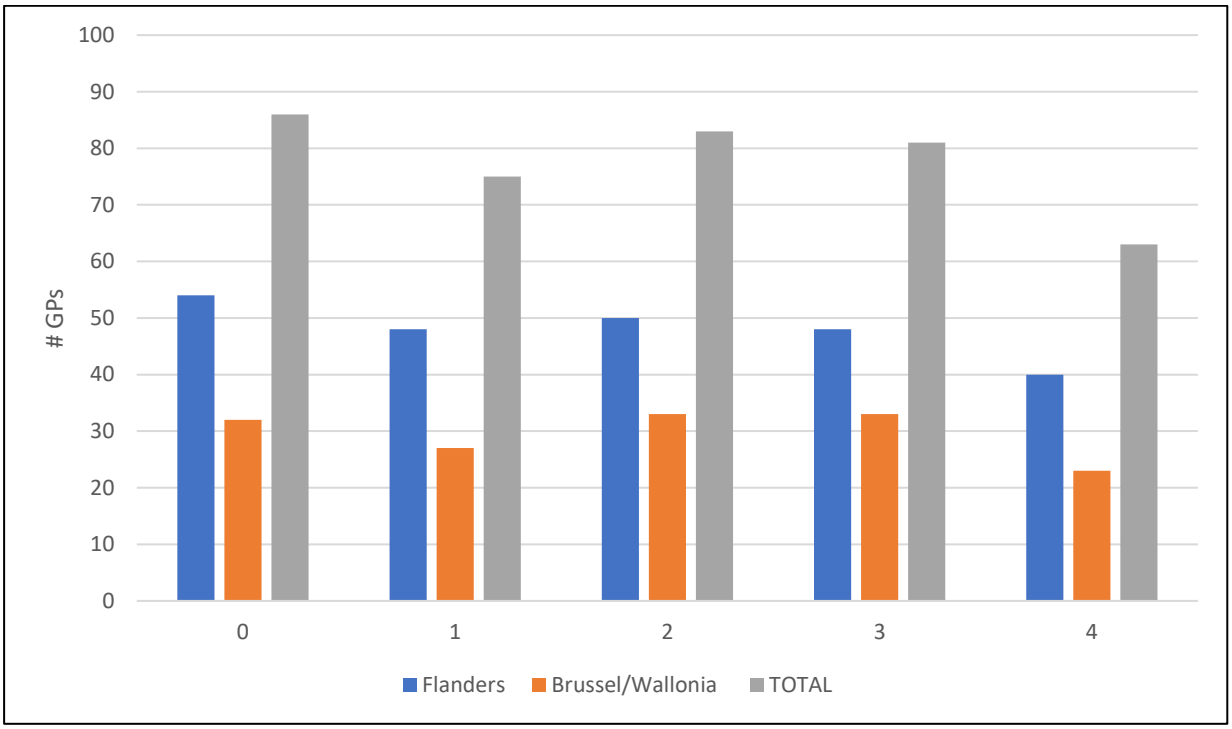
Type of practice: In a medical house, a multidisciplinary team of health care professionals provides primary health care that is reimbursed by the mandatory insurance for medical care. The care in a medical house is reimbursed in a specific and fixed way.

3.1.3.2 Drop-outs at level of GPs

From the total of 388 GPs that were subscribed and linked to a local champion (Figure 6):

- 86 (22%) did not register for the accreditation for participation to any intervision at all.
- 75 (19%) did register for the accreditation for participation for 1 intervision.
- 83 (21%) did register for the accreditation for participation to 2 intervisions.
- 81 (21%) did registered for the accreditation for participation to 3 intervisions.
- 63 (16%) did registered for the accreditation for participation to 4 intervisions.

Figure 6: Number of GPs participating to 0, 1, 2, 3 or 4 intervisions for Flanders, Brussels/Wallonia separately and combined (total).



Subanalysis of the characteristics (gender, age, years of experience, type of GP-practice, use of software) of the GPs that participated to a different number of intervisions, did not allow to identify a profile of GPs with a clearly different participation level.

No specific actions were taken to determine the underlying reason for drop-out, except a mail with the invitation to join another intervision group when the local champion of this GP decided to stop.

Possible reasons for drop-out at level of GPs are:

- Group level:
  - Stop of the local champion.
- Individual level (reasons linked to this project):
  - Wrong expectations of this implementation project and goal of intervisions (for example: theoretical lesson about AMR, focus on the use of antibiotic barometer as such without reflection on their own prescribing behaviour, …);

- GPs working with software without access to barometer at the start of the implementation project;
- Being the only GP that was not part of the same GP-practice as all other participants;
- No access or availability of Healthstat feedback report;
- Short period between two intervisions (3 months);

There are no data available to link the profile of the dropouts to the profile of antibiotic prescribing. A larger number of participants is needed to identify systematic reasons for drop-out linked to this project.

ATTACHMENT
- WP3: Recruitment flyer for local champions
- WP3 Recruitment flyer for GPs

3.2 Training of local champions (WP2)

To prepare local champions to organize and moderate the intervisions with participating GPs, two training sessions were organized with following learning objectives:

- Knowledge about guidelines and recommendations for appropriate antibiotic prescription for respiratory tract infections (for example BAPCOC).[15]
- Understand the determinants/barriers (COM-B, TDF) that keep GPs away from optimal antibiotic prescribing behaviour and be able to identify these determinants/barriers.
- Know which evidence-based interventions can be used to overcome these barriers and be able to select specific interventions, taking the local context into account.

The training program not only includes specific knowledge about the clinical aspects of antibiotics (antibiotic prescribing conform guidelines, mechanisms of the development of AMR due to inadequate prescribing behaviour), but also generic knowledge about communication skills and psychosocial and organizational aspects that play a role in the antibiotic prescribing behaviour of GPs.

Based on this training, local champions can increase their own professionalism and are able to train/coach the GPs to increase:

- their knowledge
- their skills and capacities
- their change of behaviour

to support appropriate antibiotic prescription behaviour for respiratory tract infections.

The first training session was organized in June 2023 (19/06/2023 and 27/6/2023 in Flanders and 20/06/2023 in Brussels/Wallonia). This session was organized online, took 2.5 hours and was given by project group members and external experts. The major topics of this training session are (Table 10):

- knowledge of clinical aspects of antibiotics (BAPCOC, guidelines/recommendations of specific respiratory tract infections, AMR)
- overview of determinants/barriers that influence antibiotic prescribing

Table 10: Program of first training session.

30 min	Introduction (implementation project)
30 min	Illustration of BAPCOC-guide via cases
20 min	Place of POC-testing, safety netting, delayed prescription
50 min	Factors that influence antibiotic prescribing behaviour (determinants/barriers via COM-B and TDF)
10 min	Overview of toolkit and instructions to start GP-recruitment
10 min	Questions & Answers

The second training session was organized in September - November 2023 (28/09/2023 and 5/10/2023 in Flanders and 15 and 16/11/2023 in Brussels/Wallonia). This session was organized live and took 3 hours and was given by project group members and external experts. The major topics of this training session are (Table 11):

- what is an intervision and what is the role as local champion
- communication skills and motivational interviewing
- change in prescribing behaviour

Table11: Program of second training session.

10 min	Summary of implementation project
15 min	Role of local champion
10 min	How to give feedback
10 min	What is an intervision
105 min	Role-playing
10 min	Attention points, reflections and remarks
10 min	Set-up an action plan
10 min	Practical aspects of project and Questions & Answers

For the second training session accreditation was requested and approved.

For Flanders 24/26 local champions were able to participate to the training sessions. In Flanders 2 extra sessions for local champions who were not able to participate on the above-mentioned training sessions were organized in November 2023 (09/11/2023 and 16/11/2023).

Most local champions active in Brussels and Wallonia followed the training sessions. For those who were not able to attend, a catch-up session was offered to answer questions.

The topic of content and technical aspects of the antibiotic barometer was not discussed in depth during these training sessions. This was covered via an online webinar (13/09/2023 in

Flanders and 27/11/2023 in Brussels/Wallonia) and by making support material to use and interpret the results of the antibiotic barometer available via the digital toolkit.

ATTACHMENT
- WP2: presentations for training session 1
- WP2: presentation for training session 2

3.3 Support sessions for local champions (WP3)

An implementation project is by definition adaptable to the needs and challenges in practice. And although the initial project contains clear objectives and milestones, the content can be adjusted throughout the entire project, based on input and feedback from the various participants.

It is in this context that two support sessions for local champions were organized. These sessions are organized by the project group in collaboration with external experts.
The aim of these sessions consists of:

- Intermediate follow-up and support of local champions. During these support sessions local champions, together with project group members and external experts, can share their experiences, exchange best practices and inspire each other for future intervisions.
- Intermediate evaluation of this implementation project and identify items of this project that can be optimized and/or adjusted in order to stimulate and motivate participating local champions and GPs to continue their engagement to this implementation project.

The first support sessions were organized in February – March 2024, when most local champions have completed their second intervision with participating GPs.

- For Flanders the first support sessions were organized online on 27/2/2024 and 29/2/2024. The duration of the support sessions was 2 hours. There were 23/26 local champions that participated to this session.
- For Brussels/Wallonia the first support sessions were organized online on 26/2/2024 and 12/03/2024. The duration of the support sessions was 2 hours. There were 13/16 local champions that participated tot this session.

During the first part of these support sessions, input from local champions was collected based on following three questions:

- How do you experience your role as local champion?
- What is experience with intervision 1 and 2?
- What do you need to organize next intervision?

During the second part of these first support sessions tips and tricks between local champions themselves and with the members of the project group and external experts were exchanged.

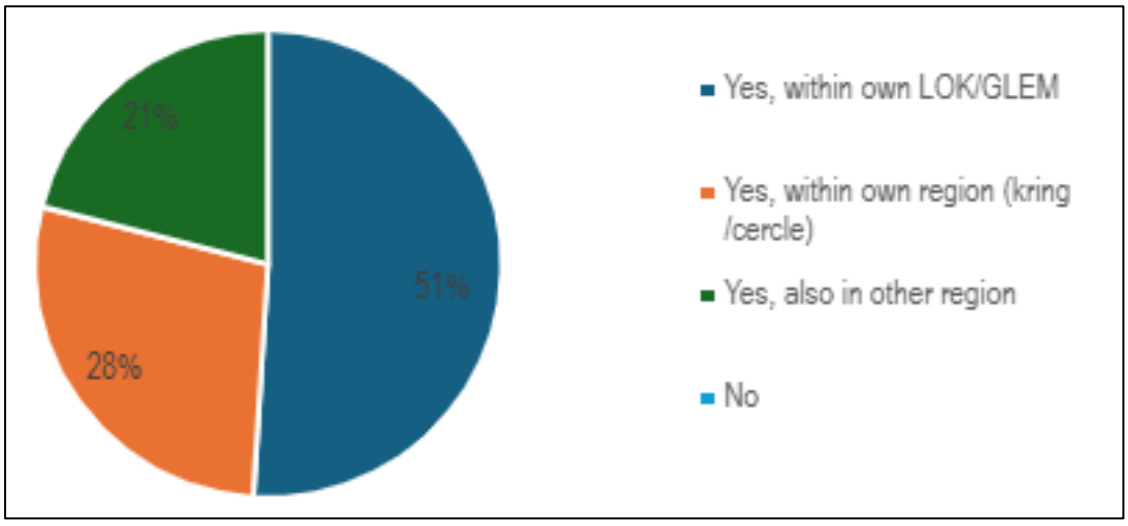
The major adjustment that was made based on the input of the first support session is the development of a revised version of the action plan.

The second support sessions were organized in June 2024, when most local champions have completed their third intervision with participating GPs.

- For Flanders the second support sessions were organized online on 05/06/2024 and 06/06/2024. The duration of the support sessions was 2 hours. There were 14/22 local champions that participated to this session.
- For Brussels/Wallonia the second support sessions was organized online on 17/06/2024. The duration of the support sessions was 2 hours. There were 9/16 local champions that participated tot this session.

At the end of the first support session local champions were asked whether they are willing to moderate an additional LOK/GLEM-group in future about the topic of antibiotics. All local champions participated to this poll (31) confirmed that they would like to do this, some of them under specific conditions. Half of the respondents (51%) indicated that they are willing to do this within their own LOK/GLEM, more than a quarter (28%) indicated that they would like to do this within the region of their own kring/cercle and the minority (21%) are also willing to moderate a LOK/GLEM in another region (Figure7).

Figure 7: Response of local champions to moderate an extra LOK/GLEM in future.



During the first part of these second support sessions, input from local champions was collected based on following three questions:

- Which evolution do you experience in the role as local champion?
- Which evolution do you observe within intervision group?
- What would you do differently when starting a new intervision group?

During the second part of these support sessions tips and tricks between local champions themselves and with the members of the project group and external experts were exchanged.

The major optimalisation that was provided based on the input of the second support session is the development of a one-pager with tips and tricks for local champions to engage and motivate participating GPs.

The input from these support sessions organized in Flanders is integrated in a narrative/descriptive way in the process evaluation. The input from local champions during the support sessions organized in Brussels/Wallonia is considered for the analysis of focus groups with local champions.

ATTACHMENT

- WP3: Presentation for support session 1
- WP3: Presentation for support session 2
- WP3: Overview of motivation why local champions are/are not willing to moderate another peer-group for the topic of antibiotics

4. Tools used for implementation strategy

This section describes the tools that are used for the implementation strategy (intervisions of local champion with GPs):

- Antibiotic barometer
- Digital toolkit
- Action plan

These tools are used for implementation strategy at two levels

- Level of local champions
  to support the change in antibiotic prescribing behaviour by GPs during the intervisions of local champions with GPs
- Level of GPs
  To change the antibiotic prescribing behaviour by GPs as such

4.1 Antibiotic barometer (WP4)

An audit- and feedback module (antibiotic barometer) was developed as a tool that can be used for the implementation strategy in this implementation project.[16–21] The feedback reports of this barometer can be discussed during the intervisions of a local champion with GPs in order to identify determinants.

The content of this audit- and feedback module is based on the disease-specific APQI (antibiotic prescribing quality indicators), which cover 6 respiratory tract indications (and one urinary tract infection) for which most antibiotics are prescribed. Table 12 represents an overview of ICPC-codes of these diseases and the recommended antibiotic as described in the approved proposal of this implementation project.

Table 12: Overview of ICPC-code and recommended antibiotic.

Disease with ICPC-code
R78: acute bronchitis/bronchiolitis, between 18 and 75 year - Recommended antibiotic: broad spectrum penicillin (ATC J01CA)
R74: acute infection of upper respiratory tract, older than 1 year - Recommended antibiotic: small spectrum penicillin (ATC J01CE) OF broad spectrum penicillin (ATC J01CA)
R72/76 (*): acute tonsillitis, older than 1 year - Recommended antibiotic: small spectrum penicillin (ATC J01CE) OF first generation generatie cephalosporines (ATC J01DB)
R75: acute/chronic sinusitis, older than 18 year

- Recommended antibiotic: small spectrum penicillin (ATC J01CE) OF broad spectrum penicillin (ATC J01CA)

H71: acute otitis media, older than 2 year

- Recommended antibiotic: small spectrum penicillin (ATC J01CE) OF broad spectrum penicillin (ATC J01CA)

R81: pneumonia, between 18 and 65 year

- Recommended antibiotic: broad spectrum penicillin (ATC J01CA)

(*) R72/76: R72, streptococcen-angina, is taken together with R76 because difference in diagnosis in primary care is not always coded.

Disease-specific APQI quantify different aspects of appropriate antibiotic prescribing behaviour (prescription or not, correct type of antibiotic). For each indicator there is a range of acceptable use to ensure effective treatment of patients with infection and to minimalize adverse effects from antibiotic use.

Calculation of disease-specific antibiotic prescribing quality indicators (APQI) in the antibiotic barometer after validation (VIKZ) and adaptation to the Belgian context (BAPCOC):

	R78	R74	R72/R76	R75	H71	R81
A: Number of patients with diagnosis						
B: Number of A within age and gender limits						
C: Number of C with antibiotic prescription						
Value-indicator a = C/B as %						
Range of acceptable use	<30	<20	<20	<20	<20	>90
D: Number of C with recommended antibiotic (=x)						
tetracyclines (ATC J01AA)						
Small spectrum penicillins (ATC J01CE)		x	x	x	x	
Broadd spectrum penicillins (ATC J01CA)	x	x		x	x	x
penicillins with enzyme inhibitor (ATC J01CR)						
first generation cephalosporins (ATC J01DB)			x			
second generation cephalosporins (ATC J01DC)						
trimethoprim (ATC J01EA)						
macrolides (ATC J01FA)						
quinolones (ATC J01M)						
nitrofurans (ATC J01XE)						
fosfomycine (ATC J01XX01)						

other J01						
Value-indicator b= D/C as %						
Limits acceptable use	>80	>80	>80	>80	>80	>80
Value-indicator c= C with chinolone prescription/D as %						
Limits acceptable use	<5	<5	<5	<5	<5	<5

Prior to software development, the relevant parameters for the audit module were submitted to the following organizations for validation:

- VIKZ (Vlaams Instituut voor Kwaliteit van Zorg)
- PAQS (La Plateforme pour l'Amélioration continue de la Qualité des soins et de la Sécurité des patients)

Validation was approved based on a validation commission that was organized on 18/03/2023 by VIKZ, where also members of PAQS were invited.

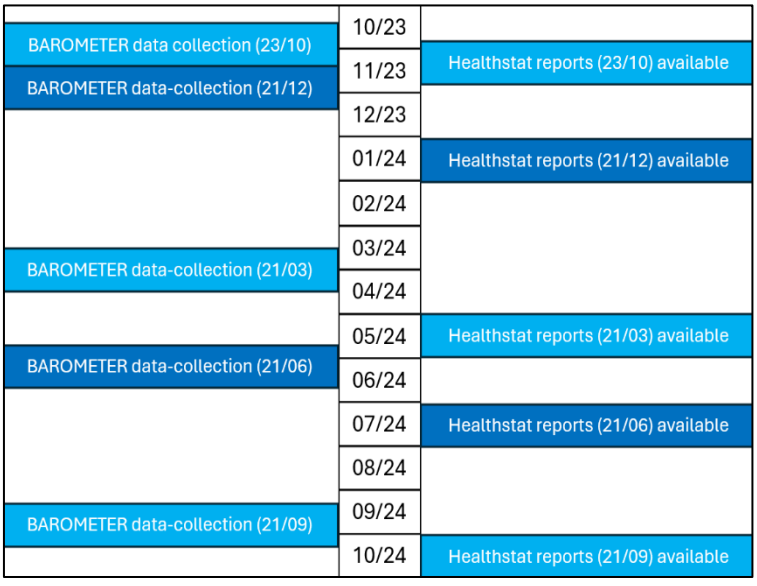
The validated quality indicators were translated to queries in order to develop an automated audit procedure for data collection. Periodic data collection was carried out every three months aligned with the different seasons:

- 21/3
- 21/6
- 21/9
- 21/12

The feedback was made available soon after each data-collection (Table 13).

Table 13: Timeline of data-collection and availability of Healthstat feedback reports.

Schedule of the automated data-collection	Communication to barometer-users about availability of Healthstat feedback reports
23/10/2023	22/11/2023
21/12/2023	17/01/2024
21/03/2024	31/5/2024
21/06/2024	3/7/2024
21/09/2024	21/10/2024



Based on this data collection Healthstat feedback reports were generated, presenting aggregated results of disease-specific APQI at micro-, meso- and TOP-10 level as explained in Table 14. In addition, the range of acceptable use is also mentioned in these feedback reports.

- The TOP-10 level represent the percentiles based on the indicator values of the GPs participating in the antibiotic barometer for each of the indicator values in the Healthstat feedback reports (= depending on antibiotic prescribing behaviour of the participating GPs).
- The ranges of acceptable is based on the international publication for the disease-specific APQI (= independent from the antibiotic prescribing behaviour of the participating GPs).[18]

Table 14: Content of Healthstat feedback reports.

Micro level	aggregated data at GP-practice level (*)
Meso level	aggregated data for a region of care (for example "Eerstelijnszone" in Flanders, province, "arrondissement")
TOP-10 level	mean of performance of TOP-10 best performing GP-practices are also available via the Healthstat feedback reports.
Indication for the range of acceptable use for all different APQI.	

(*) These data are only accessible for GPs linked to the involved GP-practice. Specific and transparent information about the legal aspect of data management is provided via an ICF (Informed Consent Form) for all GPs that have registered for the antibiotic barometer via software.

These Healthstat feedback reports can serve as a benchmark for (in)appropriate prescribing. It allows a GP-practice to compare the quality of their antibiotic prescribing behaviour over time as well as with data from the TOP-10 of participating peers as well as with aggregated data at meso level. It gives the opportunity to focus on specific challenges at GP-practice level and set objectives for improvement.

This implementation project includes the application of the barometer technology for the topic of appropriate antibiotic use in general practice. The first data-collection for the antibiotic barometer was conducte on 23/10/2023 in CareConnect. At the time of project application, the software provider CareConnect was committed to develop the audit- and feedback module. They cover 25.5% of the certified GPs in Brussels, 53.8% in Flanders and 32.5% in Wallonia. During the development phase of this project, it became clear that the antibiotic barometer woud be available in all software packages at 31/12/2023. This was made possible thanks to financial support of RIZIV/INAMI. Because both CareConnect and non-CareConnect users were allowed to participate in this project, this meant that the antibiotic barometer was available

for all participants, but for non-CareConnect users not at the very start of the implementation phase of this project.

Because in this implementation project the barometer technology was used for the first time to perform audit and feedback on the quality of antibiotic use, there was some delay in the availability of Healthstat feedback reports after the data-collection (Table 13).

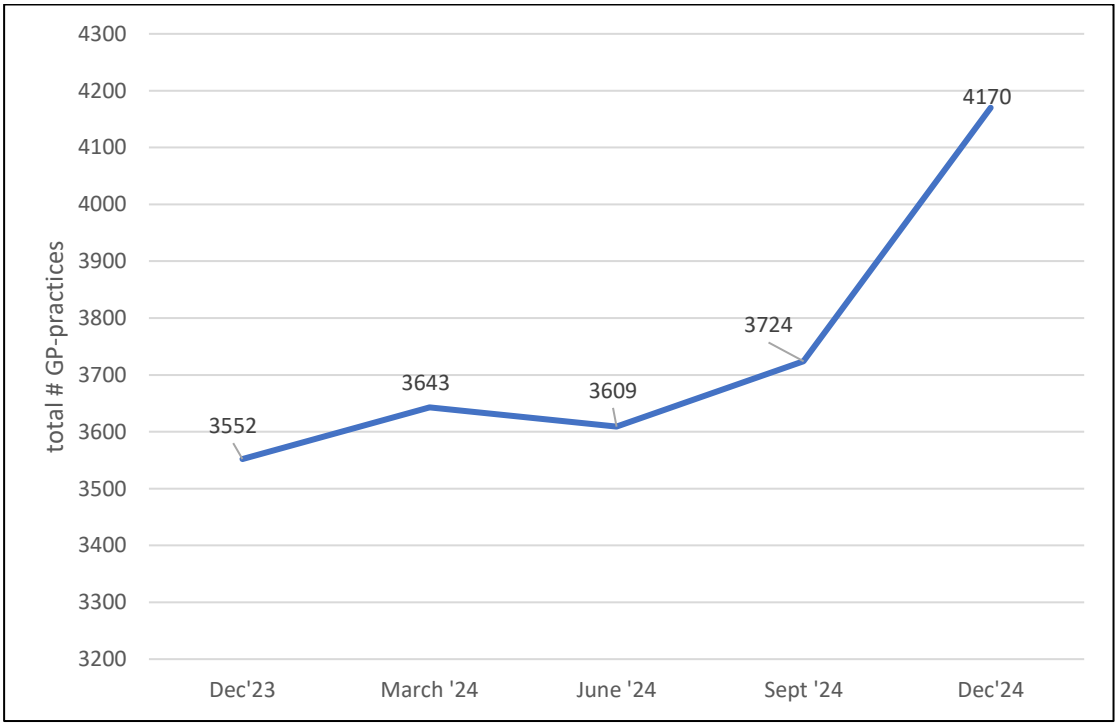
ATTACHMENT
- WP4: Statements to support interpretation of barometer results
- WP4: Manual for Healthstat-account
- WP4: Manual for consulting feedback on Healthstat

For the qualitative analysis of the use of the antibiotic barometer within this antibiotic stewardship implementation project, we refer to section 6.1.2. Process evaluation at the level of the intervisions and the local champions. Within this section 4.1 about antibiotic barometer as tool the general use of antibiotic barometer, general results of Healthstat feedback reports and general results of user-survey for antibiotic barometer will be discussed.

