



Development and Dissemination of National Antimicrobial Prescribing Guidelines

Développement et diffusion des lignes directrices nationales sur la prescription d'antimicrobiens

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AMMI Canada President 2022-2024

Objectives | Objectifs

- Introduction to antimicrobial resistance
 - Pan-Canadian Action Plan on AMR
 - AMMI-PHAC Guideline
 - Membership
 - Methodology
 - Example of completed guideline
 - Next steps
-
- Introduction à la résistance aux antimicrobiens
 - Plan d'action pancanadien sur la RAM
 - Ligne directrice AMMI-PHAC
 - Adhésion
 - Méthodologie
 - Exemple de directive complétée
 - Prochaines étapes



Antimicrobial Resistance (AMR)

Résistance aux Antimicrobiens (RAM)

- WHO identified AMR as one of the [top 10 global public health threats facing humanity](#)
- Canadian Antimicrobial Resistance Surveillance System Report (CARSS) 2022
 - Overall increase in AMR in priority organisms: MRSA, VRE, CPE, *N. gonorrhoeae*
- Antifungal resistance: MDR *C. auris*, azole resistant *Aspergillus fumigatus* complex
- L'OMS a identifié la RAM comme l'une des 10 principales menaces mondiales pour la santé publique auxquelles l'humanité est confrontée.
- Rapport du Système canadien de surveillance de la résistance aux antimicrobiens (CARSS) 2022
 - Augmentation globale de la RAM dans les organismes prioritaires : SARM, ERV, EPC, *N. gonorrhoeae*
- Résistance antifongique : *C. auris* multirésistant, résistant aux azoles *Aspergillus fumigatus* complexe



Global burden of bacterial antimicrobial resistance 1990–2021: a systematic analysis with forecasts to 2050

GBD 2021 Antimicrobial Resistance Collaborators*

Lancet 2024;404:1199-226 En anglais seulement

- Estimated deaths associated with AMR:
 - In 2021: 4.71 million deaths associated with bacterial AMR
 - Decrease in deaths in < 5 years of age but increase in >5 years
 - By 2050, projection of 1.91 million attributable deaths and 8.22 million associated deaths
- The economic cost of AMR is estimated to reach US 1 trillion in health care costs by 2050
- Estimations des décès associés à la RAM :
 - En 2021 : 4,71 millions de décès associés à la RAM bactérienne
 - Diminution des décès chez les enfants de moins de 5 ans mais augmentation chez les personnes de plus de 5 ans
 - D'ici 2050, projection de 1,91 million de décès attribuables et de 8,22 millions de décès associés. Le coût économique de la RAM devrait atteindre 1 trillion de dollars américains en coûts de santé d'ici 2050
- Le coût économique de la RAM devrait atteindre 1 billion de dollars américains en coûts de santé d'ici 2050

Pan Canadian Action Plan on Antimicrobial Resistance 2023-2027

Plan d'action pancanadien sur la résistance aux antimicrobiens 2023-2027



Development of guidelines for appropriate AMU with a broad reach and tailored for Canadian prescribers

Outcome 1:
Prescribers and other professionals in Canada have the resources, training, and tools to facilitate appropriate AMU in humans and animals

Résultat souhaité 1:
Les prescripteurs et les autres professionnels de la santé au Canada disposent des ressources, des formations et des outils nécessaires pour faciliter une UAM judicieuse chez les humains et les animaux



Développement de lignes directrices pour une UAM appropriée avec une large portée et adaptées aux prescripteurs canadiens

AMMI Guidelines Panel

Panel des directives AMMI

AMMI Canada

Chair: Dr. Deb Yamamura

Co-chair: Dr. Dena Zeraatkar (Methodologist)