4.1.1 General use of antibiotic barometer

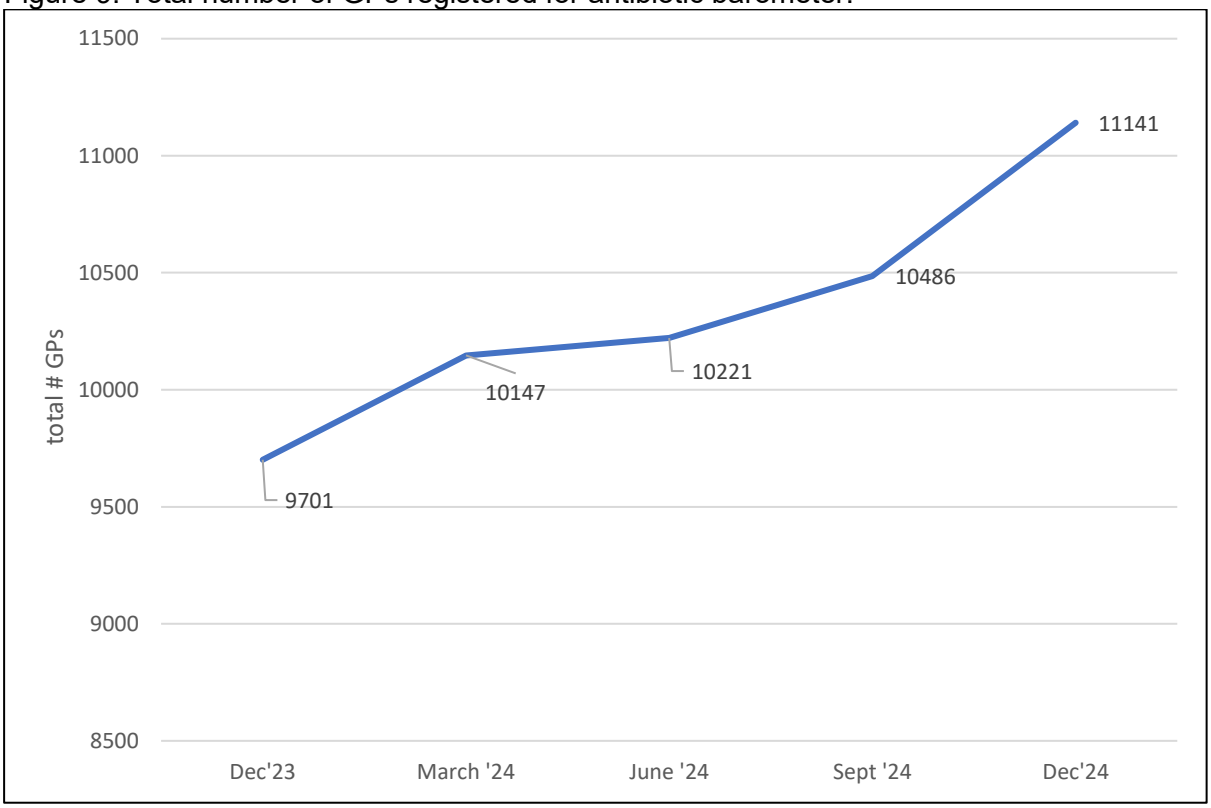
Figures 8 and 9 present the total number of GP-practices and individual GPs who registered for the antibiotic barometer via the software package, respectively. An important remark is that these figures present the general use in Belgium and not only the use by the participants in this implementation project.

Figure 8: Total number of GP-practices registered for antibiotic barometer.



The stagnation in the total user-number in June 2024 can be explained by the fact that some software systems required manual sending of the data.

Figure 9: Total number of GPs registered for antibiotic barometer.



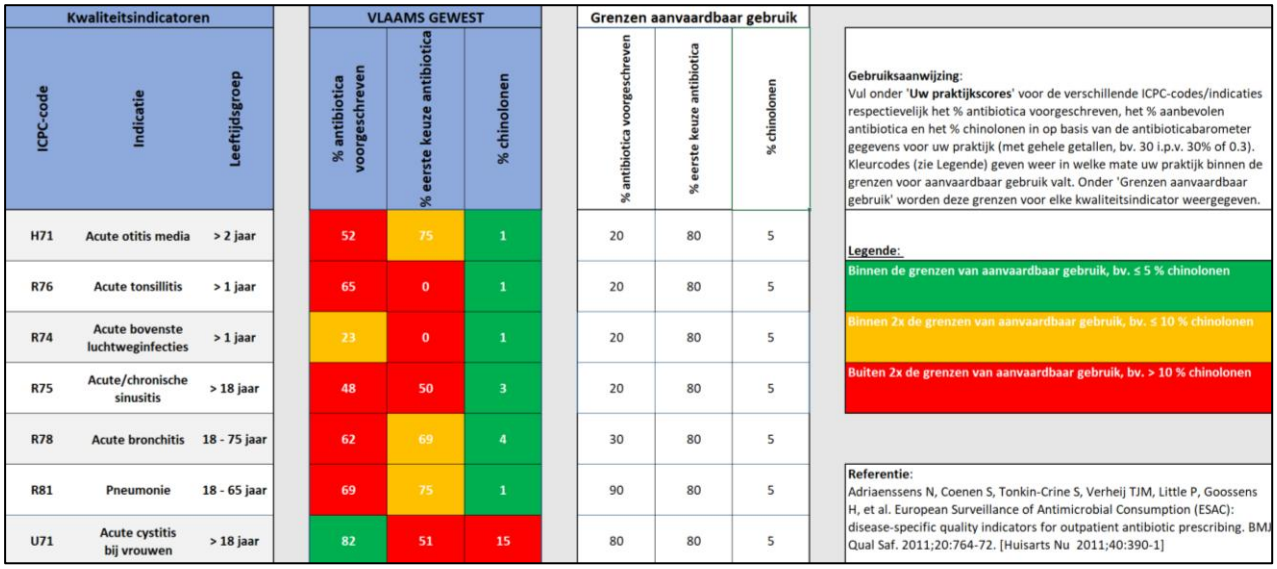
4.1.2 General results of Health feedback reports

4.1.2.1 Overview of APQI for Flanders (every three months)

Within the context of this implementation project, an excel template was developed to produce an overview of the results for all disease-specific APQI based on the antibiotic barometer results. This template was developed with the aim to support local champions and participating GPs during intervisions, and therefore, it was included in the digital toolkit.

Figures 10 - 13 present this template completed using the Healthstat feedback reports based on the aggregated data of all participating GPs in Flanders collected for the antibiotic barometer at 23/12/2023, 21/03/2024, 21/06/2024 and 21/09/2024, respectively. These aggregated results are communicated to the local champions and integrated in the model presentations that local champions can use during the intervisions.

Figure 10: Healthstat feedback report (aggregated data for Flanders) based on data-collection of 21/12/2023.



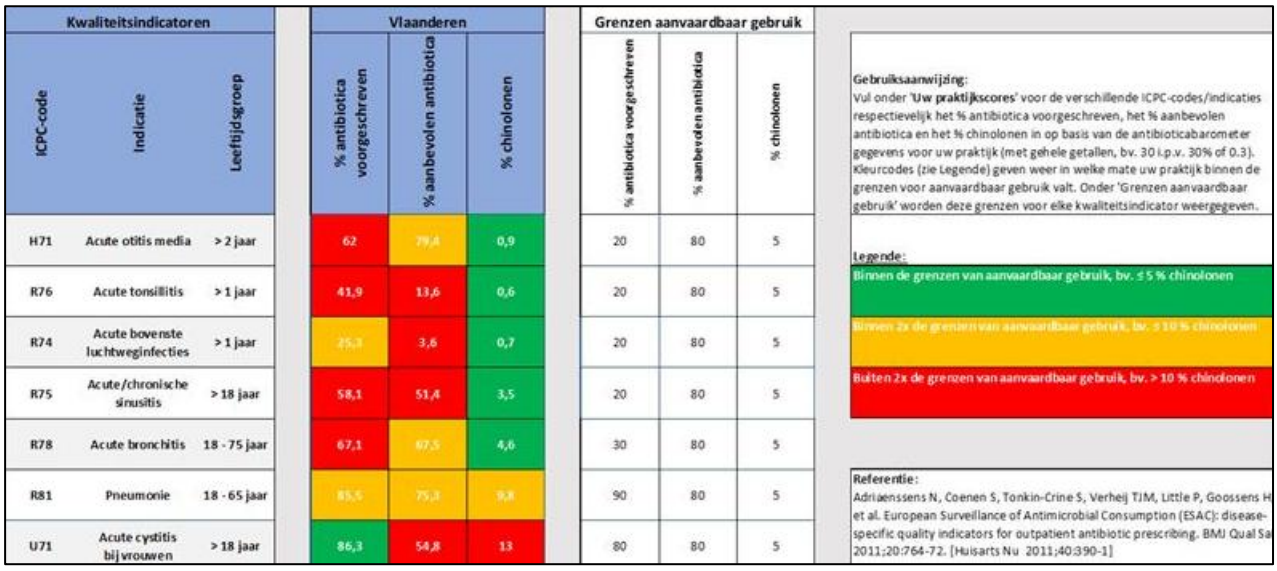
Kwaliteitsindicatoren			VLAAMS GEWEST			Grenzen aanvaardbaar gebruik		
ICPC-code	Indicatie	Leeftijdsgroep	% antibiotica voorgeschreven	% eerste keuze antibiotica	% chinolonen	% antibiotica voorgeschreven	% eerste keuze antibiotica	% chinolonen
H71	Acute otitis media	> 2 jaar	52	75	1	20	80	5
R76	Acute tonsillitis	> 1 jaar	65	0	1	20	80	5
R74	Acute bovenste luchtweginfecties	> 1 jaar	23	0	1	20	80	5
R75	Acute/chronische sinusitis	> 18 jaar	48	50	3	20	80	5
R78	Acute bronchitis	18 - 75 jaar	62	69	4	30	80	5
R81	Pneumonie	18 - 65 jaar	69	75	1	90	80	5
U71	Acute cystitis bij vrouwen	> 18 jaar	82	51	15	80	80	5

Gebruiksaanwijzing:
Vul onder '**Uw praktijkscores**' voor de verschillende ICPC-codes/indicaties respectievelijk het % antibiotica voorgeschreven, het % aanbevolen antibiotica en het % chinolonen in op basis van de antibioticabarometer gegevens voor uw praktijk (met gehele getallen, bv. 30 i.p.v. 30% of 0.3). Kleurcodes (zie Legende) geven weer in welke mate uw praktijk binnen de grenzen voor aanvaardbaar gebruik valt. Onder 'Grenzen aanvaardbaar gebruik' worden deze grenzen voor elke kwaliteitsindicator weergegeven.

Legende:
Binnen de grenzen van aanvaardbaar gebruik, bv. ≤ 5 % chinolonen
Binnen 2x de grenzen van aanvaardbaar gebruik, bv. ≤ 10 % chinolonen
Buiten 2x de grenzen van aanvaardbaar gebruik, bv. > 10 % chinolonen

Referentie:
Adriaenssens N, Coenen S, Tonkin-Crine S, Verheij TJM, Little P, Goossens H, et al. European Surveillance of Antimicrobial Consumption (ESAC): disease-specific quality indicators for outpatient antibiotic prescribing. BMJ Qual Saf. 2011;20:764-72. [Huisarts Nu 2011;40:390-1]

Figure 11: Healthstat feedback report (aggregated data for Flanders) based on data-collection of 21/03/2024.



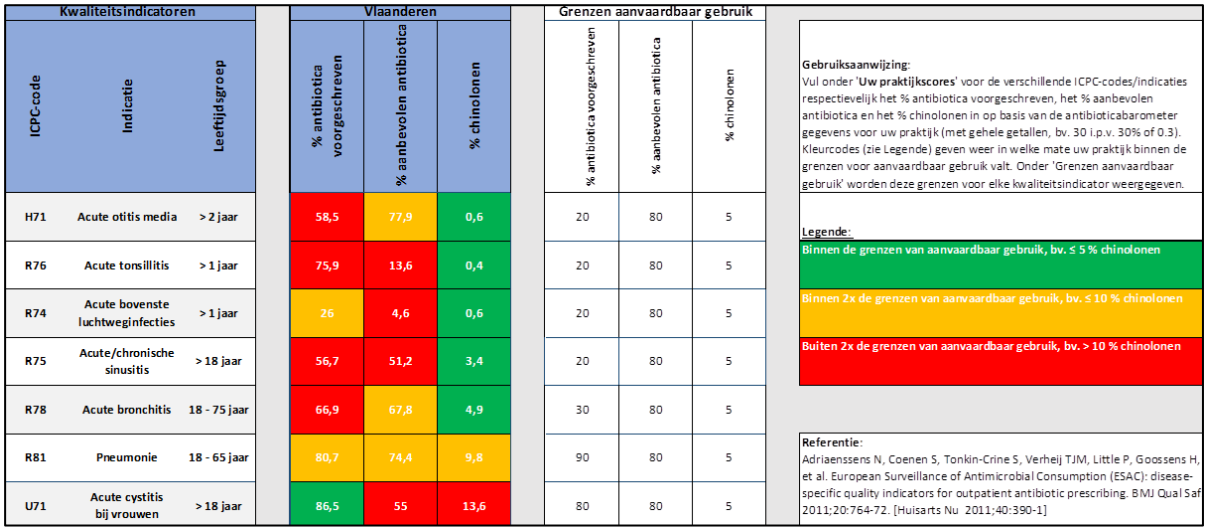
Kwaliteitsindicatoren			Vlaanderen			Grenzen aanvaardbaar gebruik		
ICPC-code	Indicatie	Leeftijdsgroep	% antibiotica voorgeschreven	% aanbevolen antibiotica	% chinolonen	% antibiotica voorgeschreven	% aanbevolen antibiotica	% chinolonen
H71	Acute otitis media	> 2 jaar	62	29,4	0,9	20	80	5
R76	Acute tonsillitis	> 1 jaar	41,9	13,6	0,6	20	80	5
R74	Acute bovenste luchtweginfecties	> 1 jaar	25,3	3,6	0,7	20	80	5
R75	Acute/chronische sinusitis	> 18 jaar	58,1	51,4	3,5	20	80	5
R78	Acute bronchitis	18 - 75 jaar	67,1	67,5	4,6	30	80	5
R81	Pneumonie	18 - 65 jaar	85,5	75,3	9,8	90	80	5
U71	Acute cystitis bij vrouwen	> 18 jaar	86,3	54,8	13	80	80	5

Gebruiksaanwijzing:
Vul onder '**Uw praktijkscores**' voor de verschillende ICPC-codes/indicaties respectievelijk het % antibiotica voorgeschreven, het % aanbevolen antibiotica en het % chinolonen in op basis van de antibioticabarometer gegevens voor uw praktijk (met gehele getallen, bv. 30 i.p.v. 30% of 0.3). Kleurcodes (zie Legende) geven weer in welke mate uw praktijk binnen de grenzen voor aanvaardbaar gebruik valt. Onder 'Grenzen aanvaardbaar gebruik' worden deze grenzen voor elke kwaliteitsindicator weergegeven.

Legende:
Binnen de grenzen van aanvaardbaar gebruik, bv. ≤ 5 % chinolonen
Binnen 2x de grenzen van aanvaardbaar gebruik, bv. ≤ 10 % chinolonen
Buiten 2x de grenzen van aanvaardbaar gebruik, bv. > 10 % chinolonen

Referentie:
Adriaenssens N, Coenen S, Tonkin-Crine S, Verheij TJM, Little P, Goossens H et al. European Surveillance of Antimicrobial Consumption (ESAC): disease-specific quality indicators for outpatient antibiotic prescribing. BMJ Qual Saf 2011;20:764-72. [Huisarts Nu 2011;40:390-1]

Figure 12: Healthstat feedback report (aggregated data for Flanders) based on data-collection of 21/06/2024.



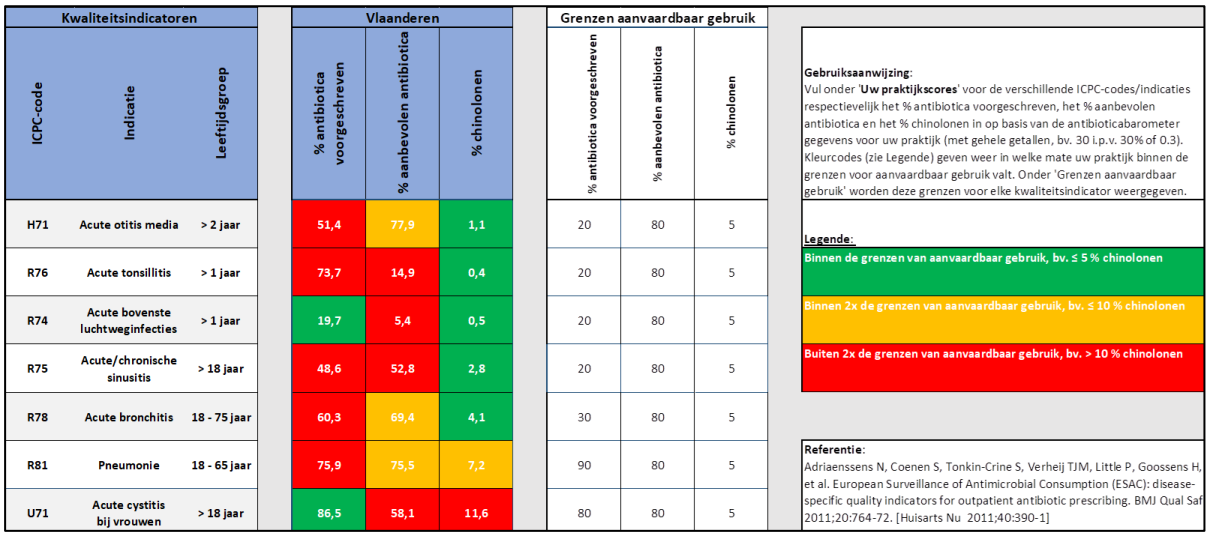
Kwaliteitsindicatoren			Vlaanderen			Grenzen aanvaardbaar gebruik		
ICPC-code	Indicatie	Leeftijdsgroep	% antibiotica voorgeschreven	% aanbevolen antibiotica	% chinolonen	% antibiotica voorgeschreven	% aanbevolen antibiotica	% chinolonen
H71	Acute otitis media	> 2 jaar	58,5	77,9	0,6	20	80	5
R76	Acute tonsillitis	> 1 jaar	75,9	13,6	0,4	20	80	5
R74	Acute bovenste luchtweginfecties	> 1 jaar	26	4,6	0,6	20	80	5
R75	Acute/chronische sinusitis	> 18 jaar	56,7	51,2	3,4	20	80	5
R78	Acute bronchitis	18 - 75 jaar	66,9	67,8	4,9	30	80	5
R81	Pneumonie	18 - 65 jaar	80,7	74,4	9,8	90	80	5
U71	Acute cystitis bij vrouwen	> 18 jaar	86,5	55	13,6	80	80	5

Gebruiksaanwijzing:
Vul onder '**Uw praktijkscores**' voor de verschillende ICPC-codes/indicaties respectievelijk het % antibiotica voorgeschreven, het % aanbevolen antibiotica en het % chinolonen in op basis van de antibioticabarometer gegevens voor uw praktijk (met gehele getallen, bv. 30 i.p.v. 30% of 0.3). Kleurcodes (zie Legende) geven weer in welke mate uw praktijk binnen de grenzen voor aanvaardbaar gebruik valt. Onder 'Grenzen aanvaardbaar gebruik' worden deze grenzen voor elke kwaliteitsindicator weergegeven.

Legende:
Binnen de grenzen van aanvaardbaar gebruik, bv. ≤ 5 % chinolonen
Binnen 2x de grenzen van aanvaardbaar gebruik, bv. ≤ 10 % chinolonen
Buiten 2x de grenzen van aanvaardbaar gebruik, bv. > 10 % chinolonen

Referentie:
Adriaenssens N, Coenen S, Tonkin-Crine S, Verheij TJM, Little P, Goossens H, et al. European Surveillance of Antimicrobial Consumption (ESAC): disease-specific quality indicators for outpatient antibiotic prescribing. BMJ Qual Saf 2011;20:764-72. [Huisarts Nu 2011;40:390-1]

Figure 13: Healthstat feedback report (aggregated data for Flanders) based on data-collection of 21/09/2024.



Kwaliteitsindicatoren			Vlaanderen			Grenzen aanvaardbaar gebruik		
ICPC-code	Indicatie	Leeftijdsgroep	% antibiotica voorgeschreven	% aanbevolen antibiotica	% chinolonen	% antibiotica voorgeschreven	% aanbevolen antibiotica	% chinolonen
H71	Acute otitis media	> 2 jaar	51,4	77,9	1,1	20	80	5
R76	Acute tonsillitis	> 1 jaar	73,7	14,9	0,4	20	80	5
R74	Acute bovenste luchtweginfecties	> 1 jaar	19,7	5,4	0,5	20	80	5
R75	Acute/chronische sinusitis	> 18 jaar	48,6	52,8	2,8	20	80	5
R78	Acute bronchitis	18 - 75 jaar	60,3	69,4	4,1	30	80	5
R81	Pneumonie	18 - 65 jaar	75,9	75,5	7,2	90	80	5
U71	Acute cystitis bij vrouwen	> 18 jaar	86,5	58,1	11,6	80	80	5

Gebruiksaanwijzing:
Vul onder '**Uw praktijkscores**' voor de verschillende ICPC-codes/indicaties respectievelijk het % antibiotica voorgeschreven, het % aanbevolen antibiotica en het % chinolonen in op basis van de antibioticabarometer gegevens voor uw praktijk (met gehele getallen, bv. 30 i.p.v. 30% of 0.3). Kleurcodes (zie Legende) geven weer in welke mate uw praktijk binnen de grenzen voor aanvaardbaar gebruik valt. Onder 'Grenzen aanvaardbaar gebruik' worden deze grenzen voor elke kwaliteitsindicator weergegeven.