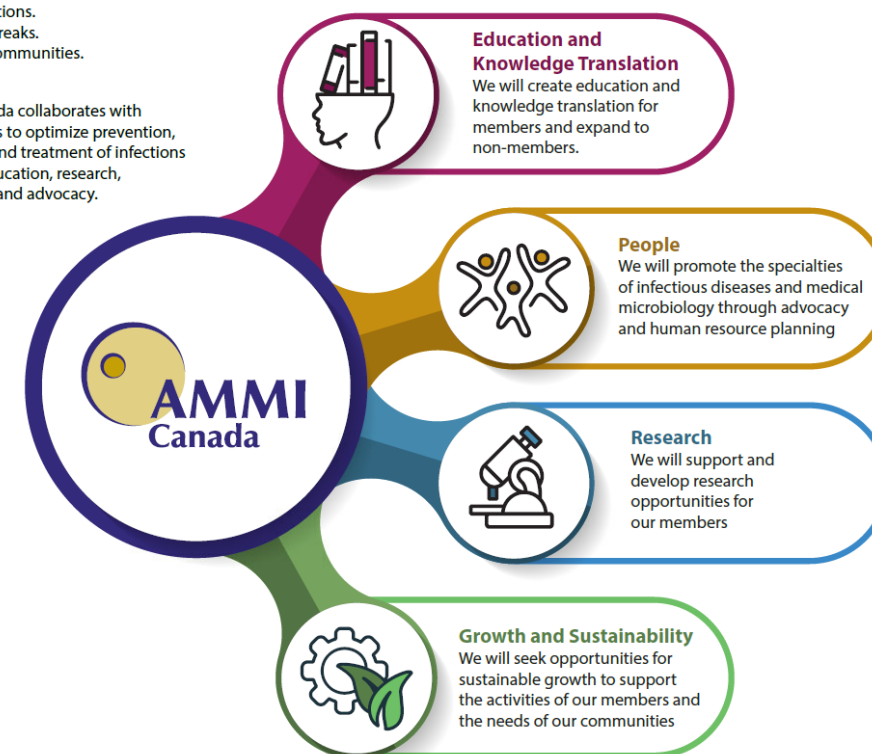
- Dr. Mark Loeb
- Dr. Nicole Le Saux
- Dr. Peter Daley
- Dr. Rene Wittmer
- Dr. Alena Tse-Chang
- Dr. Bradley Langford
- Dr. Philippe Morency-Potvin
- Dr. Kevin Afra
- Dr. Alyssa Ness
- Dr. Tim Lau

Vision:

Fewer Infections.
Fewer Outbreaks.
Healthier Communities.

Mission:

AMMI Canada collaborates with our partners to optimize prevention, diagnosis, and treatment of infections through education, research, innovation and advocacy.



En anglais seulement

WHO's essential medicines and AWaRe: recommendations on first- and second-choice antibiotics for empiric treatment of clinical infections (Clin Micro Infection 30 (2024):S1-S51) *En anglais seulement*

- Antibiotics are classified into three groups:

Access, Watch, Reserve

- Optimize empiric antibiotic prescribing for key infectious syndromes
- Increase use of Access or no antibiotics
 - ➔ Prevent emergence of AMR
 - ➔ Improve patient outcomes

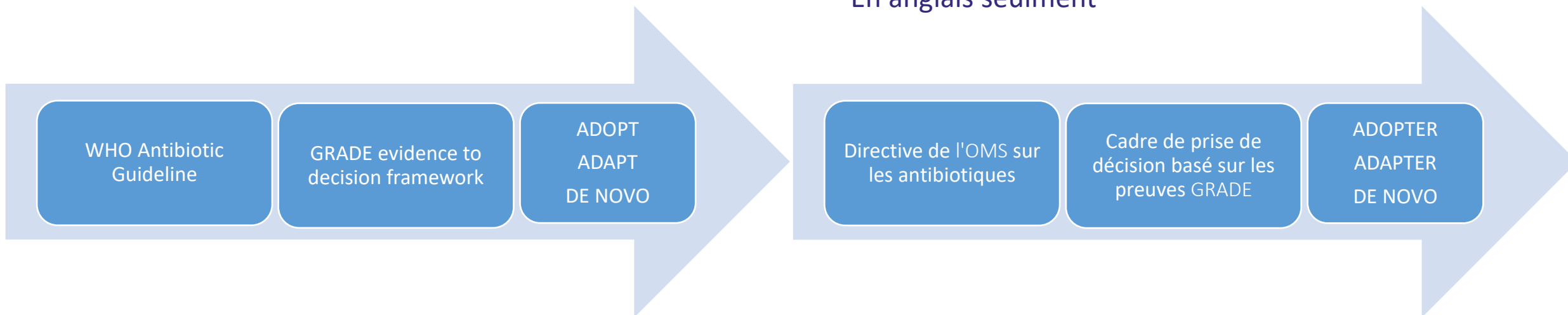
- Les antibiotiques sont classés en trois groupes:

Accès, Surveillance, Réserve

- Optimiser la prescription empirique d'antibiotiques pour les syndromes infectieux clés
- Augmenter l'utilisation de l'Accès ou pas d'antibiotiques
 - ➔ Prévenir l'émergence de l'AMR
 - ➔ Améliorer les résultats des patients

GRADE Evidence to Decision (EtD) frameworks for adoption, adaptation, and de novo development of trustworthy recommendations: GRADE-ADOLOPMENT

Journal of Clinical Epidemiology 81 (2017) 101e110
En anglais seulement



ADOPT – Adopt existing guidelines without any change

ADAPT – May change the specific population, intervention, certainty of evidence. Values and cost criteria.