Legende:
Binnen de grenzen van aanvaardbaar gebruik, bv. ≤ 5 % chinolonen
Binnen 2x de grenzen van aanvaardbaar gebruik, bv. ≤ 10 % chinolonen
Buiten 2x de grenzen van aanvaardbaar gebruik, bv. > 10 % chinolonen

Referentie:
Adriaenssens N, Coenen S, Tonkin-Crine S, Verheij TJM, Little P, Goossens H, et al. European Surveillance of Antimicrobial Consumption (ESAC): disease-specific quality indicators for outpatient antibiotic prescribing. BMJ Qual Saf 2011;20:764-72. [Huisarts Nu 2011;40:390-1]

ATTACHMENT

- WP4: Template for the overview of APQI

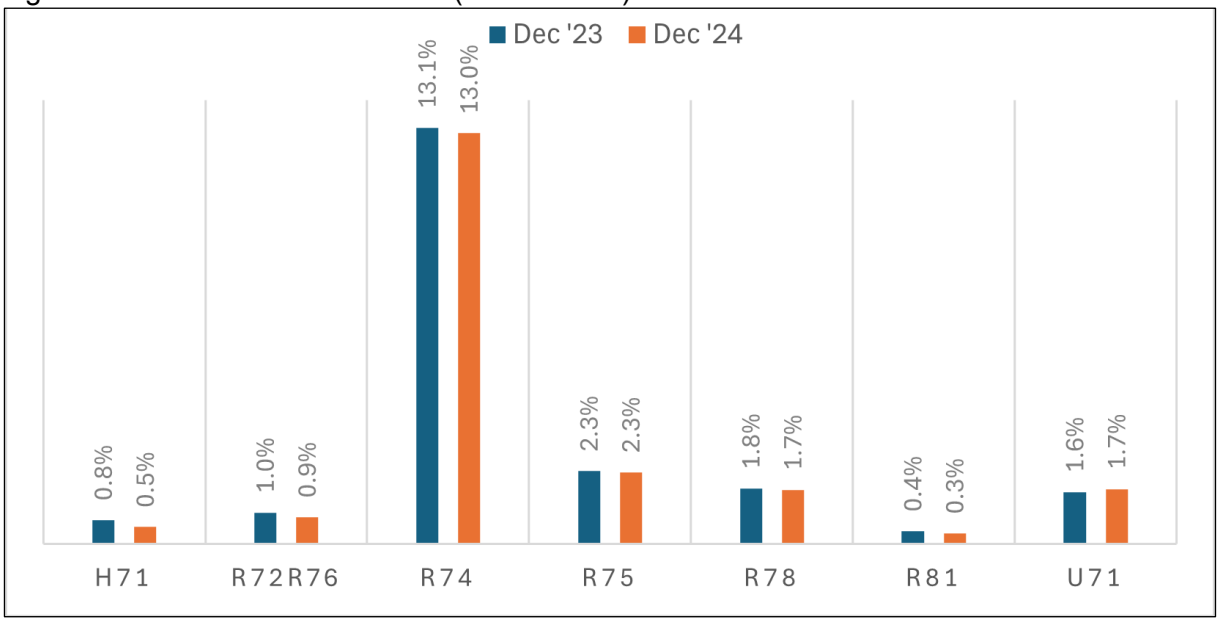
4.1.2.2 Overview of APQI for Belgium (comparison 2023 – 2024)

Within this section the general results of antibiotic barometer are presented. The aggregated data at national level (Flanders and Wallonia) from December 2023 to December 2024 are compared.

Figures 14 and 15 present the prevalence of each of the 6 respiratory tract infections targeted with this implementation project (see above for ICPC-codes) and U71 (urinary tract infections) for Flanders and Wallonia based on the data collected for the antibiotic barometer.

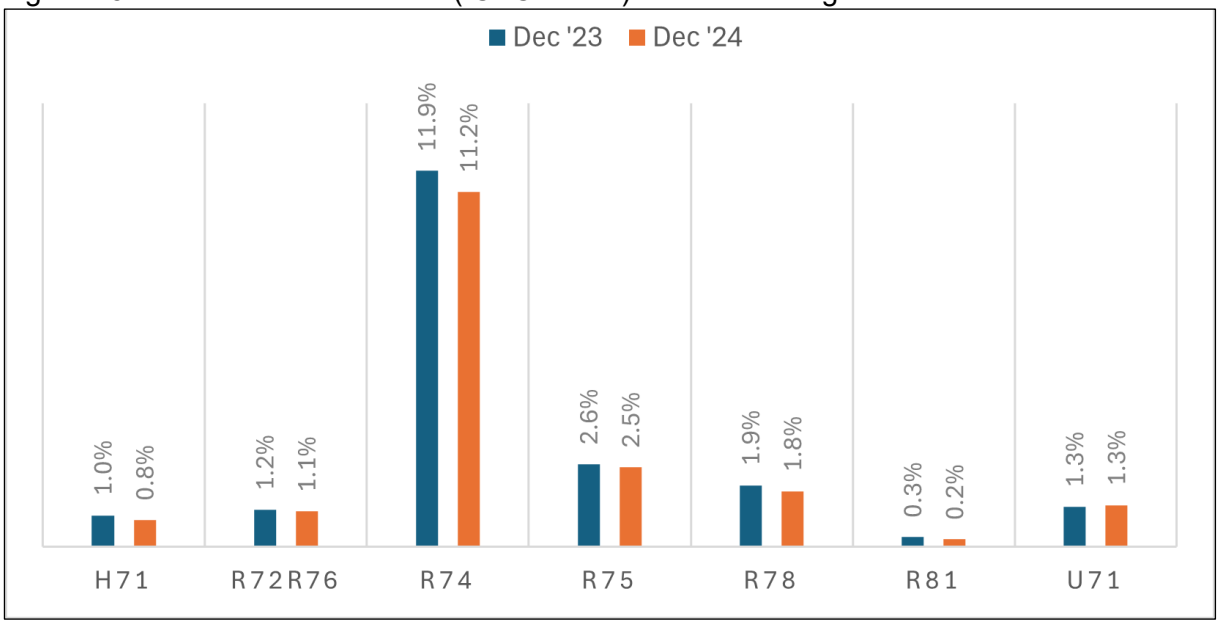
The prevalence is the total number of patients with at least one coded registration of a diagnosis ICPC-coded H71, R74, R75, R72/R76, R81 or U71 in a period of three months in a practice participating in the antibiotic barometer divided by the total number of registered patient contacts in those participating practices in a period of three months in 2023 and 2024, respectively.

Figure 14: Prevalence of diseases (ICPC-codes) for Flanders.



Legend:
Prevalence: total number of patients with at least one coded registration of a diagnosis ICPC-coded H71, R74, R75, R72/R76, R81 or U71 in a period of three months by the GPs participating in the antibiotic barometer divided by the total number of registered patient contacts in those participating practices in a period of three months in 2023 and 2024, respectively.

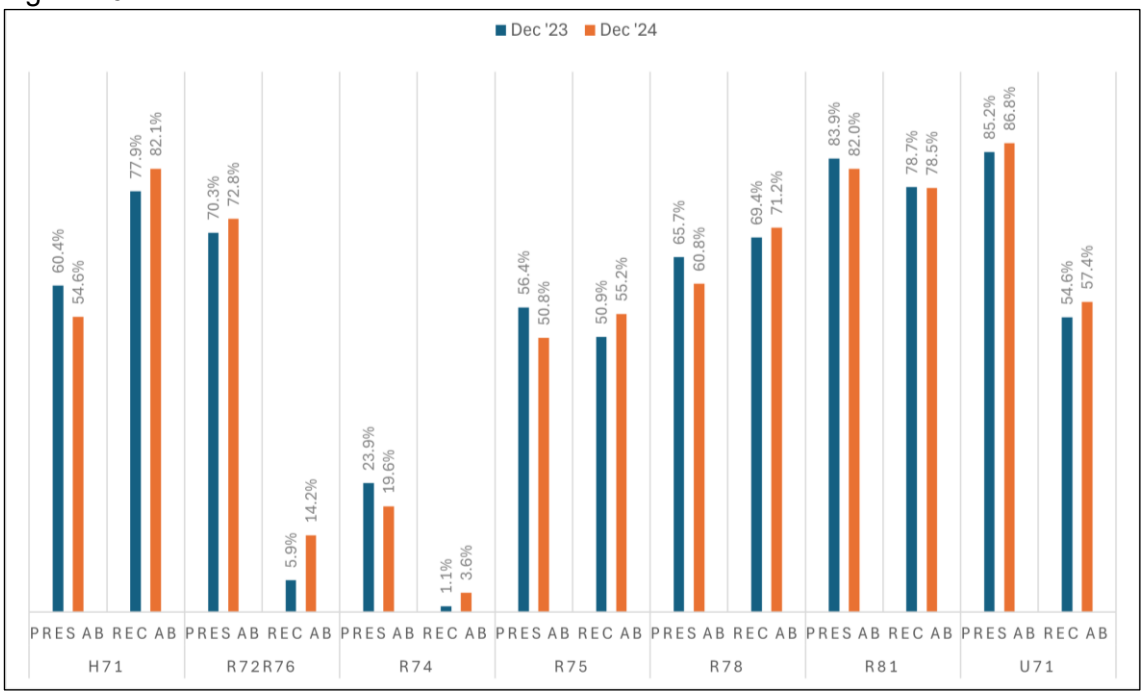
Figure 15: Prevalence of diseases (ICPC-codes) for Walloon region.



Legend:
Prevalence: total number of patients with at least one coded registration of a diagnosis ICPC-coded H71, R74, R75, R72/R76, R81 en U71 in a period of three months by the GPs participating in the antibiotic barometer divided by the total number of registered patient contacts in those participating practices in a period of three months in 2023 and 2024, respectively.

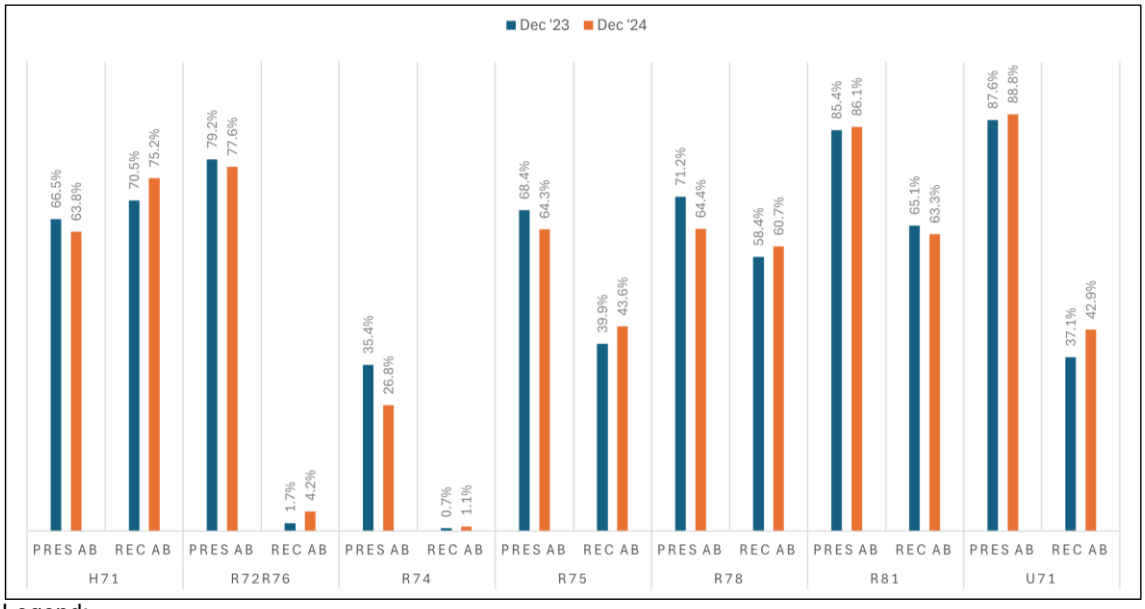
Figures 16 and 17 present the prescribed and recommended antibiotics for the 6 respiratory tract infections targeted within this implementation project (see above for ICPC-codes) and for U71 (urinary tract infections) for Flanders and Wallonia based on the data collected for the antibiotic barometer.

Figure 16: Prescribed and recommended antibiotic in Flanders.



Legend:
PRES AB: Percentage of prescribed antibiotics for patients with a specific ICPC-code.
REC AB: Percentage of recommended antibiotic prescribed for patients with a specific ICPC-code within the population of patients who are prescribed an antibiotic.

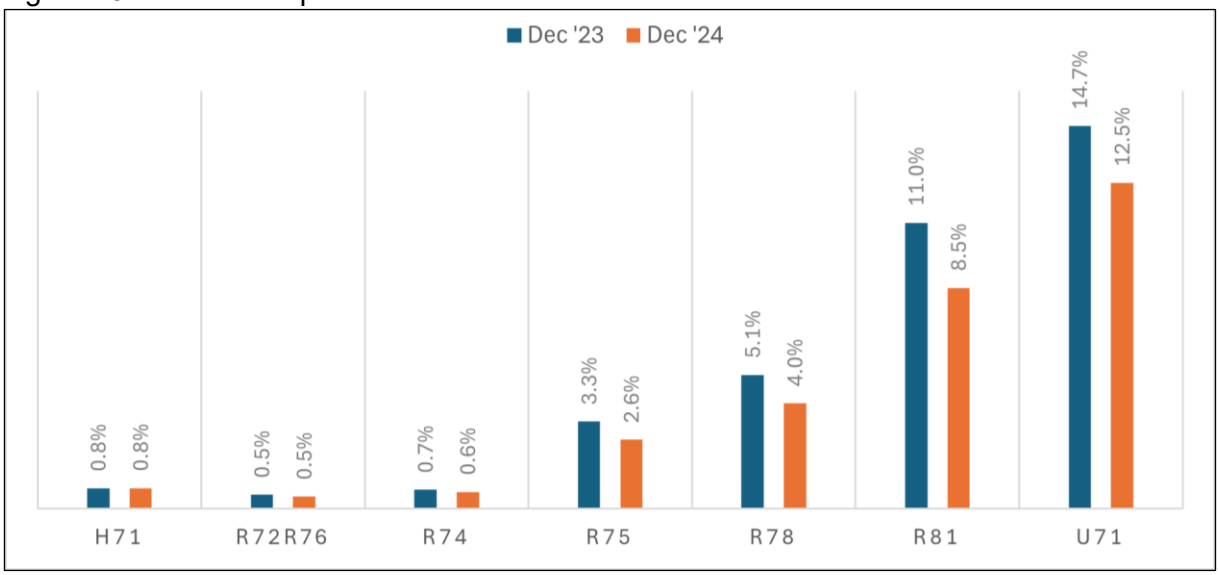
Figure 17: Prescribed and recommended antibiotic in Walloon region.



Legend:
PRES AB: Percentage of prescribed antibiotics for patients with a specific ICPC-code.
REC AB: Percentage of recommended antibiotic prescribed for patients with a specific ICPC-code within the population of patients who are prescribed an antibiotic.

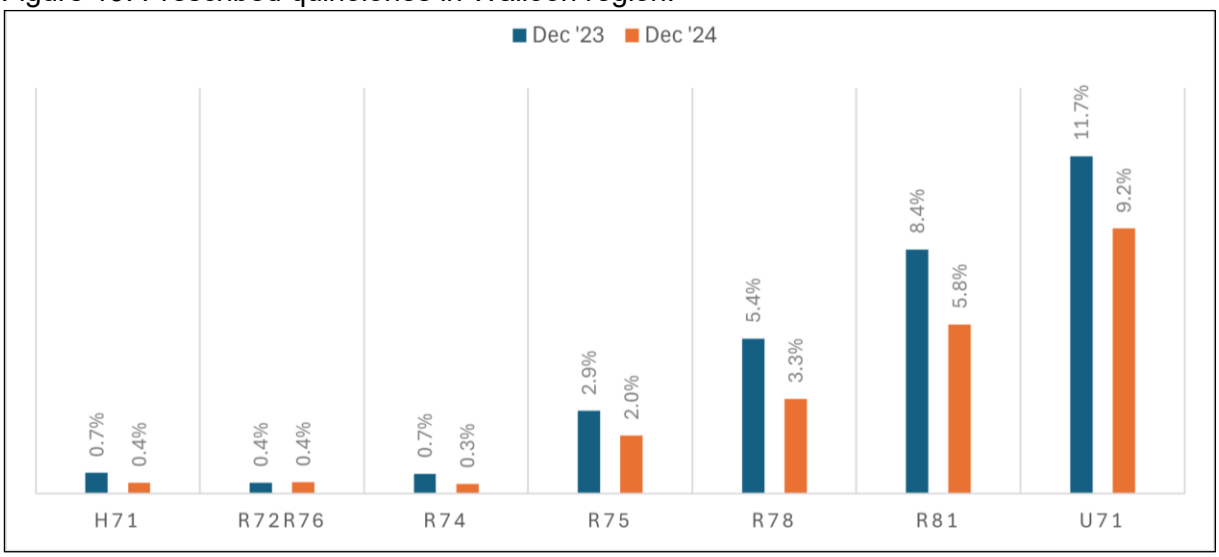
Figures 18 and 19 present the proportion of quinolones prescribed if an antibiotic was prescribed for each of the 6 respiratory tract infections targeted within this implementation project (see above for ICPC-codes) and for U71 (urinary tract infections) for Flanders and Wallonia based on the data collected for the antibiotic barometer.

Figure 18: Prescribed quinolones in Flanders.



Legend:
Percentage of quinolone prescribed for patients with a specific ICPC-code.

Figure 19: Prescribed quinolones in Walloon region.



Legend:
Percentage of quinolone prescribed for patients with a specific ICPC-code.

4.1.3 General results of user-survey for antibiotic barometer

The goal of the antibiotic barometer is to motivate, stimulate and support appropriate antibiotic prescribing by GPs. KU Leuven developed an online user-survey to collect quantitative and qualitative feedback from GPs that have hands-on experience with the antibiotic barometer.[22] This survey was distributed to all GPs registered for the antibiotic barometer (in Flanders, Brussels and Wallonia) and not only to GPs participating in this implementation project. To date, 58 GPs in Flanders completed this survey and the results will be used for further optimalization of the antibiotic barometer.

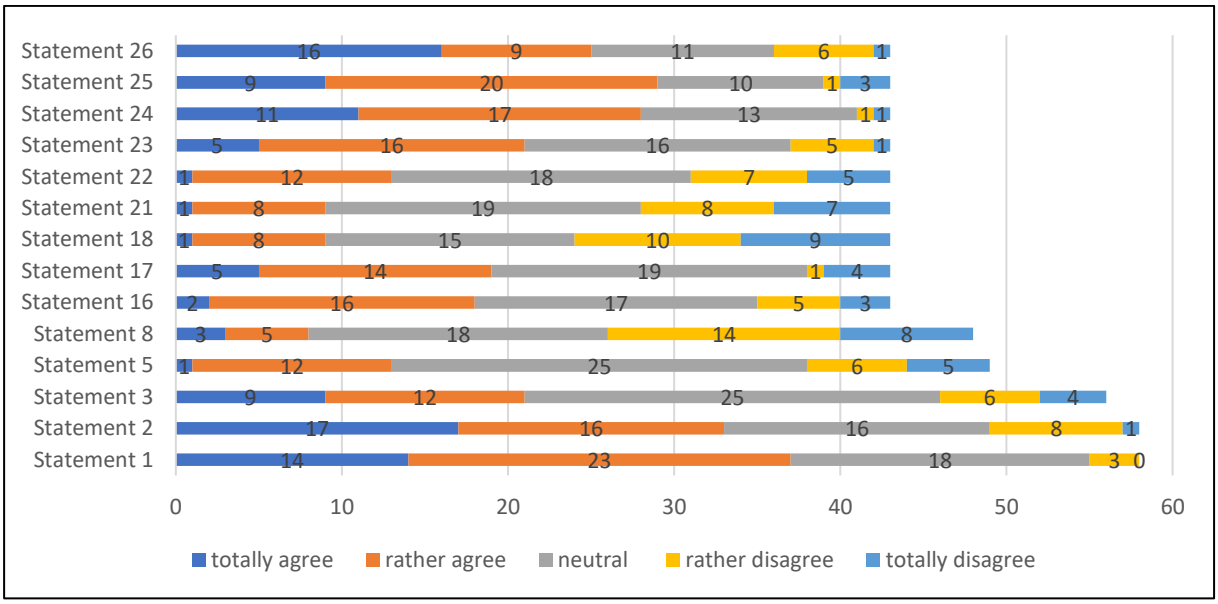
4.1.3.1 Quantitative analysis of user-survey for antibiotic barometer

The online user-survey of KU Leuven consisted of 14 statements for which participants can indicate their level of agreement. In addition this survey contains 14 questions. There are 10 questions that focus on the degree of satisfaction, two were of the binary type (yes/no) and two were multiple choice. The results of the 58 respondents are presented in figures 20 – 25.

In Figure 20 results of following statements are presented (agreement):

Statement	
1	The purpose of the antibiotic barometer is clear to me.
2	I find the purpose of the antibiotic barometer relevant to the work I do today.
3	I find that using the antibiotic barometer has a positive effect on my current way of working.
5	I believe that the collected data and results are a true representation of my practice.
8	I find participating in the antibiotic barometer (data collection) time-consuming.
16	I find the feedback given relevant for achieving better follow-up of my patients.
17	I find it useful that the current results are shown in relation to the previous determination (longitudinal display of the results).
18	I find the way a feedback report can be viewed user-friendly.
21	I find the effort I have to put into reviewing the feedback negligible.
22	I am pleased with the amount of feedback given.
23	The feedback should include written advice that aims to improve my results and is easy to implement.
24	If I received the feedback directly in my EMR (push system), I would use it more frequently.
25	The feedback provided can support me in improving the follow-up of patients in my practice.
26	A discussion with other GPs about the feedback received seems to me to be a useful addition to change my medical practice.

Figure 20: Quantitative analysis concerning the level of agreement of participants with barometer statements.

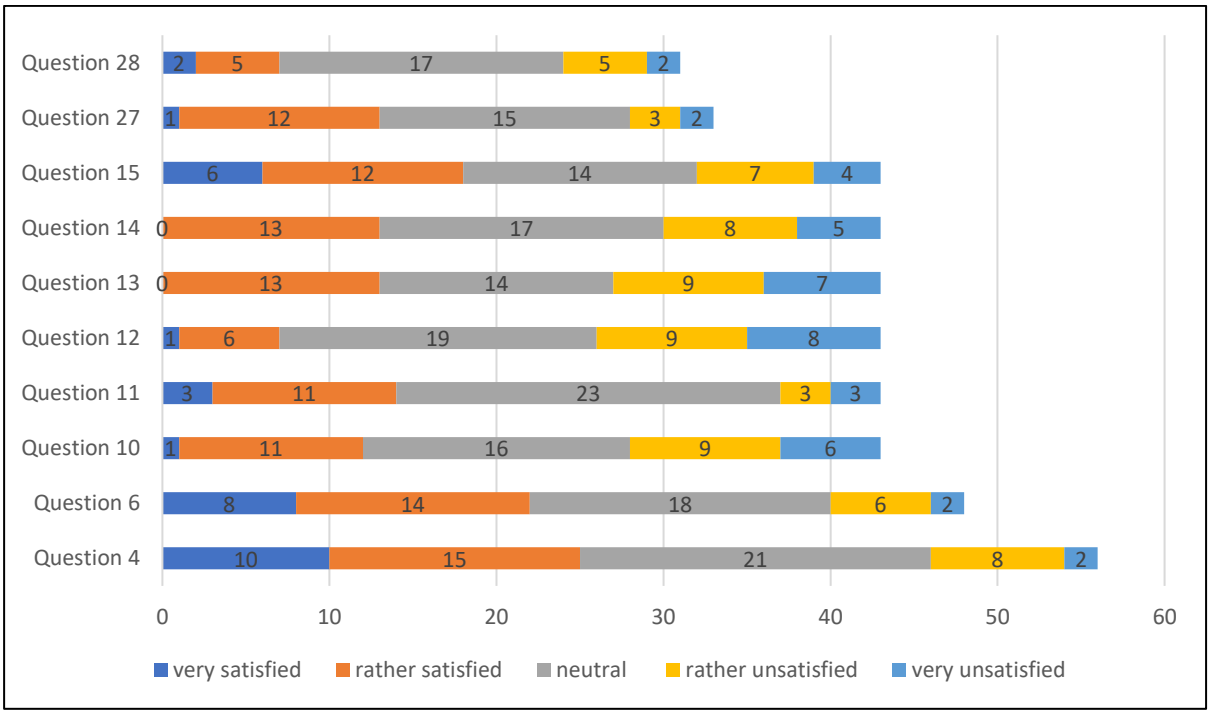


Legend:
The numbers indicated in the bars represent the absolute number of participants. In total 58 participants completed the survey, not all of them responded to all statements.

In Figure 21 results of following questions are presented (satisfaction):

Question	
4	How satisfied are you with the way the data was collected (automated data collection)?
6	How satisfied are you with the frequency (once every 3 months) with which data is retrieved?
10	Overall, how satisfied are you with the way feedback is given?
11	How satisfied are you with the frequency with which feedback is provided?
12	How satisfied are you with getting feedback per practice, as opposed to getting feedback per individual care provider?
13	How satisfied are you with the way the practice results are presented through graphs and tables?
14	How satisfied are you with the content of the feedback?
15	How satisfied are you with the possibility to compare the results of the practice with those of others (province/primary care zone/...) and with the number of levels with which comparison can be made? (benchmarking)
27	How satisfied are you with the support provided when using the antibiotic barometer and receiving feedback (webinar)?
28	How satisfied are you with the way questions and problems were resolved regarding the barometer?

Figure 21: Quantitative analysis concerning the degree of satisfaction of participants with the use barometer.



Legend:
The numbers indicated in the bars represent the absolute number of participants. In total 58 participants completed the survey, not all of them responded to all statements.

Figure 22: Results of binary question 19 (Have you set up a quality improvement project in your practice based on the feedback provided?).

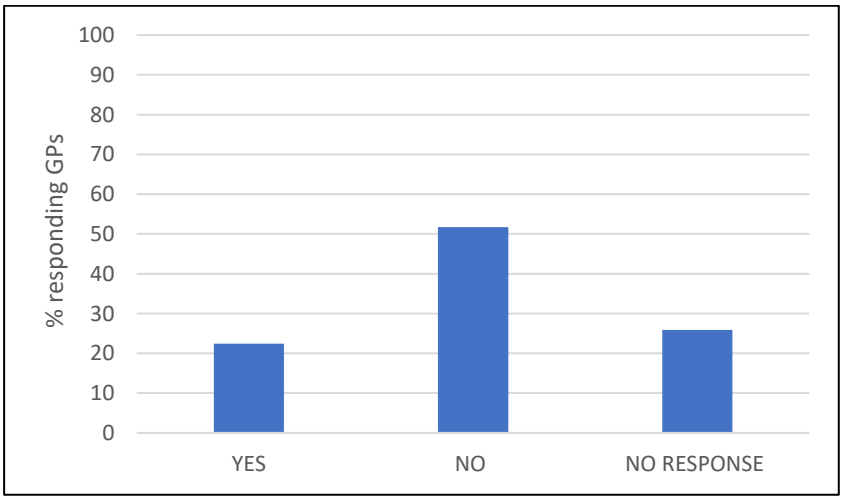


Figure 23: Results of binary question 20 (Are you planning to set up a quality improvement project in the future?).

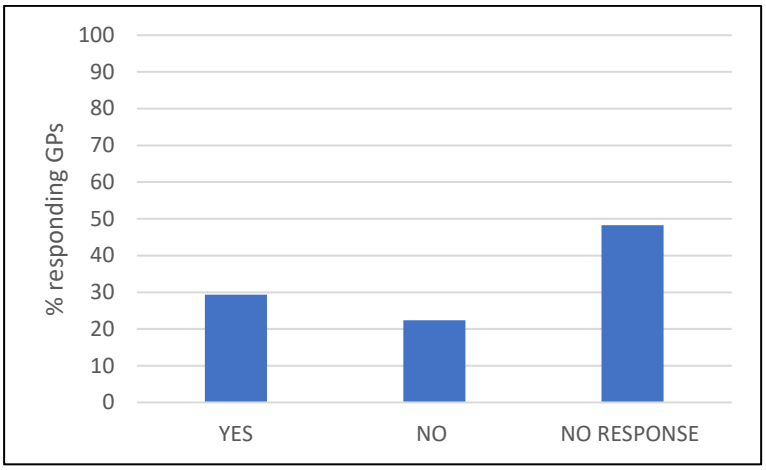


Figure 24: Results of multiple choice question 7 (How often would you like to participate in the antibiotic barometer?).

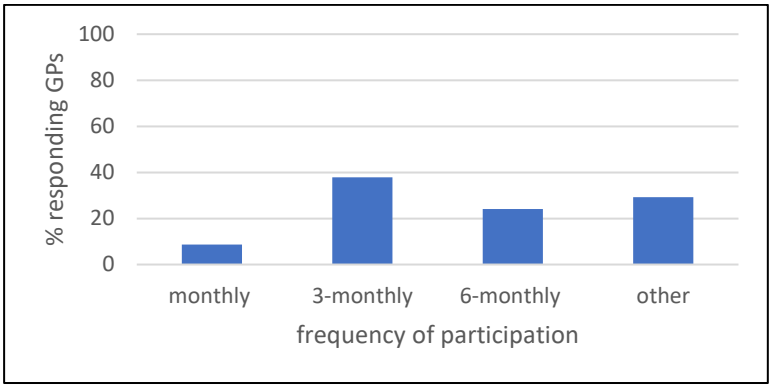
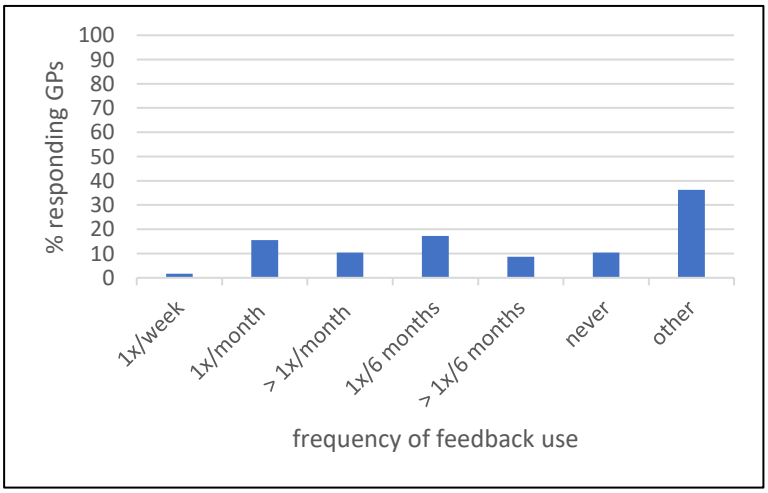


Figure 25: Results of multiple choice question 9 (How frequently did you use the feedback?).



4.1.3.2 Qualitative analysis of user-survey for antibiotic barometer

In this section the summary of the results of the qualitative input collected for 5 of the questions included in the online user-survey of KU Leuven are described.

Question: How satisfied are you with getting feedback per practice, as opposed to getting feedback per individual care provider?

How could we improve the way of data collection:

- Automatic data collection (no need to fill in things anymore)
- Bring magistral medication
- Delayed prescriptions
- Solution for incorrectly coded diagnoses
- Individual data instead of per practice (2)
- Documentation (3)
- Problems with Healthstat (3)

Question: Why did you never used the feedback?

- No time
- No interest

Question: What do you think could be improved (feedback/benchmark)?

- Screen jumps
- Too complicated (5)
- Individual feedback (4)
- More documentation (2)
- Practical training for GPs
- Overview of antibiotic stewardship
- Healthstat issues (3)
- Loads too slowly

Question 22: Why did you/didn't you set up a quality improvement project?

- Interest (2)
- Patient awareness
- Data incorrect
- Too early (2)
- Active as local champion
- Because we always want to deliver good care (3)
- To see positive evolution
- Feedback not available (4)
- We already score well (3)
- Colleagues don't want to
- Lack of time

Question 23: What do you think could be improved (feedback)

- Differences are magnified in small percentages
- Pheneticillin not as first choice, Broxil® reimbursement (learned from barometer)
- Personal contact
- Report directly in EMR

- Interpretation of results and giving advice
- Communication (2)
- Documentation
- Too much administration required

4.1.4 Conclusion

Results of antibiotic barometer discussed in this section represent the general results of the use of antibiotic barometer and the Healtstat feedback reports. These are aggregated results of all users of antibiotic barometer in Belgium and not only the results of GPs that are involved in this implementation project. The same is applicable for the results of the user-survey. This means that it is not possible to link these results directly to this implementation project.
However, these results can (partially) reflect the experiences of the GPs involved in this project and there is some overlap of these results and the results of the process evaluation for the use of barometer.

These data show an increase in the use over antibiotic barometer over time and a positive evolution for antibiotic prescribing behaviour:

- The total number of antibiotic prescriptions is slightly reduced for specific infections
- The number of first choice antibiotic prescriptions is slightly increased for specific infections

There is still room for improvement, which supports the continuation and scaling-up of this implementation project.

Problems with Healthstat, aggregation level of barometer and user-friendliness are the main conclusions of the results of the user-survey in context of this implementation project. In addition this survey confirms that the 3-monthly frequency of data-collection is in alignment with the needs from daily practice and that 1/3 GPs are willing to start a process of quality improvement for antibiotic prescribing behaviour based on the results of this antibiotic barometer.

4.2 Digital toolkit (WP5)

A digital toolkit was developed was developed as a tool that can be used for the implementation strategy in this implementation project. This toolkit aims to provide both an overview of the main determinants that hinder appropriate antibiotic prescribing behaviour (COM-B and TDF) and a number of link proven effective interventions to overcoming these determinants for appropriate antibiotic prescribing behaviour and could be used during the intervisions.

The four determinants that are discussed in this toolkit are:

- Knowledge
- Communication skills
- Diagnostic uncertainty
- Patient expectations and education

For each determinant proven effective interventions are integrated in this toolkit (Table 15).

Table 15: Overview of determinants and interventions of digital toolkit.

Determinant	Intervention
Knowledge	Guidelines, literature, e-learnings, decision aid
Communication skills	TRACE and GRACE-INTRO e-learning and summary with communication tips, consultation skills
Diagnostic uncertainty	Decision aid, safety netting, information about point-of-care test
Patient expectations and education	Patient leaflets discussing expectations, self-care advice, safety netting and awareness of AMR

TRACE and GRACE-INTRO "Safely less antibiotics" are two e-learnings that address different determinants at the same time (knowledge, communication skills, and diagnostic uncertainty of the treating physician and patient expectations and education). That is why these two e-learnings were considered the basic intervention in optimizing antibiotic prescribing behaviour. After all, they demonstrate that using fewer antibiotics can be done safely and address different determinants. The GRACE-INTRO e-learning was updated for this implementation project.

That is why all local champions were asked to complete these two e-learnings at the start of the implementation process. The other participating GPs were asked to follow TRACE at the start of the implementation process. In addition, GRACE-INTRO was strongly recommended.

In addition, the digital toolkit contains the support material that was available for local champions (presentations of training, support material for the intervisions and the use of the antibiotic barometer).

This toolkit was intended to be used during intervisions to support the local champions and participating GPs to carry out this implementation project tailored to the needs and goals of GP-practices and individual GPs. The digital toolkit can help with the selection of an intervention for implementation in daily practice addressing the determinant that hinders appropriate antibiotic prescribing behaviour.

This toolkit is available in Dutch and French and there are little content differences in accordance tot the regional context (for example: knowledge clip presented by Dr. Jan Verbakel for Flanders and Dr. Saphia Mokrane for Brussels/Wallonia).

Table 16 presents data on the use of the Dutch and French version of the toolkit. Due to privacy rules, we could not guarantee that all users were participants within this implementation project from the start of the availability of the toolkit (development started 1/5/2023) until 10/03/2025.

Table 16: Use of digital toolkit (Dutch/French version).

	Dutch version of toolkit	French version of toolkit
Number of views	2255	1823
Number of “active” users (number of people who engaged with the digital toolkit)	677	614
Average engagement duration per active user	152 seconds (2’32’’)	121 seconds (2’01’’)
Number of “events” (an action performed by a user visiting the digital toolkit, e.g. clicking a link, scrolling down)	8353	6951

ATTACHMENT

- WP5: Download of Dutch version of the digital toolkit (lokaal antibioticastewardship luchtweginfecties)
- WP5: Download of French version of the digital toolkit (gestion locale des antibiotiques pour les infections des voies respiratoires)

4.3 Action plan

To support and facilitate the change in prescribing behaviour as much as possible, a template to set-up an action plan was developed by which participating GPs could formulate clear goals and according action steps to reach that goal.

At the start of the project a template of an extended version of the action plan was available. In response to feedback from local champions during the first support sessions, a template of a compact version of the action plan was developed that was more practice-oriented.

The extended version of the action plan consists of:

- following tips and trics to set-up an action plan:
    - Concretizing goals
    - Coping plan
    - Monitoring of behaviour goal
    - Provide cues and reminders
- Different tips and trics for the intermediate evaluation of
    - Preparation of the action plan
    - Goals
    - Coping
    - Monitoring
    - Feedback from colleagues

The compact version of the action plan consists of three following steps:

- Formulate a target goal on topic of antibiotics
- Formulate a behaviour goal to reach the target
- Monitoring the implementation of the action plan

5. Implementation strategy (WP3)

This section describes the characteristics of the implementation strategy of this implementation project, the intervisions of local champions with GPs.

In addition an overview of the available support material for local champions that is developed and provided via the toolkit is described.

The organization of intervisions by a local champion with a group of GPs is the main implementation strategy in this implementation project. The tools that can be used during these intervisions to support the appropriate antibiotic prescribing behaviour are: the antibiotic barometer, the digital toolkit and the action plan.

Over the course of one year, with an average of one intervision every three months, a group of GPs, supported by a local champion, engaged in different implementation cycles.
Each intervision consisted of the following steps:

1. **Discuss** the antibiotic prescribing **behaviour** (based on antibiotic barometer, case, guideline, observations/results from action plan and/or …);
2. **Identify determinants/barriers** that hinder appropriate prescribing behaviour, discuss motivation to change inappropriate behaviour and select possible interventions to overcome the determinant/barrier addressing the determinant(s) and the local context and needs;
3. **Formulate a clear behaviour goal** for change in behaviour and select an **intervention** that can help to overcome the determinant/barrier;
4. Look for and formulate concrete actions (**develop an action plan**) that can help to implement the intervention and realize the behaviour goal in a sustainable way with permanent attention for appropriate antibiotic prescribing behaviour.
   At the start of the project a template of an extended version of the action plan was available. In response to feedback from local champions during the first support sessions, a template of a compact version of the action plan was developed that was more practice-oriented.

For participation to these intervisions double accreditation points were provided.

After each intervision, the local champion was asked to complete a post-intervision survey via which the following information was collected:

- Format of the intervision (live, online)
- Duration of the intervision (< 1h; 1,5h; 2h; > 2h)
- Number of participating GPs
- Total number of GPs that belong to the intervision group
- Open question for remarks or questions

For intervision 3 and 4, the following additional information was collected:

- What was used as starting material for the intervision (antibiotica barometer, case, statement, guideline and/or experience with action plan or other starting point)
- Was the action plan template (short of extended version) used during the intervision
- Was the antibiotic barometer used (as a starting point) during the intervision

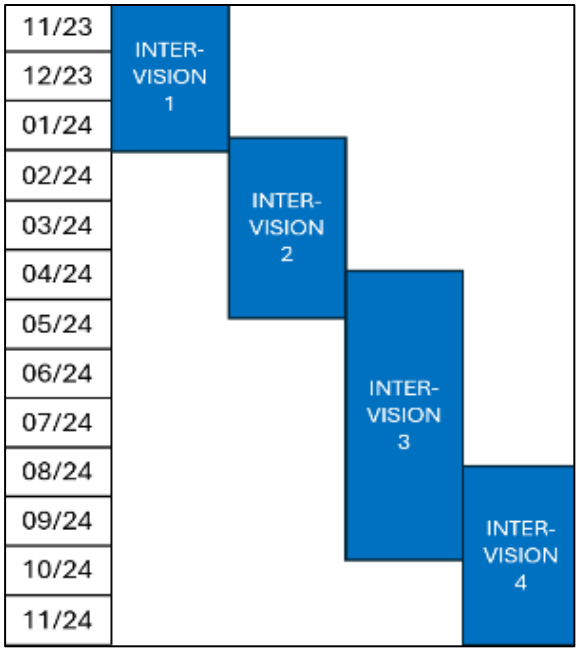
5.1 Characteristics of intervisions

5.1.1 Period in which the intervisions were scheduled

The implementation phase started in October 2023 and took place over a period of 1 year, until September 2024. Within this period, each local champion was asked to organize four intervisions (average of one intervision every three months). The time schedule of the automated data-collection of the antibiotic barometer was used as a guideline to align the planning of the intervisions. In this way, the new Healthstat feedback report that was available every three months could be discussed during the next intervision. Table 17 gives an overview of the periods in which the different intervisions were organized by local champions.

Table 17: Overview of timeline of different intervisions by local champions with GPs (based on registration for accreditation).

Intervision	Period in which the intervision was carried out by local champion
1	14/11/2023 – 30/01/2024
2	23/01/2024 – 08/05/2024
3	12/04/2024 – 02/10/2024
4	08/08/2024 – 14/11/2024



Because there was a delay in the availability of Healthstat feedback reports based on the data-collection of 21/3/2024, local champions were given the choice to organize the intervision without the availability of Healthstat feedback reports or to wait until they were available (May 2024).

5.1.2 Composition of intervision groups

Both the number of participating GPs and the number of participating GP-practices within one intervision varied. In some intervision groups, all GPs are linked to the same GP-practice, while other intervision groups are composed of different GPs linked to different GP-practices. For some intervision groups all GPs linked to the same GP-practice are participating. This makes direct feedback to colleagues possible. For other intervision groups not all GPs of a group GP-practice are participating, which has the consequence that less direct feedback to prescribers is possible.

There was also large variation in the total number of GPs that are member of an intervision group. All local champions were stimulated to recruit at least 6 GPs to participate to the intervision group. Nevertheless, the smallest group was composed of 4 GPs. The largest intervision group was composed of 16 GPs. The project group decided, after consultation with and approval of the advisory committee, that no minimum number of GPs that are member of an intervention group was required for a local champion to organize an intervision and participate in this project. Consequently, both small and large intervision groups were included in this implementation project and each group size had each own challenges and success factors to deal with. The project group is convinced that lessons can be learned from these different experiences by local champions.
Due to privacy rules, we can not present the heterogeneity of the intervision groups in a quantitative way.

5.1.3 Participation of GPs to intervisions

Figures 26 - 27 (Flanders - Brussels/Wallonia) present for each local champion the total number of participating GPs for intervisions 1, 2, 3 and 4. Data analysis is based on input from the registration for accreditation, not on data from the post-intervision survey completed by local champions after each intervision. This is the most conservative way to present these results, because not all participating GPs have registered themselves for accreditation (see Figure 28 and 29).

Figure 26: Number of participating GPs per local champions in Flanders for intervisions 1, 2, 3 and 4.

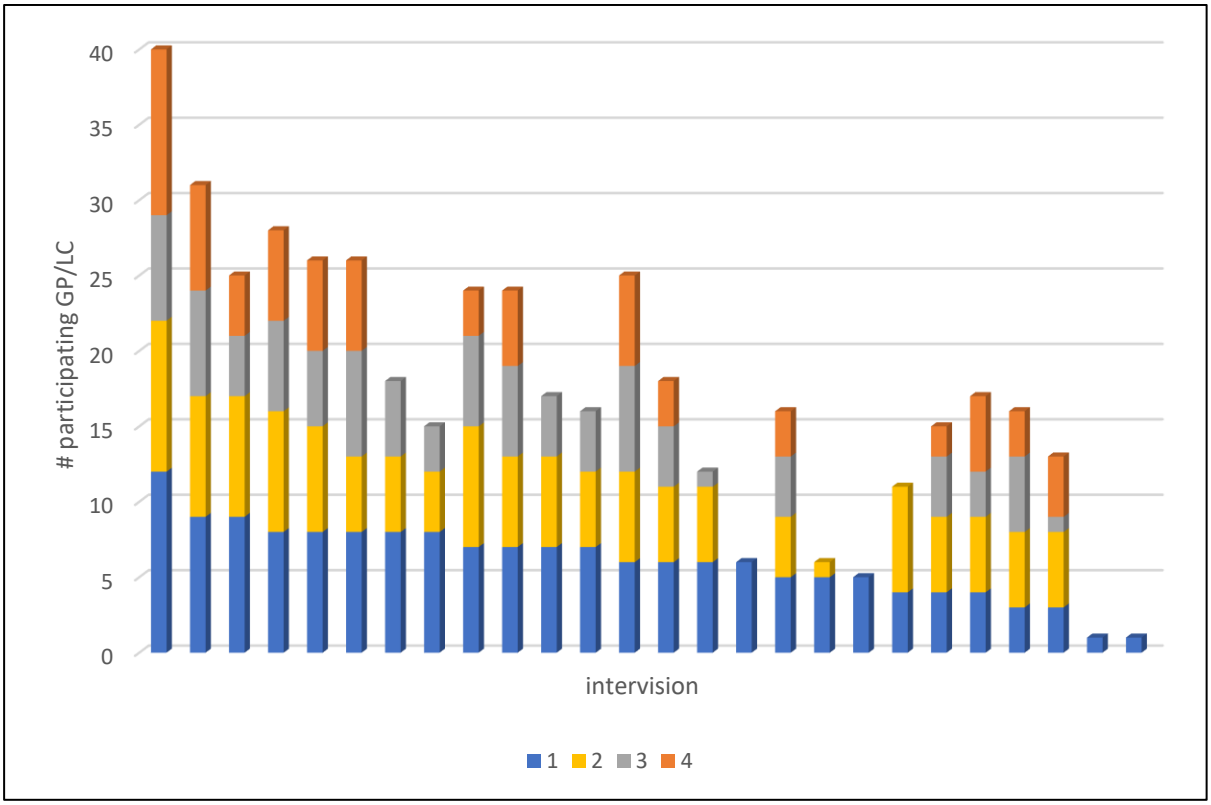
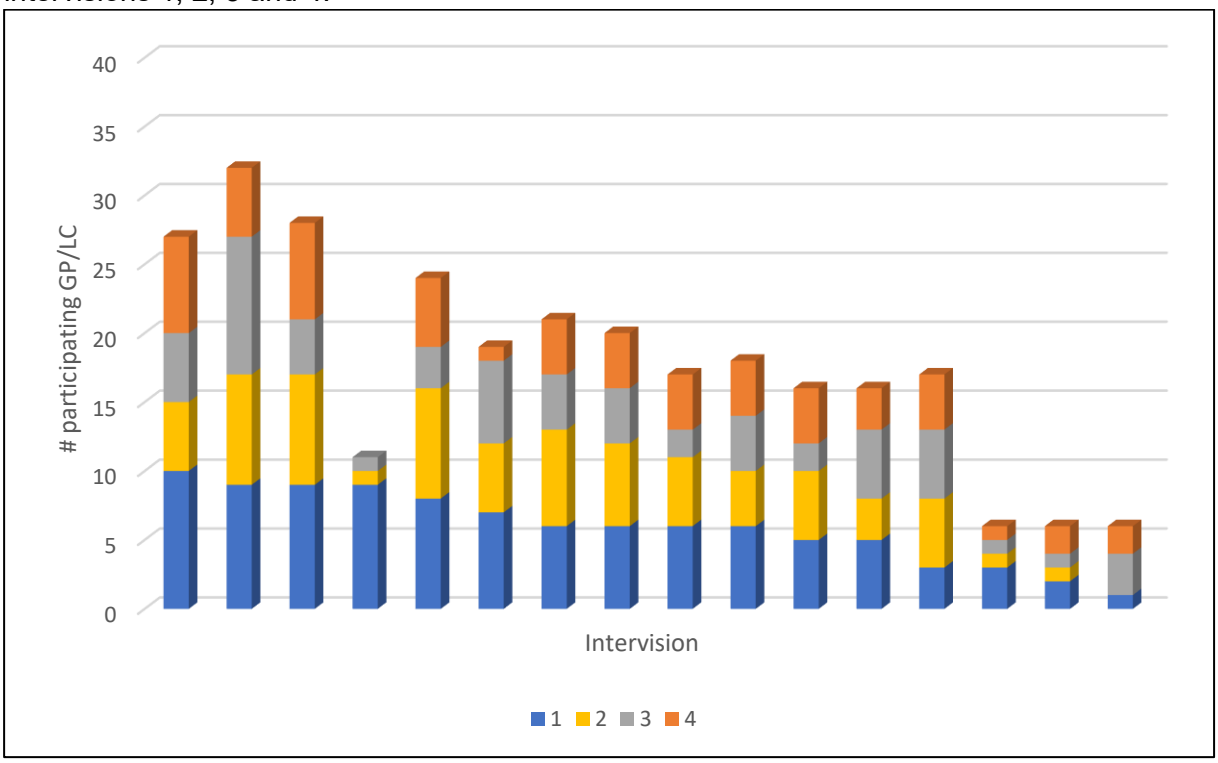


Figure 27: Number of participating GPs per local champions in Brussels/Wallonia for intervisions 1, 2, 3 and 4.