Both require less resources as build on existing guidelines

DE NOVO – New recommendations based on evidence syntheses

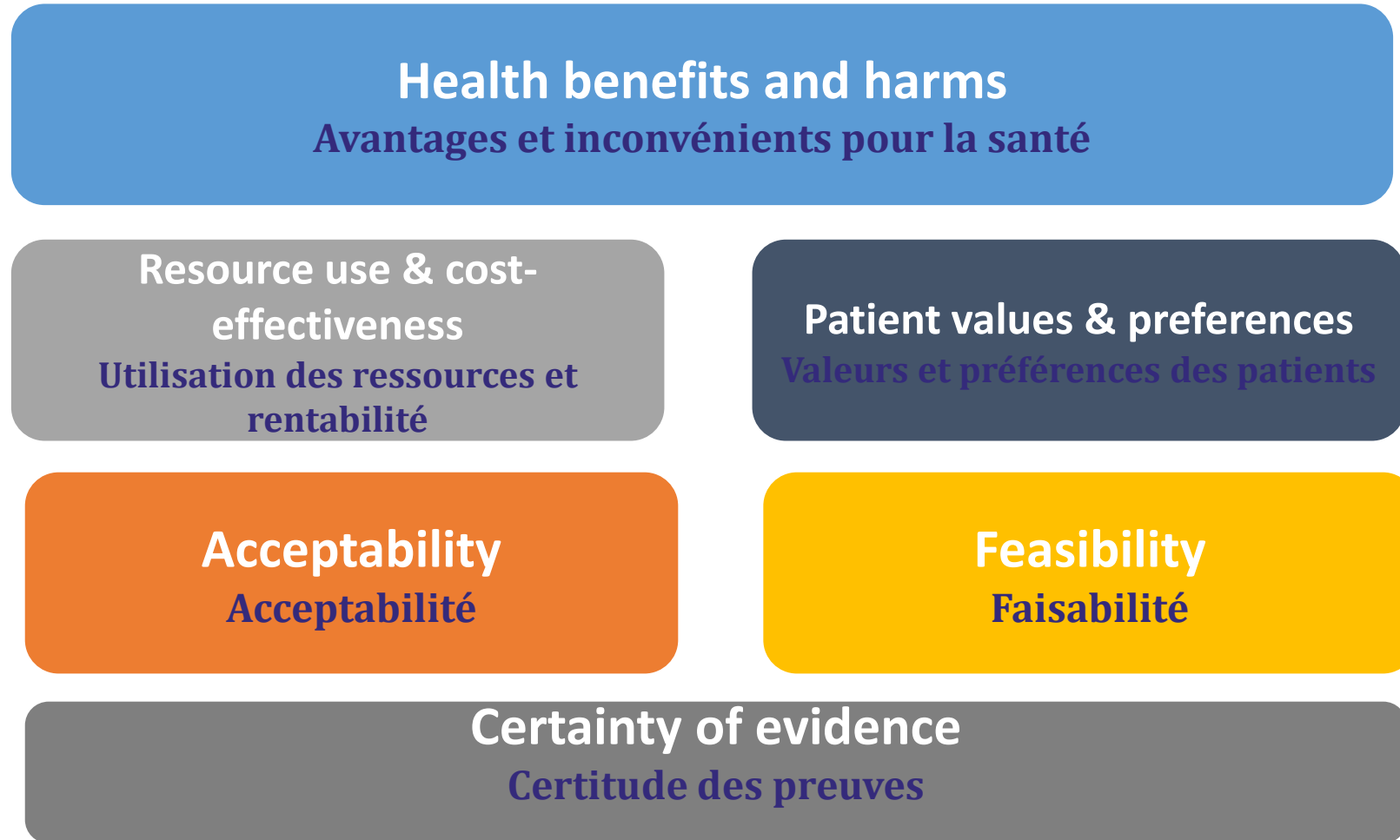
ADOPTER – Adopter les directives existantes sans aucun changement

ADAPTER – Peut modifier la population spécifique, l'intervention, la certitude des preuves. Critères de valeurs et de coûts.