Figures 28 (Flanders) and 29 (Brussels/Wallonia) present the median number of participating GPs (Y-axis) for each intervision (X-axis) based on data from the registration for accreditation and the input from the post-intervision survey completed by the local champions. The mean numbers of total participating GPs for Flanders and Brussels/Wallonia based on the post-intervision survey, are 10 and 9, respectively.

Figure 28: Median number of participating GPs per local champion in Flanders for intervisions 1, 2, 3 and 4.

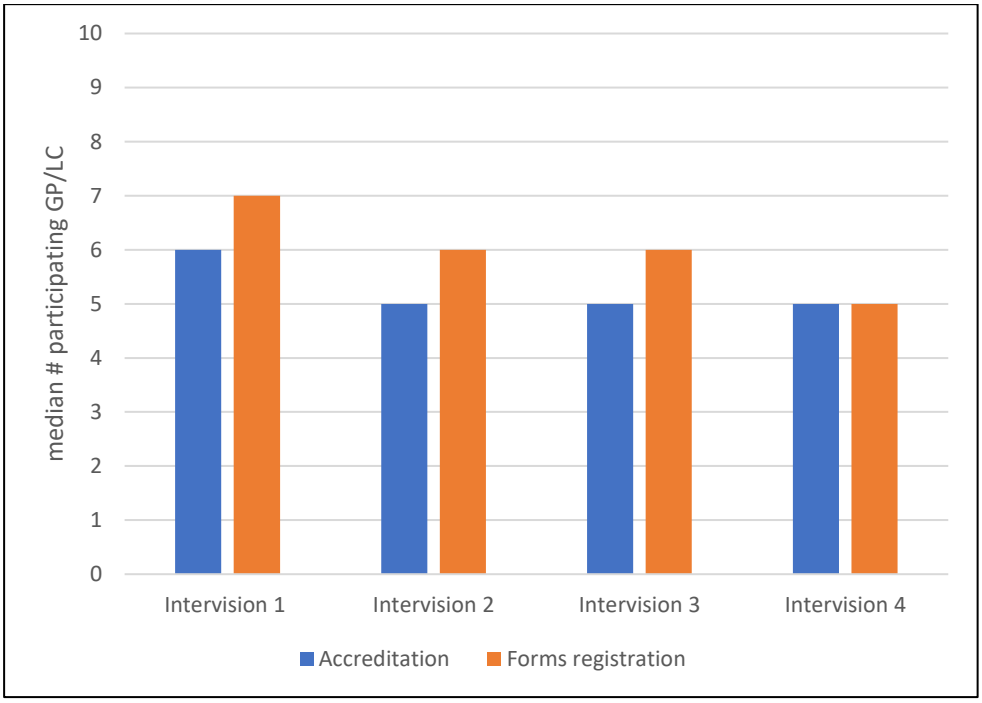
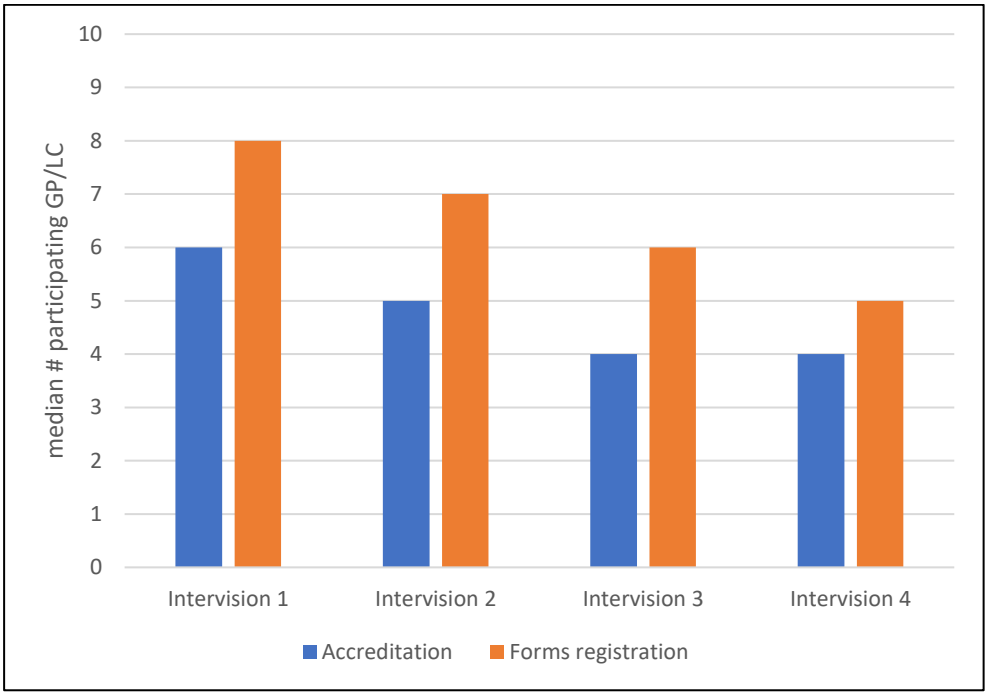


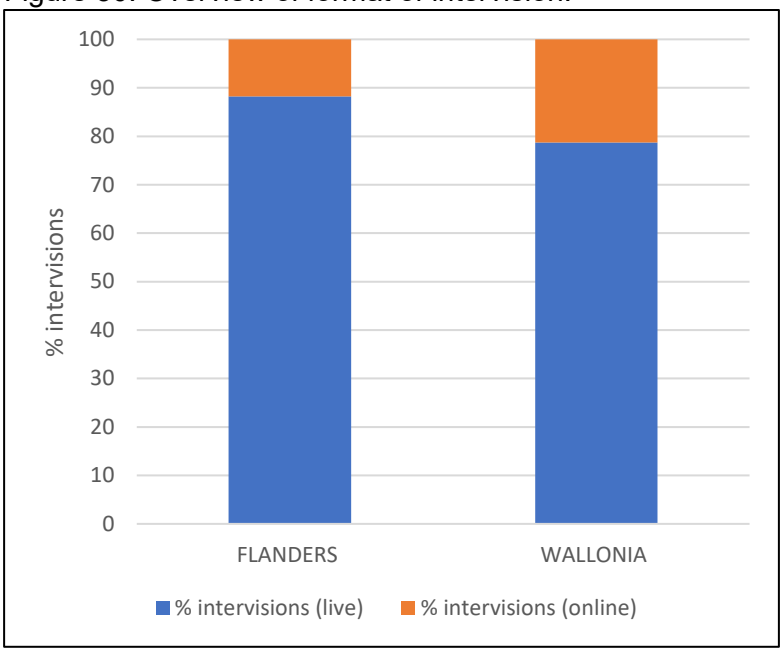
Figure 29: Median number of participating GPs per local champion in Brussels/Wallonia for intervisions 1, 2, 3 and 4.



5.1.4 Format of intervisions

For Flanders and Brussels/Wallonia, 88% and 78% of the intervisions was organized live, respectively. The minority of intervisions was organized via an online format (Figure 30).

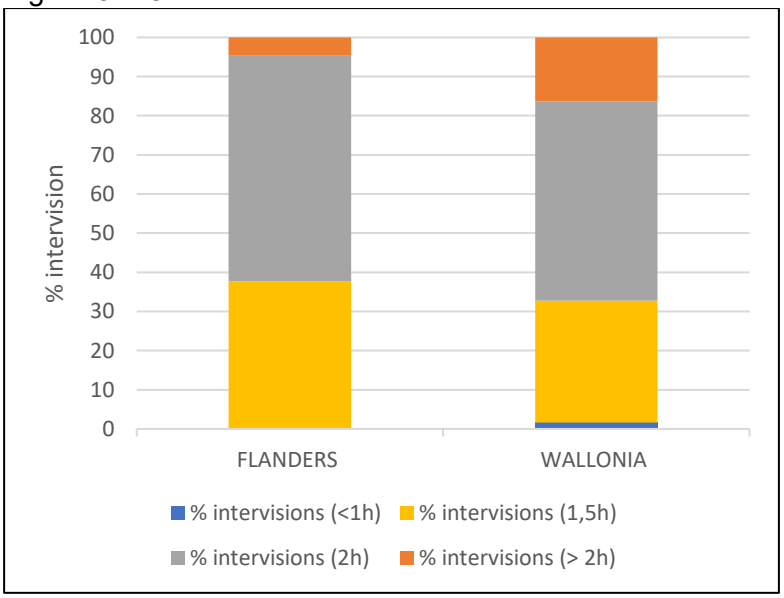
Figure 30: Overview of format of intervision.



5.1.5 Duration of intervisions

Both for Flanders and Brussels/Wallonia, the duration of the majority of the intervisions was 2 hours or more. Only a few local champions active in Brussels/Wallonia indicated a duration of an intervision less than 1 hour (Figure 31).

Figure 31: Overview of duration of intervision.



5.1.6 Starting point used for intervision 3 and 4

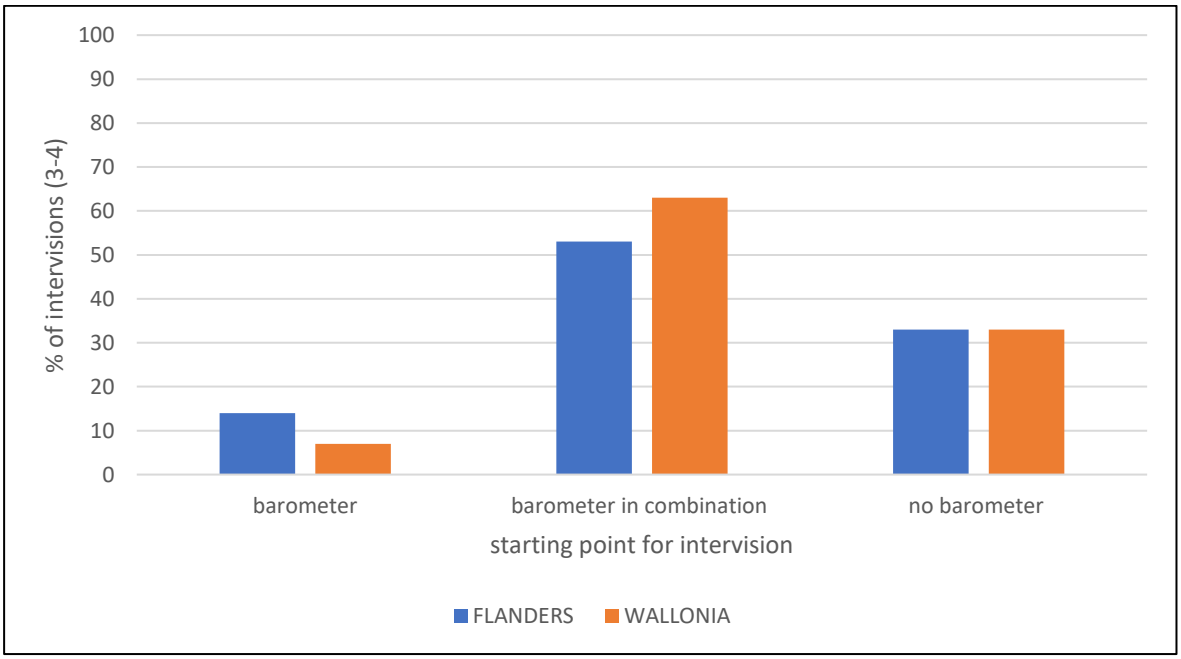
Materials that were used as a starting point during the intervisions to identify determinants/barriers are:

- Feedback results of antibiotic barometer
- A selected statement from the presentation developed to support the interpretation of barometer
- A case
- A patient leaflet
- A guideline
- An experience/observation with action plan
- Other materials

During the third and fourth intervision (both in Flanders and Brussels/Wallonia), as mentioned by local champions via the post-intervision survey:

- Few local champions used the feedback reports of the antibiotic barometer as the only starting point for the intervision (14% in Flanders, 7% in Brussels/Wallonia) (Figure 32).
- Half or more of local champions used the feedback reports of antibiotic barometer in combination with another option as starting material (case, experience, guideline, …) (53% in Flanders, 63% in Brussels/Wallonia) (Figure 32).
- A third of the local champions did not use the antibiotic barometer as starting point for the intervision, but used a statement, case, patient leaflet, guideline or experience/observation with the action plan (33% in Flanders, 33% in Brussels/Wallonia) (Figure 32).

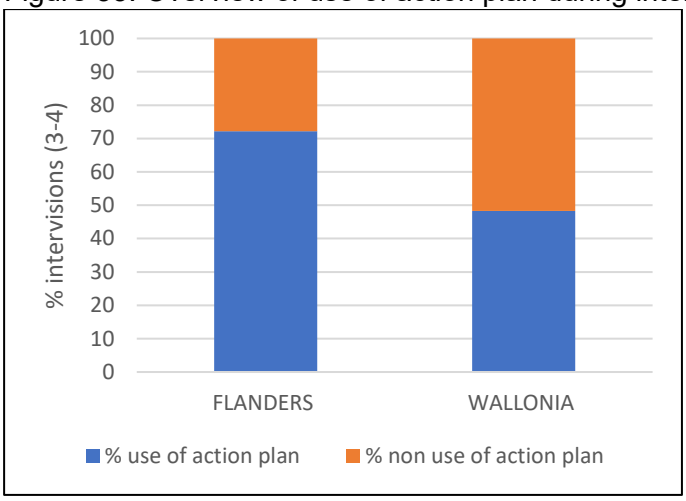
Figure 32: Starting material for intervision 3 and 4.



5.1.7 Use of action plan during intervision 3 and 4

For Flanders and Brussels/Wallonia, 72% and 48% of local champions mentioned via the post-intervision survey that they have used the action plan during the third and fourth intervision, respectively (Figure 33).

Figure 33: Overview of use of action plan during intervision.



In Flanders, more often an action plan was developed during the third and fourth intervision, in comparison to Brussels/Wallonia. A possible explanation could be that the action plan was a major discussion point during the second support session in Flanders.

5.2 Support material for local champions for intervisions

To support local champions to organize and moderate the intervisions, the following support materials were developed and provided to local champions via the digital toolkit.

ATTACHMENT

- WP3: overview of interventions (adapted version)
- WP3 (general support material for intervision): road map
- WP3 (general support material for intervision): implementation plan for each intervision
- WP3 (preparation of intervision): template mail for invitation of GPs
- WP3 (preparation of intervision): template mail reminder for GPs
- WP3 (preparation of intervision): one-pager with tips and tricks (for intervision 3 and 4)
- WP3 (preparation of intervision): guidance for intervisions
- WP3 (preparation of intervision): leaflet with overview of implementation project
- WP3 (preparation of intervision): how to give feedback (Pendleton)
- WP3 (support material during intervision): presentation for intervision 1, 2, 3, 4
- WP3 (support material during intervision): overview of methods and structure for intervision

- WP3 (support material during intervision): template of extended version of action plan
- WP3 (support material during intervision): template of compact version of action plan
- WP4: Template for the overview of APQI
- WP3 (support material after intervision): document for financial compensation of local champion

6. Process evaluation

The process evaluation aimed to identify and explain the key factors that supported and hindered the project's implementation strategy of intervisions with local champions. The process evaluation captures various levels of the project, including:

- Project level:
  the overall implementation of the project
- Intervisions with local champions:
  the development and execution of the intervisions including recruitment, training and support sessions and the tools that can be used during the intervision to support improving antibiotic prescribing behaviour such as the antibiotic barometer, digital toolkit and action plan
- GPs and their use of tools to support improvement in their antibiotic prescribing behaviour

By assessing the factors across these levels, this evaluation provides a better understanding of how to better implement intervisions with local champions and use complex tools to change antibiotic prescribing behaviour, paving the way for potential scale-up and long-term sustainability.

Here, we present our key findings drawn from the analyses outlined in Table 6 (NPT-analysis, SWOT-analysis and additional methods).

Complete results from the studies can be found in the extended reports, available as attachment.

ATTACHMENT

- WP6: report on the SWOT-analysis (provided by team ULB)
- WP6: report on NPT-analysis of focus groups (local champions) (provided by team UAntwerp)
- WP6: report on NPT-analysis of questionnaires (GPs) (provided by team ULiège)
- WP6: report on NPT-analysis of individual interviews (GPs) (provided by team UAntwerp and team ULiège)

6.1 Summary of key findings

6.1.1 Level of the project (SWOT)

Using a SWOT-analysis, we describe project level elements, such as collaboration, challenges during different phases of this implementation project, and stakeholder expectations, that impacted the implementation of the project's aims. A more detailed report of the SWOT-analysis at project level can be found in WP6: report on SWOT-analysis (in attachment).

6.1.1.1 Collaboration and coordination

The implementation of interventions to support antibiotic stewardship in primary care is a complex initiative that has greatly benefited from the collaboration of a consortium comprising general medicine departments from both French- and Dutch-speaking universities, social scientists along with the umbrella association of Dutch-speaking GPs. This project has not only initiated national implementation but has also strengthened existing collaborations between these members of the different institutions. The diverse interdisciplinary expertise of the consortium partners has been instrumental in covering all key aspects of the project, including training, audits, supervision, and evaluation.
Throughout the project, some team members withdrew, occasionally being replaced on a temporary basis. While overall team stability was maintained, these transitions sometimes led to difficulties in ensuring seamless continuity.

Successful coordination led by the coordinator was made possible by the dedication, commitment, active engagement, and constructive approach of all project group members, ensuring effective project monitoring and realization.

6.1.1.2 Regional adaptation and challenges

The adaptation of the project's implementation to the specific contexts of different regions was a time-intensive process, spanning from October 2022 to September 2023. Given the commitment to involving both French- and Dutch-speaking partners, regional specificities were carefully considered. However, the absence of a dedicated French-speaking coordination structure led to significant discrepancies and variations in implementation. Unlike in Flanders, where coordination was more structured, recruitment, communication, and follow-up of local champions in French-speaking regions had to be managed by universities (ULB and ULiège). This resulted in an uneven implementation process. Additionally, disparities in institutional support emerged, as some academic teams did not receive dedicated funding from their own institutions.

Furthermore, the training program was initially developed in Dutch before being translated and presented to French-speaking participants. As a result, adaptations proposed by French-speaking experts were not integrated into the training for Dutch-speaking local champions. Some of these adaptations reflected the unique aspects of French-speaking clinical practice, such as the use of antigenic streptococcal tests and differences in electronic medical records (e.g., a majority of systems in Wallonia differing from CareConnect). Additionally, certain national level discrepancies were observed, such as the absence of WOREL recommendations in the clinical training guidelines in Flanders, which relied primarily on BAPCOC recommendations.
In future implementation projects, it is essential to allocate a more realistic amount of work time for academic centres to effectively manage the complexities of multilingualism. While language adaptation has often been approached primarily through document translation, it is crucial to also consider socio-cultural factors.

The language barrier added to the workload and presented challenges in communication between partners. To bridge gaps in national language proficiency, English was used for meetings and written communication within the project group. However, varying levels of fluency in spoken and written English among partners sometimes hindered seamless communication. Meanwhile, Dutch and French remained the primary languages for engagement with local champions and GPs.

6.1.1.3 Content challenges and stakeholder expectations

This complex project benefited from the involvement of a multidisciplinary working group composed of content experts, with each partner contributing to the quality assurance of various project components. Tasks were distributed into work packages, and while this structure facilitated collaboration, working together within the constrained timeframe sometimes presented challenges. Coordinating across different work packages and aligning agendas was not always easy, requiring ongoing adjustments and flexibility.

Additionally, to enhance implementation, certain methodological adjustments were made during the project, such as modifications to the recruitment process for general practitioners, the approach to intervisions versus coaching, and refinements to the objectives and target audience of the toolkit.

The project sometimes had to deal with issues beyond the control of the project group, such as difficulties accessing Healthstat, or the publication and communication about the NRKP/CNPQ quality indicators for antibiotics to control prescribing behaviour, which created confusion with the antibiotic barometer, that is meant for quality improvement based on audit- and feedback, not control. This confusion discouraged some participants.

The project group encountered requests and expectations from stakeholders that were unrealistic, not aligned with the project's methodology, and not accounted for in the budget. One example was the demand for data on the effectiveness of the project's implementation in reducing antibiotic consumption. The design of this implementation project is not fit for outcome assessment (effect on antibiotic prescribing) (see section 2.3).
Moving forward, it will be important to set more realistic stakeholder expectations from the outset, ensuring alignment with the project's methodology and timeline, and to allocate resources effectively to address unforeseen demands. This proactive approach will help mitigate potential challenges and ensure smoother project execution.

6.1.1.4 Opportunities and strategic alignment

The project provided a valuable opportunity to intensify collaboration, leading to the establishment of new inter-university partnerships. Given its relevance, the project garnered significant interest and support from BAPCOC, as it aligned with the broader priorities in the fight against antibiotic resistance. Experts were consulted with a view to large-scale implementation, and they felt that their input was valued and taken into consideration.

Additionally, the project highlighted important connections with other initiatives, such as the PSS (Prescription Search support, RIZIV/INAMI), barometers (KU Leuven), NRKP/CNPQ quality indicators (RIZIV/INAMI), and others, fostering a broader network and coordination of efforts in the fight against antibiotic resistance.

6.1.1.5 Funding and time challenges

The lack of capacity—specifically in terms of time, human resources, and funding—significantly jeopardized the consortium and, at times, threatened the project's success. The funding provided was inadequate for all partners involved, limiting their ability to fully contribute their expertise and resources. Unanticipated issues with VAT added additional strain on the project's financial resources. For the local champions a compensation of €500 was provided for each intervision.

The unique characteristics of the three regions involved in the project were not adequately considered in the budgeting and time allocation when the pilot project was initially developed. Key factors such as management, implementation, and software requirements were not sufficiently accounted for. Adapting the project to the context of these different regions proved to be time-consuming, with tasks such as identifying local partners, managing communication (e.g., emails, translations, and adaptations of documents), and reviewing materials (e.g., training and questionnaires) underestimated in the pilot phase. This led to delays, and at times, there was not enough time to complete all stages of the implementation plan under optimal conditions.

Proactively addressing these challenges—by ensuring more realistic budgeting, better time allocation, and anticipating potential financial issues—can help mitigate risks and optimize the efficiency and sustainability of future projects.

6.1.1.6 Conclusion

The involvement of a diverse consortium of partners, each bringing a wide range of expertise, allowed for contributions from multiple perspectives, enriching the project. However, the complexity of working with numerous partners also posed challenges, particularly regarding differing views on responsibilities, project management, evaluation approaches, and task allocation. Additionally, technical issues arose during the project that could have led to the loss of participants, particularly GPs, and the discouragement of some local champions.

The coordination function was critical to the project's success. To maximize its effectiveness, it is essential to allocate sufficient time, resources, and funding. Strengthening this function will contribute to improved project management and streamlined collaboration. However, the lack of adequate budgetary resources and the pressure of tight deadlines were significant obstacles. Some key potential partners, particularly from Wallonia, opted not to participate due to underfunding. This shortage of resources put additional pressure on the consortium and prevented proper French-speaking coordination. As a result, coordination responsibilities were

assumed by the main coordinator (based in the Dutch-speaking region) and the two French-speaking universities which resulted in decentralization. Without dedicated Walloon coordination, the project faced even greater challenges in recruitment and monitoring. A realistic workload planning for academic centres, will be essential to ensuring smoother collaboration and implementation.

Moreover, the project lacked sufficient resources to compensate scientific contributors for their expertise, active participation, and support. To ensure the success of future projects, it is vital to secure adequate capacity in terms of time, human resources, and budget. Addressing these factors proactively will help mitigate risks and optimize efficiency.

Multilingualism is a key consideration that requires not only translation but also adaptation to socio-cultural differences which also requires adequate time and funding. It is essential to account for local and regional specificities to ensure the effectiveness of tools and resources. This will support smoother implementation and more inclusive collaboration across all regions involved.

6.1.2 Level of the intervisions and local champions (NPT + SWOT)

We used the NPT to explore the process of implementation of the intervisions from the perspectives of the local champions. NPT is valuable because it helps understand how complex implementation strategies of interventions are used, highlighting the factors that influence their adoption, implementation, and sustainability.

Here, we present a summary of our key findings from the four constructs of the NPT based on the focus groups with local champions. More information about the background, methods, and in-depth results is available in a separate report (WP6: report on focus group analysis (local champions), in attachment).

Additionally, we include results from the SWOT-analysis at this level. However, to maintain brevity and avoid redundancy, overlapping findings are not repeated. An extensive report on the SWOT-analysis is available in a separate report (WP6: report on SWOT-analysis, in attachment).

6.1.2.1 Key findings from focus groups with local champions

6.1.2.1.1 Coherence

Local champions shared their varied views on their role as local champions and their understanding of both the project and the intervisions.

***Role of local champions**:*

Local champions had diverse interpretations of their roles, reflecting variations in expectations, responsibilities, and engagement levels. Some saw themselves as facilitators, guiding discussions to ensure structured and meaningful exchanges. Others viewed themselves as

experts or "knowledge brokers," responsible for sharing scientific insights on antibiotic prescribing. Some preferred to engage in intervisions as equal participants, integrating into discussions rather than taking an instructional role. Others acted as logistical coordinators, ensuring smooth organization. A few noted that their role became clearer over time through training, expert guidance, and hands-on experience.

> ***Additional qualitative input from support sessions/focus groups - Role of local champion***
> *Walloon local champions quickly opted for the term "référent local", which is further removed from the notion of performance, but retains a connotation of guidance.*

***Understanding of the project's goals**:*
When it came to understanding the project's aims, local champions had varied initial understandings.
While many recognized its focus on improving antibiotic prescribing, others saw the project as an introduction to only the antibiotic barometer or believed the project focused on communication skills and collaborative work approaches. Although for some, the purpose and structure of the intervisions, particularly the action plan, were unclear at first, understanding developed over time.

6.1.2.1.2 Cognitive participation

Local champions discussed their motivations for participating and the influence of time in building their confidence for their role as local champion.

***Motivations for participating as a local champion**:*
Local champions learned about the project through various channels, such as newsletters, emails, and colleagues, which influenced their initial interest and engagement. Their motivations varied—some were drawn to the project's peer-driven approach and the opportunity for knowledge exchange, reflection, and improved communication. Others saw themselves as "agents of change," committed to addressing antibiotic overprescribing in primary care. Some valued its relevance to their clinical practice, seeing it as a way to gain practical insights. While intrinsic motivation was key, a few acknowledged that financial compensation provided additional commitment but was not their primary reason for participating.

> ***Additional qualitative input from support sessions/focus groups - Motivations for participating as a local champion***
> *Some Walloon local champions previously had positive experiences in leading groups of doctors to improve clinical practice, such as GLEMs and as a SPMA leader. Additionally, in the recruitment advert, the use of CareConnect was mentioned. Some local champions using Medispring were interested in participating in the project, but did not take part because they were not using CareConnect. Other potential local*

champions made their participation conditional on the agreement of their teams, as it was their colleagues who were going to form their group of GPs.

***Time needed to build confidence in their role**:*
Some local champions initially lacked confidence in their role, feeling unprepared or insecure. However, their confidence grew over time through experience, and participation in intervisions and support sessions. Training materials were particularly helpful in enhancing their preparedness.

6.1.2.1.3 Collective action

Local champions discussed how the intervisions were used, including the topics discussed, and the challenges that they faced when facilitating the intervisions. They also shared strategies that they took to engage with GPs and steer intervisions, particularly when it came to overcoming the challenges they faced. They also reflected the influence that trust and personal connections had in facilitating the intervisions.

***Intervisions as a space for exchanges**:*
The intervisions provided participants with a platform to reflect on their clinical experiences, discuss challenges, and share strategies for improving antibiotic prescribing. Key topics included diagnostic uncertainties, managing patient expectations, and alternative treatments. These discussions fostered peer feedback and best practice sharing, such as using ICE (ideas, concerns, and expectations) in consultations or recommending non-antibiotic treatments like nasal irrigation. They also encouraged self-reflection on communication styles. Some noted that the tools played a crucial role in facilitating discussions and promoting critical reflection.

> ***Additional qualitative input from support sessions/focus groups - Organization of intervisions***
> *Intervisions were mainly organized face-to-face. The experience of remote intervisions varied. While it was more accessible and made it possible for GPs spread out geographically to get together, others felt that it reduced interactivity. There was also a lack of funding for operational resources such as video-conferencing system, website, shared drive space, catering, and secretariat (monitoring registrations, accreditations and payments).*

***Challenges in facilitating intervisions**:*
Many local champions struggled with the action plan and discussions on behavioural determinants, finding the plan too formal, detailed, and difficult to present. Local champions felt that GPs disengaged when the topic was introduced, while others focused too much on antibiotic prescription numbers, leaving little time for broader discussions. This made it challenging for local champions to steer intervisions back on track. Scheduling intervisions that suited all participants was also difficult, and limited access to the antibiotic barometer further hindered discussions in some groups.

***Strategies to engage with GPs and steer intervisions**:*
To address the challenges of the structured action plan, local champions adopted more flexible approaches to goal-setting. Some encouraged GPs to set personal or collective goals, while others used real clinical challenges linked to behavioural determinants as discussion points. Role-playing exercises were introduced to enhance engagement, allowing GPs to analyze communication and prescribing behaviours dynamically. When faced with difficult questions, champions promoted collaborative learning by involving the group or seeking expert input. To foster participation, some hosted intervisions in informal settings with food and drinks, while others maintained engagement between sessions through emails or WhatsApp. Over time, group dynamics improved—initially hesitant participants became more open, fostering trust and self-reflection. Discussions evolved beyond the antibiotic barometer, with alternative tools, such as educational videos, generating more meaningful exchanges.

Training and supporting materials aided local champions:
Some local champions found resources like training sessions, the action plan document, and the intervision presentation template helpful for clarifying expectations and saving preparation time. However, others felt they needed significant effort to adapt the materials to their groups' needs. A few champions also struggled with understanding and applying the theoretical framework, especially regarding behavioural determinants.

> ***Additional qualitative input from support sessions/focus groups - Training and supporting materials aided local champions***
> *Local champions wanted to have an updated clinical practice recommendations of first-choice antibiotics based on reimbursement criteria and at a reasonable cost.*

Trust and personal connections facilitated intervisions:
Many local champions emphasized that trust and personal connections were key to the success of their intervisions. Knowing the GPs in their group made their role easier by reducing pressure and allowing for mistakes. Pre-existing relationships also boosted attendance and openness, but familiarity sometimes led to off-topic discussions. As the intervisions continued, trust grew, encouraging GPs to engage in more honest discussions about their prescribing habits.

6.1.2.1.4 Reflexive monitoring

Local champions also shared their views on the project's successes and improvements to be considered for the future. Additionally, they reflected on the future recruitment of local champions.

Project's successes:
Local champions widely recognized the project's value in creating a space for open dialogue and critical reflection on antibiotic prescribing. They saw this as a key strength, enabling GPs

to address challenges collaboratively in a non-formal setting. The intervisions fostered mutual learning, aligning prescribing practices and promoting a unified approach. Some champions noted behaviour changes, such as integrating safety-netting strategies and using GRACE tools. A few even observed a personal reduction in antibiotic prescribing. There was strong interest in sustaining intervisions beyond the project, with some planning follow-up sessions or forming new groups within their professional networks.

***Suggestions for improvements*:**
Key suggestions included adjusting the timing and frequency of sessions, with some preferring more meetings during winter or starting earlier for better planning. A few participants felt that four sessions on antibiotic prescribing were too many, leading to reduced engagement. Improving the accessibility and clarity of supporting materials was also recommended, particularly for translating theoretical content into practice. Suggestions included more practical examples and exercises, along with better understanding of the antibiotic barometer. Expanding the interprofessional scope to include pharmacists, veterinarians, and other clinicians was another idea. There were mixed opinions on online intervisions, with some seeing it as beneficial for accessibility and others worried about reduced engagement. Reflections on terminology led some to question the term "local champions," feeling that the term could imply an expert role that might distance them from their peers and create expectations that might not be met. Instead, suggested alternatives like "steward" or “moderator” better reflected their role. Other possible alternatives in Dutch and French instead of ‘local champion’ are “lokale intervisor”, “lokale trekker”, “modérateur”, “animateurs”. Lastly, local champions emphasized the importance of receiving feedback on prescribing behaviour changes to maintain motivation, as lacking tangible evidence of impact could reduce engagement.

Reflections on the recruitment of local champions and GPs:
Local champions expressed enthusiasm about their participation and were willing to take on the role again in the future, finding the experience intellectually stimulating and professionally enriching. Opinions differed on whether they preferred leading a familiar group or working with a new one; some valued continuity for stronger discussions, while others sought fresh perspectives. Strategies for recruiting GPs included sharing personal experiences, targeting GPs who already lead training, and promoting the project's results. Opinions on financial incentives were mixed; some saw them as a motivator for initial participation, whilst others felt they were not essential for long-term engagement. Local champions highlighted the importance of using professional networks like LOK/GLEM for recruitment but suggested diversifying participant backgrounds to foster more critical and dynamic discussions.

Additional qualitative input from support sessions/focus groups - Antibiotic barometer
The antibiotic barometer has been developed for several GP practice software packages and has reached a wide audience in both the north and south of the country,

whereas it has hardly been implemented in the Walloon region. However, there were a number of problems linked to the short lead times and lack of foresight on the part of certain developers (e.g. Healthstat, Medispring). In addition, the local champions did not have sufficient time to familiarise themselves with the barometer before it was made available to GPs. Furthermore, despite local champions and GPs were eager to use the antibiotic barometer, some had problems accessing the results of the barometer which had an impact on certain intervisions and sometimes even discouraged GPs, especially when they had high expectations of the antibiotic barometer.

Once the barometer was accessible and both local champions and GPs understood its limitations (feedback by practice group, not by prescriber; results also depended on the way in which diagnoses are encoded in the digital patient record (free text or ICD code; harmonisation of codes used in group practice, etc.) the interpretation of the antibiotic barometer indicators still required extensive training due to its intrinsic limitations (technical or clinical and non-modifiable) – no link between diagnosis and prescription, global result for group practice (and not individual by doctor) and a learning curve for correct encoding of diagnoses. As the local champions had not had the time to test these tools themselves, additional training courses were organised (despite the lack of budget and with last-minute coordination) on these aspects in particular so that they could master these technical elements to lead the intervisions.

The results of the barometer were limited in their ability to assess changes in practice during this pilot project due to significant technical challenges and the short duration of the project. Since respiratory infections have a seasonal peak, and the project only spanned one year (covering a single season), the data collected was insufficient for drawing meaningful conclusions. However, understanding how the barometer functions facilitated valuable discussions within group practices. This process contributed to improvements in and standardization of the encoding of medical and diagnostic data within the EMD.
Local champions expressed a desire for more opportunities to exchange questions and share experiences regarding the use of the antibiotic barometer.
Additionally, the user-friendliness of the barometer continues to be a challenge due to the slow performance of the Healthstat platform and the limited budget available to enhance the quality of the displays, such as improving the presentation of chronological trends, displaying absolute figures, and summing results.

Additional qualitative input from support sessions/focus groups – Digital toolkit
Given the short timeframe and limited resources, an digital toolkit was proposed to support the project. At the outset, there was still a significant need for educational work with local champions. The toolkit contained valuable information, but it lacked clear organization, with some content being either too complex, too simplistic, or occasionally contradictory. Additionally, certain key tools, such as GRACE, were not available at the

beginning of the project, despite being presented as essential resources. The local champions also faced time constraints that hindered their ability to fully explore the toolkit. To address these challenges, the toolkit was continuously improved throughout the project, with revisions made to its layout, structure, and content, based on feedback and a better understanding of needs and available resources.

6.1.2.1.5 Conclusion

The NPT-analysis demonstrated an evolution in both the role of the local champion and the intervisions, particularly in the way local champions conducted them, engaged with GPs, and overcame challenges. The SWOT-analysis provided more specific instances of challenges, particularly in regards to the tools used within the intervisions.

The role and experiences of local champions within the project revealed a broad spectrum of interpretations, responsibilities, and evolving engagement. Their contributions were essential in facilitating structured discussions, sharing expertise, and fostering peer learning. Time is a particularly important element to consider as it is time, in parallel with training and practical experience, that helped local champions refine their roles, enabling them to navigate their responsibilities with greater confidence.

Local champions' understanding of the project's goals evolved throughout their participation. While initial comprehension varied, many grew to appreciate its focus on improving antibiotic prescribing, communication strategies, and collaborative approaches. The process of learning by doing, coupled with peer discussions, played a crucial role in clarifying project objectives and strengthening their engagement. In addition, motivations for participating in the project were diverse, ranging from a commitment to addressing antibiotic overprescribing to a desire for professional growth and knowledge exchange. While financial incentives played somewhat of a role in engagement, intrinsic motivation was a key driver. Confidence-building required time, with many champions initially feeling unprepared but growing more self-assured through training, intervisions, and peer support.

The local champions found that the intervisions provided a valuable space for reflection and exchange, fostering discussions on clinical challenges, patient communication, and best practices with peers. However, facilitating these sessions was not without challenges. Issues such as the structured action plan’s complexity, disengagement from behavioural determinant discussions, and difficulties in scheduling were common. The SWOT-analysis further indicated practical challenges with the antibiotic barometer that hindered discussions during the intervisions suggesting that further refinement of such tools is necessary. Importantly, however, local champions managed to overcome these challenges through their own strategies, including adapting session formats and the action plan, using real clinical cases, and fostering informal interactions to build trust. Over time, group dynamics improved, leading to deeper and more open discussions. On the other hand, local champions noted the

importance of trust and personal connections in facilitating intervisions, as pre-existing relationships helped reduce barriers to participation and fostered open dialogue.

Furthermore, the support materials played a role in guiding local champions, though their usability amongst local champions varied. Whilst some champions found them helpful, others struggled to adapt the theoretical concepts to practical settings. This indicates that more pragmatic examples may be needed during training to showcase how to apply theoretical frameworks on behavioural change to practice.

The project was recognized as a success in creating a space for critical reflection and peer learning on antibiotic prescribing. In some instances, local champions observed behaviour changes amongst GPs, including the increased use of safety-netting strategies and GRACE tools. Many expressed a desire to sustain intervisions beyond the project's formal scope, reinforcing its value in primary care practice.

Several areas for improvement were identified. Suggestions included adjusting session timing and frequency, refining supporting materials to enhance clarity and practical application, and expanding the interprofessional scope to include other healthcare providers. The terminology surrounding "local champions" was also reconsidered, with alternative titles like "steward" or "moderator" proposed to better reflect their role. The SWOT-analysis further demonstrated that Walloon local champions switched to using "référent local", showing a preference for alternative titles. Additionally, local champions highlighted the need for tangible feedback on prescribing behaviour changes to maintain motivation and engagement.

Regarding future recruitment, local champions showed enthusiasm for continuing their involvement. Strategies for engaging GPs included leveraging professional networks, sharing personal experiences, and targeting those already active in training roles. Whilst financial incentives were acknowledged as a potential motivator, they were not seen as essential for long-term commitment. Broadening recruitment strategies and participant backgrounds was recommended to enhance discussion diversity and critical reflection.

In conclusion, local champions played a vital role in facilitating discussions, guiding learning, and promoting best practices in antibiotic prescribing. Their experiences underscore the importance of clear role definition, ongoing support, and adaptable strategies to maximize engagement and effectiveness. Sustaining and refining this initiative will help further embed intervisions as a valuable implementation strategy in improving prescribing behaviours and enhancing primary care practice.

6.1.3 Level of GPs

At the level of the GPs, we present the key findings from the questionnaire completed by GPs and the individual interviews with GPs. Further information about the background, methods, and in-depth results can be found in the following reports respectively:

- WP6: report on questionnaire (GPs)
- WP6: report on individual interviews (GPs)

6.1.3.1 Key findings from the GP questionnaire

The evaluation of the implementation of the interventions in the "Local Antibiotic Stewardship for Respiratory Tract Infections" project revealed several important aspects regarding their adoption, satisfaction, and impact on GPs' practices. The findings are structured around the three identified dimensions: intervisions with local champion, digital toolkit and the antibiotic barometer.

Most participants attended the intervisions, primarily face-to-face (77% at T1, 79% at T2, 66% at T3). However, the percentage of participants who did not attend increased over time (8% at T1 to 20% at T3). This trend highlights a decrease in participation, which could influence engagement with the project's interventions.

Before the project, 84% of participants reported using knowledge-enhancing tools such as the BAPCOC guide and other educational resources. After the start of the project, the use of TRACE and GRACE-INTRO e-learnings increased, at T2 and T3. The use of tools designed to improve patient communication and manage diagnostic uncertainty also increased during the project, although they remained less frequently used compared to knowledge-enhancing tools. Tools to manage uncertainty and patient expectations and educate them did not vary over timepoints.

GPs are responsible for improving their antibiotic prescribing practices and feel involved in optimizing their antibiotic prescription by using the interventions proposed in this project. This sense of responsibility remains unchanged over time. However, GPs aged 51-60 are less likely to view improving their antibiotic prescription as part of their responsibilities as a GP, compared to those under 30. Although participants recognize the importance of intervision with local champions (~70% agreement at T3), satisfaction with this support and its perceived impact decreased slightly over time (85% at T1 to 73% at T3). The digital toolkit's usefulness is recognized but this recognition decreased over time (~80% at T1 to 65% at T3), and satisfaction remained mixed (56% at T3), particularly in terms of their integration into daily practice. Indeed, fewer participants reported being able to easily integrate these tools into their daily practice at T3 (54%) compared to earlier time points. Concerning the antibiotic barometer, although appreciated for its role in optimising prescribing (73% at T3), satisfaction with its content was low (48% at T3). Integration into daily practice also remained a challenge, with 55% of participants at T3 reporting ease of use.

A general decrease in agreement with intervention-related statements was observed from T1 to T3, particularly regarding the digital toolkit and the antibiotic barometer. In addition, participants who attended all or part of the intervision sessions consistently reported higher levels of agreement and satisfaction with the interventions across all dimensions.

Perceptions of the antibiotic barometer also varied based on language, age, and working environment. Dutch-speaking GPs expressed higher satisfaction with the barometer's content and its impact on antibiotic prescription compared to their French-speaking counterparts. Age also influenced attitudes, with GPs aged 41-50 showing greater satisfaction and recognition of the barometer's value than younger GPs. Additionally, GPs in rural and semi-rural areas reported lower satisfaction with the barometer and found it harder to integrate into their daily practice compared to urban GPs. These findings highlight how demographic and environmental factors shape the perceived utility and integration of the antibiotic barometer.

6.1.3.2 Key findings from GP interviews using NPT

6.1.3.2.1 Coherence

GPs shared their comprehension of the project's objectives, key components, and the roles of intervisions and local champions. This construct also encompasses GPs' perceptions of the project's relevance to their clinical practice, their initial expectations, and the barriers they encountered in engaging with the initiative. Furthermore, it sheds light on how GPs negotiated meaning throughout their participation and how their perspectives evolved over time.

Understanding project components:

Some GPs found the project interesting and ambitious, recognizing its potential to improve antibiotic prescribing. Whilst some had a clear understanding of the project's goal to foster peer discussions on prescribing decisions, others struggled to distinguish between its different elements, leading to uncertainty. A gap between expected and actual outcomes affected their engagement. Experiences with tools like the BAPCOC guidelines and the antibiotic barometer were mixed—some found them helpful, while others found them too technical. Initially, some GPs expected the local champion to act as an expert, and others focused on the barometer data, but many struggled to fully grasp the broader behavioural factors behind prescribing practices and the value of the action plan.

Role of local champion:

GPs valued local champions for their leadership, neutrality, and adherence to evidence-based guidelines, with key qualities including humility, effective communication, and dedication. Local champions were seen as important facilitators, providing structure and ensuring productive discussions. However, some GPs expected local champions to be experts or problem solvers, which led to confusion or dissatisfaction when they acted as neutral facilitators instead.

Value of the project:

GPs who saw the value in the project were better able to integrate it into their practice and recognized its relevance. Those who viewed antibiotic resistance as a critical public health issue were particularly supportive. Many appreciated the project's feedback mechanisms, especially visual tools that aided self-reflection. Intervisions were praised for creating a supportive environment where GPs could share experiences and learn from peers.

6.1.3.2.2 Cognitive participation

This construct captures the factors that influenced GPs iinitial engagement and sustained involvement in the antibiotic stewardship project. It encompasses motivational elements such as scientific interest and group dynamics, as well as barriers that impeded participation. Additionally, it considers GPs' willingness for future involvement, including potential role as local champion.

Initial engagement factors:

GPs were strongly motivated to engage in the project, driven by a desire for self-improvement, practice evaluation, and the potential to influence colleagues and enhance interdisciplinary collaboration. Key motivators included the pursuit of clinical excellence, adherence to evidence-based medicine (EBM), and refining medical reasoning. GPs saw the project as an opportunity to challenge ingrained habits, integrate updated guidelines, and improve their practice. Additionally, awareness of antibiotic resistance and a desire for professional growth and practice improvement were factors in their participation.

Sustained participation:

The impact of peer interactions on continued engagement was positive, with some GPs appreciating the seminar-like structure. The project promoted shared decision-making, reinforcing individual prescribing patterns and reducing patient-driven pressure for unnecessary antibiotic prescriptions. Many GPs valued peer discussions, exchanging practices and solutions. Peer influence and group practice culture were recognized as key factors influencing prescribing behaviours.

Participation barriers:

Heavy workloads were a significant challenge for GPs, making it difficult to maintain ongoing participation in the intervisions despite initial enthusiasm. Competing professional demands, concerns about data accuracy, and misinterpretations of prescribing metrics undermined confidence in the feedback tools. External monitoring, perceived as evaluative or punitive, reduced engagement and discouraged self-reflection. Practical resource limitations also impacted participation.

6.1.3.2.3 Collective action

GPs discussed their integration of evidence-based tools and guidelines into routine clinical practice and their increased awareness of their own prescribing behaviours. However, they also highlighted implementation challenges and the extent to which they continued to engage with colleagues outside of intervisions.