Les deux nécessitent moins de ressources car ils s'appuient sur des directives existantes.

DE NOVO – Nouvelles recommandations basées sur des synthèses de preuves

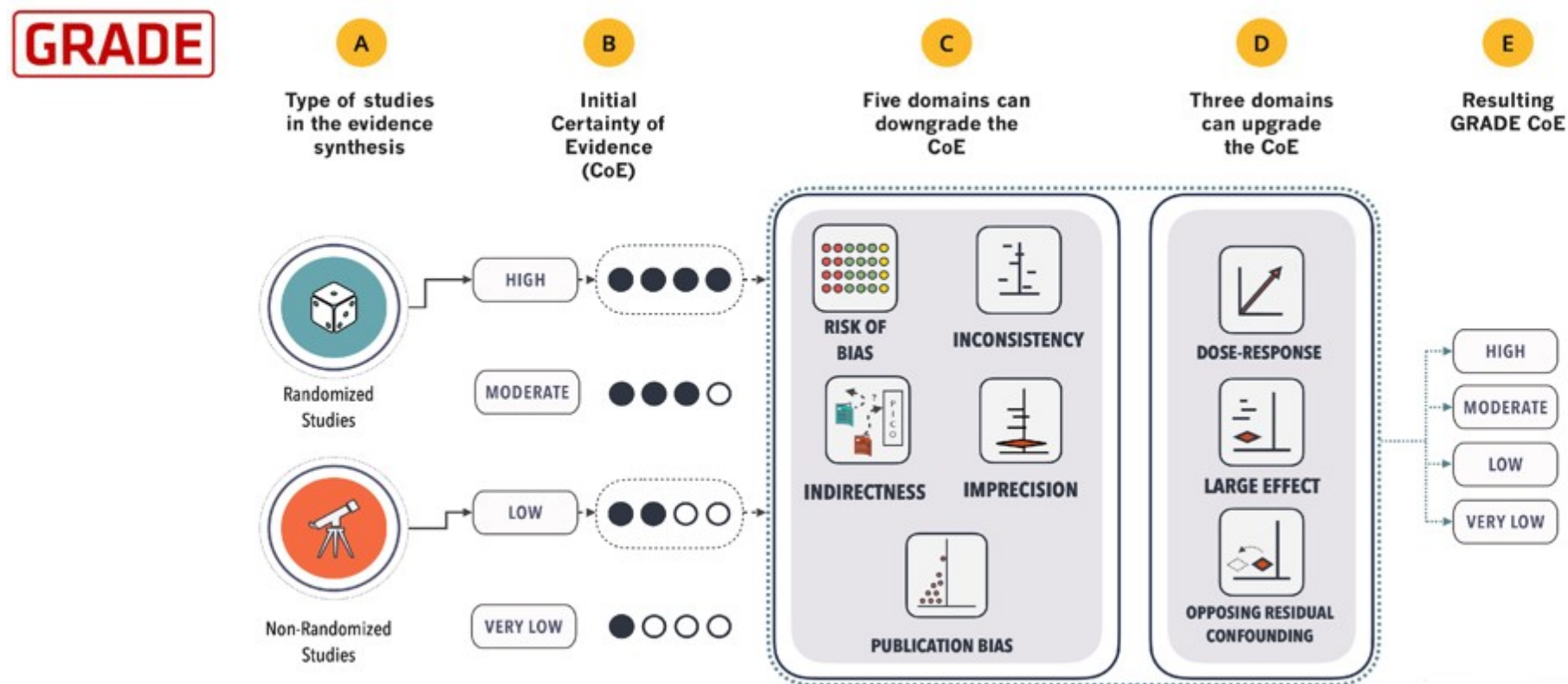
ADOLOPMENT | “ADOLOPMENT”



From | de Dr. Dena Zeraatkar

Overview of Systematic Reviews

Aperçu des revues systématiques



Measurement of effectiveness and safety

Mesure de l'efficacité et de la sécurité

Systematic review

Revue systématique

GRADE ratings and interpretation

High certainty	Definitely more effective	Definitely worse	Definitely no different
Moderate certainty	Probably more effective	Probably worse	Probably no different
Low certainty	May be more effective	May be worse	May be no different
Very low certainty	We are very uncertain		