Integration into clinical practice:

GPs adapted their communication strategies to improve patient education, manage expectations, and promote shared decision-making, often using deferred prescribing to encourage responsible antibiotic use. Challenges arose when interacting with patients from

cultures with more liberal antibiotic access. The project encouraged a more reflective, evidence-based approach, challenging habitual practices and reinforcing adherence to clinical guidelines. Some GPs became more aware of their prescribing behaviours, gaining confidence in non-prescription decisions. The use of clinical decision-making tools provided a structured approach to prescribing, supporting consistency. Structured goal-setting within the project helped maintain focus on behavioural change and accountability.

Implementation challenges:

GPs highlighted the challenge of balancing clinical guidelines with strong patient demands for antibiotics, often facing internal conflict between respecting patient autonomy and following best practices. Diagnostic uncertainty, financial constraints, time pressures, limited training, and ingrained prescribing habits further complicated decision-making. Some GPs also recognized the need for greater flexibility, particularly in cases that required clinical reassessment.

Intervisions in sustaining collaboration and reflection:

Ongoing peer interaction, particularly through LOK/GLEM, provided GPs with a structured space for reflection and discussion, fostering collective responsibility and sustained engagement with evidence-based prescribing practices. Intervisions helped reduce professional isolation, especially for those in smaller or rural practices, and created an open, non-judgmental environment for critical reflection and support. However, logistical barriers, such as conflicting schedules, lack of follow-up, and competing clinical demands, hindered continued participation. Whilst some GPs found intervisions valuable, others felt they lacked depth or actionable takeaways. The findings highlight the need for stronger long-term peer support structures and clearer follow-up processes to sustain engagement and ensure lasting practice change.

6.1.3.2.4 Reflexive monitoring

GPs discussed varying degrees in their antibiotic prescribing behaviour and their overall optimism about the long-term effects of the project. They also raised factors that could ensure long-term viability of the project and future developments.

Shifts in prescribing behaviour:

Many GPs reported a noticeable shift toward more judicious antibiotic prescribing, particularly for conditions like tonsillitis and ear infections, with increased alignment to evidence-based guidelines. The initiative sparked greater clinical curiosity and critical reflection, encouraging GPs to question habitual practices and seek additional information. Some participants observed a broader cultural shift within their practices, with more open discussions about antibiotic use and shared responsibility for antimicrobial stewardship. However, the impact varied; for some GPs, the change was subtle or slow, as existing practices were already aligned with guidelines or the strategies didn’t feel transformative enough to drive significant change.

Sustainability of change:
GPs were optimistic about the long-term effects of the project, noting improved prescribing habits, better patient education, and greater adherence to clinical guidelines. However, they emphasized the need for time and ongoing reinforcement to sustain these improvements. Some also highlighted the importance of embedding antibiotic stewardship into routine practice, shifting from reactive to proactive prescribing.

Implementation challenges*:*
Sustaining the initiative in routine practice required addressing practical and systemic challenges, such as concerns about data accuracy, external oversight, and technical barriers affecting usability. Some GPs struggled with accessing resources and reports, highlighting the need for better integration of decision-support tools into clinical workflows. To improve long-term viability, GPs suggested refining the tools, simplifying statistical outputs, and ensuring easier access to reports.

***Need for ongoing support*:**
GPs stressed that intermittent engagement was not enough to sustain meaningful change. They emphasized the need for regular education and structured follow-up sessions to reinforce evidence-based prescribing practices. To further refine prescribing behaviours, participants called for continuous training opportunities beyond the initial intervention period.

Applying the model more broadly:
Many GPs saw potential for broader implementation, suggesting that the structured approach used in the intervisions could be applied to other prescribing behaviours and chronic disease management.

Engaging a diverse range of practitioners:
GPs emphasized the need to engage a broader range of GPs, particularly those who prescribe antibiotics more frequently and may be less involved in rational prescribing efforts. They also supported involving other healthcare professionals, recognizing that a multidisciplinary approach could enhance antibiotic stewardship.

Enhance training:
Improving communication strategies and patient education were key priorities for future iterations. Participants suggested adding structured case studies to intervision sessions for more focused, real-world discussions.

6.1.3.3 Conclusions
For GPs, the ‘antibiotic stewardship project’ showed strong initial acceptance of the proposed implementation strategies and interventions, with excellent internal consistency of the measurement tools. However, while the intervisions with local champions were well-attended

initially, declining participation over time signals a need to sustain engagement. Similarly, although tools like TRACE and GRACE-INTRO saw increased uptake, their integration into daily practice remains a challenge. An overall positive impact on GPs' prescribing practices was reported by GPs, promoting greater awareness of the issues related to the use of antibiotics and increased alignment with evidence-based recommendations. However, its uptake was heterogeneous, influenced by the understanding of the interventions, the motivation of the participants, organizational constraints and the perception of the tools provided.

While most GPs recognized the relevance of the project and its potential to improve their practices, some found it difficult to distinguish its different components or to fully integrate them into their daily clinical practice. Participation in the intervision sessions played a key role in overall satisfaction with the project and its implementation strategies and interventions. Intervisions also helped in structuring exchanges and reinforcing collective decisions, but their impact varied according to the group dynamics and the stance of the local champions. The GPs' commitment was stimulated by their interest in continuous improvement and peer exchange, although obstacles such as lack of time, fear of external evaluation or doubts about the reliability of the data limited the participation of some.

Participants' satisfaction declined over time, particularly for the digital toolkit and the barometer and their adoption was mixed. While several GPs appreciated the tools made available to them, others found their use restrictive or too far removed from their clinical routine. The sustainable integration of these tools would require better anchoring in existing systems and simplification of their accessibility and interpretation.

One of the major challenges identified is the sustainability of the changes brought about by the project. Participants emphasize the importance of enhanced support, with regular follow-up sessions, continuous training and better integration of recommended practices into the daily work environment. In addition, a broader approach including a sense of belonging to a wider movement such as the OneHealth initiative and involvement of other healthcare professionals could strengthen the collective dynamic and ensure a more widespread impact on antibiotic management.

Ultimately, although this project has initiated a change in practices and reinforced a dynamic of reflection among GPs, its long-term success will depend on the of more robust support mechanisms, structured follow-up and adaptation to the constraints and expectations of practitioners. Extending it to other clinical topics and involving healthcare professionals more widely could also help maximize its impact and ensure greater adherence to good medical practice.

7. Recommendations for national implementation (BASICS)

These recommendations aim to optimize operational processes and enhance the coordination of the implementation strategy. They address both improvements for actions already undertaken within this project and suggestions that may facilitate future implementation efforts.
Recommendations are formulated at three different levels:

- Project level
- Intervisions with local champions
- GPs and their use of tools to support changes in their antibiotic prescribing behaviour

Based on the findings from the NPT-analysis, SWOT-analysis, additional methods and insights gathered from project-related meetings (e.g. project group meetings), several recommendations have been developed.

Section 7.1. presents recommendations at the project derived from the SWOT-analysis and additional methods. Sections 7.2. and 7.3. outline targeted recommendations based on NPT-analysis, specifically addressing local champions and GPs. This structured approach enables readers to focus on recommendations relevant to different levels of the implementation process. While some recommendations may overlap due to thematic similarities across different levels, their perspective and contextual relevance remain distinct.

7.1 Recommendations at the project level

7.1.1 General recommendations

7.1.1.1 Project coordination and collaboration

- **Engage experts with comprehensive expertise**
  Collaborate with experts whose knowledge spans key areas of antibiotic prescribing, including reducing inappropriate prescribing, changing prescribing behaviour, and managing infectious diseases. A multidisciplinary approach will ensure a more holistic and well-rounded implementation strategy.
- **Promote project results to encourage participation**
  Actively disseminate the results of the implementation project can serve as a motivational tool for healthcare professionals. Highlighting the benefits and successes of the initiative will encourage greater participation and foster a sense of ownership and commitment among stakeholders.
- **Allow sufficient time and resources for language adaptation**
  Recognizing the impact of multilingualism on project implementation, adequate time and resources should be allocated to ensure that materials are effectively adapted into national languages. Rather than focusing solely on translation, efforts should also

address socio-cultural differences to enhance the relevance and accessibility of project materials across diverse regions.

- **Install a coordination at a regional level**
  From the outset the project should integrate region-specific characteristics, such as healthcare system organization, recruitment processes and software requirements. This ensures that the implementation strategy is tailored to local needs beyond linguistic considerations.
  To achieve this, active involvement of local coordination teams and regional partners is crucial, particularly during national rollout. Additionally, providing materials in both official languages (where applicable) will further support regional adaptation and implementation efforts.
- **Develop strategies to overcome local reluctance**
  To address potential reluctance to collaborate it is important to identify common concerns among local stakeholders and develop targeted strategies to mitigate them. Ensuring inclusivity and addressing regional comprehension will foster stronger engagement and cooperation.
- **Clearly define tasks and roles from the outset**
  Clearly define and communicate roles and responsibilities from the beginning will ensure that all participants understand their contributions and time commitments. Specific tasks, such as following up with GPs, responding to inquiries from local networks, facilitating communication between general and regional coordination, and verifying translations of tools should be explicitly outlined.

7.1.1.2 Communication

- **Develop a communication plan for target audience**
  The results and content of this implementation pilot project should be very carefully communicated and disseminated among the target audience.
  Communication about the intermediate and final results of this project could motivate participants for continuation and could stimulate other GPs to engage for participation.
  It is important to communicate about updates and optimalization of the content of tools that were developed. This is essential for sustainability and continuation of this project.

7.1.1.3 Funding

- **Ensure sufficient budget allocation**
  Secure adequate funding to meet the project's objectives and ensure the availability of necessary resources to support successful implementation and scale-up.
  Avoid confusion and misunderstanding about the effective available budget (budget in/exclusive VAT and VAT liability of different partners) to guarantee sufficient financial resources.
- **Provide financial compensation for key activities**
- **To ensure the successful execution of the project, financial support should be allocated to the following critical areas:**
  - **language adaptation**

Allow sufficient time and resources for adaption of materials into various national languages ensuring accessibility and relevance for all regions involved.

- **recruitment and organizational support**
  Adequate financial compensation should be provided for the time and effort invested in recruitment, intervision organization, and the facilitation of project-related activities. This will help maintain engagement and commitment from key stakeholders.
- **maintenance and updating of project tools**
  A dedicated budget should be allocated to ensure the continuous maintenance, updating, and refinement of project tools, allowing them to remain relevant.
- **support for intervisions**
  Financial compensation should be continued for time spent on intervision training, the utilization of project tools, and the organization and facilitation of intervision sessions. This will help sustain knowledge exchange and professional development.
- **Communication**
  See section 7.1.2. Communication
  Financial resources and support from government to build and implement a communication plan for the target audience about results and updates of the tools, especially with the view to scale-up this implementation project.

- **Ensure sufficient funding for scientific support**
  To maintain high-quality training and access to top-level experts, sufficient funding should be allocated for ongoing scientific support. This includes the capacity to adapt project messages to local contexts, ensuring the relevance and effectiveness of the implementation strategy across different regions.

7.1.1.4 Time

- **Adjust expectations and timeframes**
  Simplify expectations where possible, or allow for additional time to achieve project objectives, ensuring a realistic approach to milestones and outcomes.
- **Allow sufficient time for training preparation**
  Allocate ample time for planning the training sessions, ensuring that they integrate both national and local expertise for maximum relevance.

7.1.1.5 Timeline

- **Space intervisions further apart**
  Reduce the frequency of intervisions from four times a year to twice a year to prevent participant fatigue and ensure the sessions remain valuable. Hereby, it is important to provide interim follow-up in context of sustainable change in prescribing behaviour.
- **Extend the length of an implementation cycle**
  Consider extending the intervision cycle to two years rather than one to cover multiple seasons, particularly to better capture winter trends.

7.1.1.6 Policy recommendations for future

- **Ensure availability and regular updates of up-to-date clinical guidelines**
  Guarantee the availability and update of guidelines with clinical practice recommendations aligned with current best practices in antibiotic prescribing to ensure that all project participants are working with the most accurate and applicable information.
- **Support ambulatory stewardship development**
  Continue to dedicate the necessary time and resources to developing the concept of ambulatory stewardship, recognizing its distinct differences from hospital stewardship due to its multi-location nature and unique practical constraints.
- **Install national coordination of antibiotic stewardship initiatives (by BAPCOC)**
  Avoid confusion and fragmentation by launching and coordinating different initiatives by different entities by installing a national coordination of all antibiotic stewardship initiatives (by BAPCOC).

7.1.2 Recommendations for development

7.1.2.1 Recruitment (organization and coordination at project level)

To optimize the recruitment of local champions, the following strategies should be considered (see also section 7.2. for recommendations at the level of local champions):

- **Clarify roles for recruitment and monitoring**
  Define responsibilities for recruitment and monitoring to ensure accountability. Specify whether these tasks fall under the purview of Local Liaison Officers or local coordination teams.
- **Diversify recruitment strategies**
  Expand recruitment efforts beyond email communication, which may be less effective due to saturation. Consider in-person engagement strategies, as oral communication remains central to GP interactions. Recruitment should be flexible, adaptable to regional contexts while allowing sufficient time and resources for personalized outreach.
- **Ensure equitable recruitment across regions**
  Regional coordination should oversee recruitment efforts to ensure balanced participation nationwide.
- **Identify suitable profiles for recruitment**
  Prioritize the recruitment of GPs who are already involved in organizing training courses. These individuals have experience in leading discussions and may be more inclined to take on the role of local champions, thereby facilitating knowledge dissemination and engagement. In addition, it is important to point out that a local champion does not have to be an expert but can act as peer among peers (bottom-up).
- **Target individuals interested in behavioural change and stewardship**
  Recruit individuals who demonstrate an interest in behavioural change, antibiotic stewardship, and improving prescribing practices. Ideal candidates should be open to

sharing their experiences with colleagues and committed to enhancing both their own and their peers' prescribing behaviours.

7.1.2.2 Training for local champions (development at project level)

To ensure the effectiveness and sustainability of training for local champions, the following key recommendations should be considered during its development:

- **Expertise**
  - **Leverage Train-the-Trainer Expertise**
    Utilize the experience of existing train-the-trainer educators, especially those from NGOs or other training organizations. They can provide valuable insights into how to structure the training to ensure long-term sustainability (5-10 years).
- **Topics (see section 7.2. Recommendations at the level of local champion)**
  Ensure training covers all required topics that are necessary to carry-out their role
  - **Knowledge of their role as a local champion**
  - **Knowledge of tools**
    Local champions should be trained in using and interpretation of the antibiotic barometer, digital toolkit and the action plan and the goal of these tools to support the antibiotic prescribing behaviour.
  - **Knowledge about the distinction between tools for GPs and intervisions**
    Clearly differentiate between the tools intended for use during intervisions and those designed for GPs to use during consultations to support the antibiotic prescribing behaviour.
  - **Knowledge on antibiotic resistance and appropriate prescribing**
    Provide specific training on antibiotic resistance, appropriate prescribing practices, and the management of infectious diseases to ensure comprehensive knowledge.
  - **Knowledge about additional infectious diseases**
    Consider incorporating other infectious disease topics, such as urinary tract infections, for a broader scope.
  - **Communication skills**
    Local champions should be trained in developing effective communication skills.
  - **Skills to support patient communication**
    Promote tools and methods to support communication skills with patients about self-care, patient expectations and AMR (ICE - Information, Communication, Education, TRACE and GRACE-INTRO).
  - **Skills to support local champions in their role**
    Design training programs that help local champions understand how to support behavioural change, motivate less engaged GPs, and facilitate peer exchanges of experience.
- **Format**
  - **Adapt systems to the heterogeneity of local champions**

Acknowledge the diverse levels of knowledge and awareness among local champions and participating doctors. Tailor systems and tools to accommodate different levels of expertise and ensure that all participants are fully supported.

  - **Provide practical training for key roles**
    The training should cover practical aspects of the local champion role, such as organizing intervisions and addressing challenges like GP drop-out, with adaptable formats based on local champion backgrounds.
  - **Consider bilingualism in training**
    Ensure training materials and sessions are bilingual, reflecting the diverse linguistic needs of the participants. This makes nationwide uniform training possible.
- **Maintenance of content of training**
  - **Evaluate training courses for improvement**
    Plan for regular evaluation of the training courses to gather feedback and improve the structure and content for future cycles.
  - **Update training materials regularly**
    Ensure that training materials are always up-to-date with the latest clinical guidelines and supported by current scientific literature.

7.1.2.3 Communication

- **Explain the goal and use of different tools**
  It is essential that local champions and GPs clearly understand the goal and use of different tools within the context of this implementation strategy. These tools are not intended to be used as such during daily practice, but serve as a starting point and/or support material during intervisions in order to change the antibiotic prescribing behaviour.

7.1.2.4 Support provided to participants by project group

Recommendations at project level to take into account for the support of participating local champions and GPs:

- **Provide regular support from coordination teams**
  Ensure ongoing support from the coordination team addressing questions about the practical organization, troubleshoot issues with the tools and offer guidance to local champions and GPs.
- **Support GP-participation**
  Consider requests or reminders between intervisions via email to maintain engagement.
- **Create structured linkages for expert exchange**
  Facilitate ongoing interactions between local champions and external experts, such as hospital infectiologists, Sciensano, and regional public health services (Vivalis, AVIQ, Departement Zorg), to exchange expertise and experience.
- **Be responsive to feedback**
  Actively listen to the concerns and needs of local champions and GPs, and incorporate these insights into training content and project adjustments (e.g., scientific issues, changes in epidemiology, or health policy) enabling targeted interventions to prevent drop-outs.
- **Allocate time for monitoring and follow-up to identify challenges early**

Ensure local coordination teams have adequate time to monitor the performance of local champions and their GPs closely. This includes follow-up intervisions, tracking GP participation or abandonment. Determine how often GPs should participate in intervision cycles, particularly if the project is extended over multiple cycles.

7.1.2.5 Antibiotic barometer (development at project level)

Recommendations at project level to take into account concerning the antibiotic barometer:

- **Ensure Healthstat Platform is operational**
  The Healthstat platform must be fully operational to allow GPs to access and use the barometer results effectively and efficiently during intervision sessions.
- **Integrate the barometer in the EMD**
  Easy accessibility for GPs to the feedback results of antibiotic barometer can play an important role in facilitating the use of this barometer. Therefore it is important to integrate the barometer within the EMD of the GPs (via single-sign-on) instead of providing feedback reports via a separate platform.
- **Allocate time for a smooth implementation**
  Ensure there is enough time for a “bug-free” implementation of key tools, including electronic medical records (EMR) and Healthstat, to avoid technical issues that could hinder progress.
- **Ensure data availability and regular updates**
  Ensure continuous availability of data and plan for any necessary software updates or changes in calculation methods.
- **Standardize data encoding**
  Address potential issues with data encoding in different electronic health record systems to ensure consistent and accurate data input.
- **Account for seasonal variability**
  Adjust the barometer’s functionality to account for the seasonal nature of infections, ensuring that feedback and data extraction are performed quarterly to reflect seasonal variations.
- **Consider preference of some GPs for individual feedback**
  It is important to explain the value of the feedback reports at GP-practice level. This prevents individual GPs from being targeted and stimulates collaboration at GP-practice level to optimize the appropriate antibiotic prescribing policy.

7.1.2.6 Digital toolkit (development at project level)

Recommendations at project level to take into account concerning the digital toolkit:

- **Reorganize toolkit layout and content to enhance user experience**
  Redesign the digital toolkit for better layout and content organization. Focus on improving the user experience of the digital toolkit, ensuring that it is intuitive, accessible, and meets the needs of all users involved in the project. The toolkit should be structured for long-term sustainability, including a user-friendly website with integrated search functionality.
- **Allocate time for familiarization (see section 7.1.7. Training for local champions)**

Ensure that local champions and GPs have adequate time to familiarize themselves with the toolkit and its contents to ensure they can fully utilize it during intervision and/or in their GP-practice.

- **Maintain the toolkit regularly**
  Regularly update and maintain the toolkit, removing obsolete documents and adding new ones to reflect evolving needs, such as the inclusion of new topics (e.g., urinary tract infections, information on antibiotic resistance).
- **Evaluate the toolkit**
  Periodically evaluate the website and content to ensure it remains relevant and user-friendly for local champions and GPs.

7.1.2.7 Action plan (tool used during intervision)

Recommendations at project level to take into account concerning the action plan:

- **Provide enough information and explanation on how the action plan can support the change in prescribing behaviour**
  Clear communication from the experts of the project group to the participating local champions during training and support sessions about the goal and the reason to use the action plan within this implementation strategy is essential to support the change in antibiotic prescribing behaviour. By use of the action plan GPs, with support of a local champion, can formulate clear goals and according action steps to reach that goal. The action plan can also help GPs to monitor and make reflexive exercises to assess behaviour changes.

7.2 Recommendations at the level of the intervisions and local champions

Following the results from the NPT-analysis on the focus groups with the local champions, recommendations were developed within the constructs of the NPT.

7.2.1 Coherence

- **Clarify the role of local champion**: clearly define the responsibilities of local champion to prevent misconceptions of the role and consider renaming the term ‘local champion’ to ‘steward’ or another term that resonates better with participants.
- **Strengthen communication of project**: provide clearer and simplified objectives and training materials to ensure that local champions fully understand the concepts of the project.
- **Practical examples in training**: use real-world examples or case studies to showcase how to apply theoretical frameworks on behavioural change to practice.

7.2.2 Collection action

- **Improve session accessibility**: offer flexible participation formats (in-person or online) depending on the needs of the participants.

- **Enhance facilitator training**: provide more interactive workshops on leading and steering discussions, handling resistance, and using the antibiotic barometer effectively.
- **Support interactive intervision techniques**: consider the use of role-playing to enhance engagement with participants.

- **Encourage multidisciplinary collaboration**:
  On the one hand, it is important to focus on GPs and their prescribing behaviour in a monodisciplinary way. A point of consideration is to include GPs with varying backgrounds and prescribing behaviours to challenge norms and to foster critical discussions around behavioural change among GPs (without involvement of other health care professionals).
  On the other hand, other healthcare professionals (e.g. pharmacists, dentists, veterinarians) can be involved to broaden impact on antibiotic perceptions and to ensure that different health care professionals communicate uniform messages about AMR to patients. Multidisciplinary collaboration also emphasizes that all health care professionals can contribute to appropriate use of antibiotics by patients and broaden the project's impact in future (One Health approach).

7.2.3 Cognitive participation

- **Target motivated GPs through existing networks**: recruit champions via LOK/GLEM and professional training groups.
- **Encourage peer-led recruitment**: leverage the personal experiences of local champions to inspire new participants.
- **Strategically incentivise participation**: offer financial or logistical support (e.g. venue costs, materials, food, drinks) to facilitate engagement rather than direct monetary compensation. Incentivisation can particularly help for starting up this implementation strategy and is not necessarily required to motivate participation in the long-term.
- **Support long-term involvement of local champions**: provide local champions autonomy and flexibility so that they can lead and adapt intervisions to the needs of their groups.

7.2.4 Reflexive monitoring

- **Establish feedback mechanisms measuring behavioural determinants**: implement short surveys or reflective exercises assessing changes in attitudes, confidence, and perceived influences o appropriate prescribing to compliment long-term prescribing data to show the project’s impact and maintain motivation.
- **Adapt interventions based on participant feedback**: review and refine intervisions formats, materials, and facilitation approaches.
- **Showcase success stories**: highlight tangible improvements in prescribing behaviours to reinforce engagement and spread best practices during intervisions and via communication strategy.

7.3 Recommendations at the level of the GPs

Following the results from the NPT-analysis on the GPs (questionnaire and individual interviews), recommendations were developed within the constructs of the NPT.

7.3.1 Strengthening coherence

- **Enhance training and communication**
  provide clear and concise educational materials to improve understanding of project components, including structured onboarding sessions for new participants.
- **Refine the local champion model**
  ongoing support for local champions to enhance their ability to guide discussions and support implementation to keep champions motivated and well-equipped to support their peers.
- **Clearly define the scope of champions' responsibilities**
  to optimize their impact in guiding behaviour change and tool adoption.
- **Promote intervisions as reflective spaces in general**
  emphasize the value of intervisions as safe, constructive environments for peer-to-peer learning and problem-solving in antibiotic stewardship. These intervisions can provide a framework for future discussions and reflections about other topics in context of quality improvement.
- **Clarify the role of decision-support tools**
  ensure GPs understand how to use tools like the barometer and action plan within their practice.
- **Increase awareness of the value of the project**
  launch awareness campaigns highlighting the project's scientific, clinical, and public health impact to foster greater engagement among healthcare providers.
- ***Additional recommendation***
  - ***Adapt training for GPs with varying levels of experience***
    Acknowledge that GPs may have different levels of experience regarding antibiotic stewardship. Offer tailored training and resources to support those who may need extra help.
    Encourage Active Involvement in Local Networks
    GPs should be encouraged to engage actively with local networks, share experiences, and participate in ongoing feedback loops to ensure the project is continuously improving. Intervisions can be integrated in existing LOK/GLEM-groups to encourage active participation.

7.3.2 Facilitating collective action

- **Integrate guidelines into clinical systems**
  embed decision-support tools within electronic medical records (EMRs) for easy access during consultations.
- **Support practice adaptations**

provide funding or workflow redesign assistance to accommodate new protocols without disrupting patient care.

- **Address implementation challenges**
  develop culturally sensitive patient education materials and ensure adequate resource allocation to overcome system constraints. Improve the accessibility to the barometer for seamless use.
- **Leverage local champions for implementation**
  champions can drive adoption by offering guidance on practical workflow modifications, ensuring smoother integration of new practices, and serving as role models for their peers.
- **Develop sustainable behaviour reinforcement mechanisms**
  implement regular check-ins (quarterly feedback reports of antibiotic barometer, NRKP/CNPQ-indicators, general and specific communication about AMR and implementation) or structured follow-ups (participation of intervisions via LOK/GLEM-groups (mandatory attendance if necessary), train new local champions by working in duo with existing local champions, organize team-meetings about this topic at GP-practice level) to ensure continued application of new practices.

7.3.3 Enhancing cognitive participation

- **Provide incentives for participation**
  offer continuing medical education (CME) credits, professional recognition, or small grants to sustain motivation.
- **Foster collaborative network**
  establish peer support groups or digital platforms for knowledge sharing and group discussions. Intervisions play a key role here, enhancing professional learning through real-world case discussions and shared experiences.
- **Reduce participation barriers**
  simplify tools, improve technical support, and reassure participants about the non-punitive nature of external monitoring to foster sustained engagement.

7.3.4 Strengthening reflexive monitoring

- **Establish routine performance feedback**
  provide regular, non-punitive feedback reports to participants to track prescribing trends and improvements.
- **Develop sustainable behaviour reinforcement mechanisms**
  implement regular check-ins (quarterly feedback reports of antibiotic barometer, NRKP/CNPQ-indicators, general and specific communication about AMR and implementation) or structured follow-ups (participation to intervisions via LOK/GLEM-groups (mandatory attendance if necessary), train new local champions by working in duo with existing local champions, organize team-meetings about this topic at GP-practice level) to ensure continued application of new practices.
- **Ensure long-term sustainability**

institutionalize antibiotic stewardship programs through policy mandates and dedicated funding.

- **Expand and scale up the initiative**
  explore broader implementation across different clinical areas and professional groups while enhancing training programs.

7.4 Scientific evidence to underpin antibiotic stewardship implementation project

In addition to the recommendations formulated based on this antibiotic stewardship implementation project, the relevance and the effect of antibiotic stewardship and/or audit and feedback are underpinned via following recent international scientific publications.

- Alves et al., Establishing core competencies for antimicrobial stewardship teams: a consensus development using the modiefied Delphi technique – an European society of Clinical Microbiology and Infectious Diseases Study Group for Antimicrobial Stewardship position paper (Alves et al., European Society of clinical Microbiology and Infectious Diseases, 2025)[23]

ABSTRACT

Objectives: This study aimed to identify and develop a standard set of competencies needed for members of an antimicrobial stewardship (AMS) team.

Methods: A panel of experts in AMS utilized a survey based on a modified Delphi technique to establish consensus on AMS competencies.

Results: The authors identified 88 competencies covering 15 domains with strong agreement by 58 international experts. The identified domains were: the objectives of AMS; management of infection; microbiology diagnostics; pharmacology of antimicrobial agents; general principles of antibiotic use; the structure and the position of AMS; antimicrobial stewardship interventions; AMS in special settings; surveillance and monitoring; behaviour change and communication; infection prevention and control; quality management and patient safety; information technology (IT) support; communication with patients and general public and governance/policy framework. The consensus-based list of competencies was ratified by the European Study Group for Antimicrobial Stewardship Executive Committee.

Conclusions: The identified competencies can be used as a tool in planning of AMS training and to develop and optimize AMS programmes worldwide

They highlighted 15 areas of expertise necessary for an effective AMS team, ranging from microbiology and pharmacology to communication, governance, IT and human behaviour. They point the fact that the problem is not limited to ‘prescribing better’. Action is needed at several levels: clinical, organisational, educational, technological and political. They also pointed the need to set up multidisciplinary AMS teams.

- Audit and feedback: effects on professional practice (Ivers et al., Cochrane Database Systematic reviews, 2025)[24]

Background: Audit and feedback (A&F) is a widely used strategy to improve professional practice. This is supported by prior Cochrane reviews and behavioural theories describing how healthcare professionals are prompted to modify their practice when given data showing that their clinical practice is inconsistent with a desirable target. Yet there remains uncertainty regarding the effects of A&F on improving healthcare practice and the characteristics of A&F that lead to a greater impact.

Objectives: To assess the effects of A&F on the practice of healthcare professionals and to examine factors that may explain variation in the effectiveness of A&F.

Search methods: With the Cochrane Effective Practice and Organisation of Care (EPOC) group information scientist, we updated our search strategy to include studies published from 2010 to June 2020. Search updates were performed on 28 February 2019 and 11 June 2020. We searched MEDLINE (Ovid), Embase (Ovid), CINAHL (EBSCO), the Cochrane Library, clinicaltrials.gov (all dates to June 2020), WHO ICTRP (all dates to February Week 3 2019, no information available in 2020 due to COVID-19 pandemic). An updated search and duplicate screen was completed on February 14, 2022; studies that met inclusion criteria are included in the 'Studies awaiting classification' section.

Selection criteria: Randomised trials, including cluster-trials and cross-over and factorial designs, featuring A&F (defined as measurement of clinical performance over a specified period of time (audit) and provision of the resulting data to clinicians or clinical teams (feedback)) in any trial arm that reported objectively measured health professional practice outcomes.

Data collection and analysis: For this updated review, we re-extracted data for each study arm, including theory-informed variables regarding how the A&F was conducted and behaviour change techniques for each intervention, as well as study-level characteristics including risk of bias. For each study, we extracted outcome data for every healthcare professional practice targeted by A&F. All data were extracted by a minimum of two independent review authors. For studies with dichotomous outcomes that included arms with and without A&F, we calculated risk differences (RDs) (absolute difference between arms in proportion of desired practice completed) and also odds ratios (ORs). We synthesised the median RDs and interquartile ranges (IQRs) across all trials. We then conducted meta-analyses, accounting for multiple outcomes from a given study and weighted by effective sample size, using reported (or imputed, when necessary) intra-cluster correlation coefficients. Next, we explored the role of baseline performance, co-interventions, targeted behaviour, and study design factors on the estimated effects of A&F. Finally, we conducted exploratory meta-regressions to test preselected variables that might be associated with A&F effect size: characteristics of the audit (number

of indicators, aggregation of data); delivery of the feedback (multi-modal format, local champion, nature of comparator, repeated delivery); and components supporting action (facilitation, provision of specific plans for improvement, co-development of action plans).

Main results: We included 292 studies with 678 arms; 133 (46%) had a low risk of bias, 41 (14%) unclear, and 113 (39%) had a high risk of bias. There were 26 (9%) studies conducted in low- or middle-income countries. In most studies (237, 81%), the recipients of A&F were physicians. Professional practices most commonly targeted in the studies were prescribing (138 studies, 47%) and test-ordering (103 studies, 35%). Most studies featured multifaceted interventions: the most common co-interventions were clinician education (377 study arms, 56%) and reminders (100 study arms, 15%). Forty-eight unique behaviour change techniques were identified within the study arms (mean 5.2, standard deviation 2.8, range 1 to 29). Synthesis of 558 dichotomous outcomes measuring professional practices from 177 studies testing A&F versus control revealed a median absolute improvement in desired practice of 2.7%, with an IQR of 0.0 to 8.6. Meta-analyses of these studies, accounting for multiple outcomes from the same study and weighting by effective sample size accounting for clustering, found a mean absolute increase in desired practice of 6.2% (95% confidence interval (CI) 4.1 to 8.2; moderate-certainty evidence) and an OR of 1.47 (95% CI 1.31 to 1.64; moderate-certainty evidence). Effects were similar for pre-planned subgroup analyses focused on prescribing and test-ordering outcomes. Lower baseline performance and increased number of co-interventions were both associated with larger intervention effects. Meta-regressions comparing the presence versus absence of specific A&F components to explore heterogeneity, accounting for baseline performance and number of co-interventions, suggested that A&F effects were greater with individual-recipient-level data rather than team-level data, comparing performance to top-peers or a benchmark, involving a local champion with whom the recipient had a relationship, using interactive modalities rather than just didactic or just written format, and with facilitation to support engagement, and action plans to improve performance. The meta-regressions did not find significant effects with the number of indicators in the audit, comparison to average performance of all peers, or co-development of action plans. Contrary to expectations, repeated delivery was associated with lower effect size. Direct comparisons from head-to-head trials support the use of peer-comparisons versus no comparison at all and the use of design elements in feedback that facilitate the identification and action of high-priority clinical items.

Authors' conclusions: A&F can be effective in improving professional practice, but effects vary in size. A&F is most often delivered along with co-interventions which can contribute additive effects. A&F may be most effective when designed to help recipients prioritise and take action on high-priority clinical issues and with the following characteristics: 1. targets important performance metrics where health professionals have substantial room for improvement (audit); 2. measures the

individual recipient's practice, rather than their team or organisation (audit); 3. involves a local champion with an existing relationship with the recipient (feedback); 4. includes multiple, interactive modalities such as verbal and written (feedback); 5. compares performance to top peers or a benchmark (feedback); 6. facilitates engagement with the feedback (action); 7. features an actionable plan with specific advice for improvement (action). These conclusions require further confirmatory research; future research should focus on discerning ways to optimise the effectiveness of A&F interventions.

8. General conclusion

8.1 Enhance Clarity and Communication

- Clearly define the **role of local champions** - potentially renaming them as "stewards" - to prevent misconceptions and improve engagement.
- Strengthen **communication** by simplifying objectives and training materials, and use real-world case studies to **illustrate behavioural change strategies in practice**.

8.2 Increase Engagement and Participation

- **Recruit** a diverse range of GPs through **existing** professional **networks** and peer-led referrals.
- Provide **strategic incentives such as logistical support** rather than direct monetary compensation.
- Empower local champions with greater **autonomy and flexibility** to lead discussions tailored to their groups' needs.

8.3 Optimize Implementation and Multidisciplinary Collaboration

- Improve accessibility by offering flexible **participation formats** (online and in-person).
- Strengthen facilitator training with **interactive workshops** and role-playing techniques.
- **Encourage collaboration** by involving a diverse range of healthcare professionals - such as pharmacists, dentists, and veterinarians - to foster critical discussions and broaden the project's impact in the future (One Health approach).

8.4 Ensure Continuous Monitoring and Adaptation

- Establish **structured feedback mechanisms**, including short surveys and reflective exercises, to assess behavioural changes **alongside prescribing data**.
- **Adapt interventions** based on **participant feedback and showcase success stories** to reinforce engagement and share best practices.

9. Congresses and publications

This project was presented on the following national/international congresses:

- **WONCA (7-10/06/2023)**
  Anthierens Sibyl, Anneleen Jannsen, Digregorio Marina, Fauquert Benjamin, Heytens Stefan, Jan Verbakel on behalf of the project group. Antibiotic stewardship for respiratory tract infections: implementation research project. WONCA 2023, 7-10 June 2023, Brussels.
- **Be.hive primary care conference (29/11/2023)**
  Pauwen Nathalie, Vrancken Leia, Corremans Marleen, Janssen Anneleen. Implementation of evidence-based practice: how to support implementers? Be.hive 2023, 29 November 2023, Brussels.
- **CMG-congres (15/11/2024)**
  Digregorio M, Colliers A, Fauquert B, Mokrane S, Offermans AM, Laverdeur J, Scholtes B, Soetaert J, Vaes B, Van den Bulck S, Van den Bruel A, Vanholle S, De Sutter A, Verbakel J, Heytens S, Coenen S, Anthierens S, Janssen A. Local antibiotic stewardship for respiratory tract infections in general practice: a national implementation project. Congrès CMG 2024, 15-16 November 2024, Namur.
- **66th EquiP Conference (8-10/05/2025)**
  Meel Liesbeth, Vaes Bert. An A&F strategy in combination with an antibiotic stewardship program – improving GP awareness when prescribing antibiotics.
- **Interuniversity symposium (ULB, UCLouvain, ULiège) (19/06/2025)**
  Digregorio Marina, Fauquert Benjamin, Mokrane Saphia, Offermans Anne-Marie
  Gestion des traitements infectieux en ambulatoire : état des lieux et perspectives.
- **European Implementation Event (5-6/06/2025)**
  Hoste Melanie, Anthierens Sibyl et al. The intention was to work bottom-up, and it worked out. Local champions transforming antibiotic prescribing practices amongst Belgian general practitioners: a pilot implementation study
- **Symposium interuniversitaire en gestion de la therapie anti-infectieuse (19/06/2025)**
  Gestion des traitements anti-infectieux en ambulatoure: état des lieux et perspectives

This project is submitted to be presented on the following national/international congresses:

- **10th International Audit and Feedback in Healthcare Conference (2025)**
  Soetaert J, Van den Bulck Steve, Janssen Anneleen, Raat Willem, Meel Liesbeth, Vaes Bert. An automated A&F strategy combined with academic detailing to improve antibiotic stewardship in primary care.
- **CMG-congres (15/11/2025)**
  Digregorio M, Fauquert B, Mokrane S, Offermans AM, Laverdeur J, Scholtes B, Soetaert J, Vaes B, Van den Bulck S, De Sutter A, Verbakel J, Heytens S, Coenen S, Anthierens S, Hoste M, Janssen A. Implementing local antibiotic stewardship for respiratory tract infections for general practitioners Congrès CMG 2025, 21-22 November 2025, Charleroi.
- **WONCA (17-21/06/2025)**

Anthierens Sibyl, Anneleen Jannsen on behalf of the project group. Driving behaviour change through intervisions: lessons learned from a national antimicrobial stewardship implementation project. WONCA 2025, Lisbon

10. Acknowledgements

- Consortium partners and Domus Medica for investing much more time and efforts than provided.
- External experts for their added-value, expertise and commitment.
- Evikey core partners (Cebam and EBPracticenet) for their unwavering support, advise and expertise.
- Guidance committee for their advice and guidance.

11. Attachments

Table 18 gives an overview of materials (end-products) that are developed in context of this project and the work package to which they belong.

Table 18: Overview of attachments/end-products.

WORK PACKAGE	FILE-NAME OF DOCUMENT
WP1	Implementation plan (20230210)
	Overview of determinants and link with WP (IRLM)
WP2	Presentation of training session (part 1)
	Presentation of training session (part 2)
WP3	Recruitment flyer for local champions
	Recruitment flyer for GPs
	Overview of interventions (adapted version)
	General support material for intervision: road map
	General support material for intervision: implementation plan for each intervision
	Preparation of intervision: template mail for invitation of GPs
	Preparation of intervision: template reminder for GPs
	Preparation of intervision: one-pager with tips and tricks (for intervision 3 and 4)
	Preparation of intervision: guidance for intervisions
	Preparation of intervision: leaflet with overview of implementation project
	Preparation of intervision: how to give feedback (Pendleton)
	Support material during intervision: presentation for intervision 1, 2, 3, 4
	Support material during intervision: overview of methods and structure for intervision
	Support material during intervision: template of extended version of action plan
	Support material during intervision: template of compact version of action plan
	Support material after intervision: document for financial compensation of local champion
	Presentation for support session 1
	Presentation for support session 2
	Overview of motivation local champions to moderate additional peer group
	Overview of input of participants via registration forms
WP4	Manual for Healthstat account
	Manual for consulting feedback on Healthstat via screenshots
	Statements to support interpretation of barometer results
	Template for overview of APQI

WP5	Digital toolkit: lokaal antibioticastewardship luchtweginfecties
	Digital toolkit: gestion locale des antibiotiques pour les infections des voies respiratoires
WP6	Report on focus group analysis (local champions)
	Report on questionnaire (GPs)
	Report on individual interviews (GPs)

12. References

1. Malhotra-Kumar S, Lammens C, Coenen S, Van Herck K, Goossens H. Effect of azithromycin and clarithromycin therapy on pharyngeal carriage of macrolide-resistant streptococci in healthy volunteers: a randomised, double-blind, placebo-controlled study. *The Lancet*. 2007;369(9560):482-490. doi:10.1016/S0140-6736(07)60235-9

2. Malhotra-Kumar S, Van Heirstraeten L, Coenen S, et al. Impact of amoxicillin therapy on resistance selection in patients with community-acquired lower respiratory tract infections: a randomized, placebo-controlled study. *J Antimicrob Chemother*. 2016;71(11):3258-3267. doi:10.1093/jac/dkw234

3. *RIZIV. Farmanet. <https://Www.Riziv.Fgov.Be/Nl/Statistieken/Geneesmiddel/Paginas/Geneesmiddelen-Groep-Voorschrijvers.Aspx>*.

4. Bruyndonckx R, Adriaenssens N, Versporten A, et al. Consumption of antibiotics in the community, European Union/European Economic Area, 1997–2017. *Journal of Antimicrobial Chemotherapy*. 2021;76(Supplement_2):ii7-ii13. doi:10.1093/jac/dkab172

5. *Leroy R, Christiaens W, Maertens de Noordhout C, et al. Voorstellen Voor Een Effectiever Antibioticabeleid in België-Synthese. Health Services Research (HSR) Brussel: Federaal Kenniscentrum Voor de Gezondheidszorg (KCE) 2019*.

6. Borek A, Anthierens S, Allison R, et al. Social and Contextual Influences on Antibiotic Prescribing and Antimicrobial Stewardship: A Qualitative Study with Clinical Commissioning Group and General Practice Professionals. *Antibiotics*. 2020;9(12):859. doi:10.3390/antibiotics9120859

7. Borek AJ, Santillo M, Wanat M, Butler CC, Tonkin-Crine S. How can behavioural science contribute to qualitative research on antimicrobial stewardship in primary care? *JAC-Antimicrobial Resistance*. 2022;4(1):dlac007. doi:10.1093/jacamr/dlac007

8. Colliers A, Philips H, Bombeke K, Remmen R, Coenen S, Anthierens S. Safety netting advice for respiratory tract infections in out-of-hours primary care: A qualitative analysis of consultation videos. *European Journal of General Practice*. 2022;28(1):87-94. doi:10.1080/13814788.2022.2064448

9. Smith JD, Li DH, Rafferty MR. The Implementation Research Logic Model: a method for planning, executing, reporting, and synthesizing implementation projects. *Implementation Sci*. 2020;15(1):84. doi:10.1186/s13012-020-01041-8

10. Aagaard EM, Gonzales R, Camargo CA, et al. Physician Champions Are Key to Improving Antibiotic Prescribing Quality. *The Joint Commission Journal on Quality and Patient Safety*. 2010;36(3):109-116. doi:10.1016/S1553-7250(10)36019-3

11. Cranley LA, Cummings GG, Profetto-McGrath J, Toth F, Estabrooks CA. Facilitation roles and characteristics associated with research use by healthcare professionals: a scoping review. *BMJ Open*. 2017;7(8):e014384. doi:10.1136/bmjopen-2016-014384

12. Michie S, Van Stralen MM, West R. The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Sci*. 2011;6(1):42. doi:10.1186/1748-5908-6-42

13. Cane J, O'Connor D, Michie S. Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implementation Sci*. 2012;7(1):37. doi:10.1186/1748-5908-7-37

14. May CR, Cummings A, Girling M, et al. Using Normalization Process Theory in feasibility studies and process evaluations of complex healthcare interventions: a systematic review. *Implementation Sci*. 2018;13(1):80. doi:10.1186/s13012-018-0758-1

15. *BAPCOC-Antibioticagids, Available via Www.Bcfi.Be*.

16. Adriaenssens N, Bartholomeeusen S, Ryckebosch P, Coenen S. Quality of antibiotic prescription during office hours and out-of-hours in Flemish primary care, using European quality indicators. *European Journal of General Practice*. 2014;20(2):114-120. doi:10.3109/13814788.2013.828200

17. Colliers A, Adriaenssens N, Anthierens S, et al. Antibiotic Prescribing Quality in Out-of-Hours Primary Care and Critical Appraisal of Disease-Specific Quality Indicators. *Antibiotics*. 2019;8(2):79. doi:10.3390/antibiotics8020079

18. Adriaenssens N, Coenen S, Tonkin-Crine S, et al. European Surveillance of Antimicrobial Consumption (ESAC): disease-specific quality indicators for outpatient antibiotic prescribing. *BMJ Quality & Safety*. 2011;20(9):764-772. doi:10.1136/bmjqs.2010.049049

19. Arnold SR, Straus SE. Interventions to improve antibiotic prescribing practices in ambulatory care. Cochrane Effective Practice and Organisation of Care Group, ed. *Cochrane Database of Systematic Reviews*. Published online October 19, 2005. doi:10.1002/14651858.CD003539.pub2

20. Trietsch J, Van Steenkiste B, Hobma S, et al. The challenge of transferring an implementation strategy from academia to the field: A process evaluation of local quality improvement collaboratives in Dutch primary care using the normalization process theory. *Evaluation Clinical Practice*. 2014;20(6):1162-1171. doi:10.1111/jep.12287

21. Hallsworth M, Chadborn T, Sallis A, et al. Provision of social norm feedback to high prescribers of antibiotics in general practice: a pragmatic national randomised controlled trial. *The Lancet*. 2016;387(10029):1743-1752. doi:10.1016/S0140-6736(16)00215-4

22. Van Den Wyngaert I, Van Pottelbergh G, Coteur K, Vaes B, Van Den Bulck S. Developing a questionnaire to evaluate an automated audit & feedback intervention: a Rand-modified Delphi method. *BMC Health Serv Res*. 2024;24(1):433. doi:10.1186/s12913-024-10915-2

23. Alves J, Schouten J, Thursky K, et al. Establishing core competencies for antimicrobial stewardship teams: a consensus development using the modified Delphi technique—an European Society of Clinical Microbiology and Infectious Diseases Study Group for Antimicrobial Stewardship position paper. *Clinical Microbiology and Infection*. Published online May 2025. doi:10.1016/j.cmi.2025.04.035

24. Ivers N, Yogasingam S, Lacroix M, et al. Audit and feedback: effects on professional practice. Cochrane Central Editorial Service, ed. *Cochrane Database of Systematic Reviews*. 2025;2025(3). doi:10.1002/14651858.cd000259.pub4

DOMUS MEDICA

V.U.: Jeroen van den Brandt • Lange Leemstraat 187 • 2018 Antwerpen

Domus Medica VZW
Lange Leemstraat 187
2018 Antwerpen

www.domusmedica.be
info@domusmedica.be
03 425 76 76