En anglais seulement

Patient Values and Preferences

Valeurs et préférences des patients

- Patients place a higher value on outcomes like mortality and serious adverse events compared to clinical cure and antibiotic resistance.
 - For conditions that are self-limiting, patients place a higher value on avoiding serious adverse events compared to achieving faster clinical cure.
 - Patients prefer antibiotics that require less frequent dosing, have a shorter treatment duration, are less costly, and are available in oral formulations.
 - Patients are less adherent to antibiotics that cause adverse events.
 - Patients have a lower preference for antibiotics once they are counseled about antibiotic resistance.
 - Children prefer oral antibiotics that can be formulated to have a pleasant taste.
- Les patients accordent une plus grande importance aux résultats tels que la mortalité et les événements indésirables graves par rapport à la guérison clinique et à la résistance aux antibiotiques.
 - Pour les affections autolimitantes, les patients accordent une plus grande importance à éviter les événements indésirables graves qu'à obtenir une guérison clinique plus rapide.
 - Les patients préfèrent les antibiotiques qui nécessitent des posologies moins fréquentes, ont une durée de traitement plus courte, sont moins coûteux et sont disponibles sous forme orale.
 - Les patients sont moins adhérents aux antibiotiques qui provoquent des effets indésirables.
 - Les patients ont une préférence moindre pour les antibiotiques une fois qu'ils sont informés sur la résistance aux antibiotiques.
 - Les enfants préfèrent les antibiotiques oraux qui peuvent être formulés pour avoir un goût agréable.

Other principles | Autres principes

- Antibiotic resistance:
 - When limited evidence of effectiveness, withholding antibiotics are preferred
 - Non antibiotic alternatives should be considered/provided if the benefits of antibiotics are limited
 - Local resistance patterns can impact regional selection of empiric antibiotics
 - Narrower-spectrum agents are preferable to broader spectrum agents
 - Shortest effective duration (reduces selection pressure, complications such as *C. difficile*)
 - Prior exposure to antibiotics is associated with colonization or infection with a multi-drug organisms and the risk is the least with Access versus Reserve Abx (Sulis G et al Clin Micro Inf 28 (2022) 1193-1202)
 - Resources – antibiotic cost per day
 - FDA warnings eg. Tigecycline increased risk of all-cause mortality
- Résistance aux antibiotiques:
 - Lorsque les preuves d'efficacité sont limitées, il est préférable de ne pas administrer d'antibiotiques
 - Les alternatives non antibiotiques doivent être envisagées/fournies si les avantages des antibiotiques sont limités
 - Les schémas de résistance locaux peuvent influencer la sélection régionale des antibiotiques empiriques
 - Les agents à spectre plus étroit sont préférables aux agents à spectre plus large
 - Durée effective la plus courte (réduit la pression de sélection, complications comme le *C. difficile*)
 - Une exposition antérieure aux antibiotiques est associée à la colonisation ou à l'infection par des organismes multirésistants, et le risque est le plus faible avec Access par rapport à Reserve Abx (Sulis G et al Clin Micro Inf 28 (2022) 1193-1202)
 - Ressources – coût quotidien des antibiotiques
 - Avertissements de la FDA, par exemple, la tigécycline augmente le risque de mortalité toutes causes confondues.

Overview of other guidelines

Aperçu des autres directives

- National or International Guidelines
 - Specific to the syndrome and population being reviewed
 - Includes recommendations on empiric antibiotics
 - Excludes regional guidelines
- Directives nationales ou internationales
 - Spécifique au syndrome et à la population examinés
 - Comprend des recommandations sur les antibiotiques empiriques
 - Exclut les directives régionales

Adult Non-Severe Community Acquired Pneumonia (CAP)

Pneumonie communautaire acquise non sévère chez l'adulte (CAP)

WHO AWaRE antibiotic book

R_x Mild to Moderate Cases

All dosages are for normal renal function
Antibiotics are listed in alphabetical order and should be considered equal treatment options unless otherwise indicated

First Choice

 Amoxicillin 1 g q8h **ORAL**

----- **OR** -----

 Phenoxyethylpenicillin (as potassium) 500 mg (800 000 IU) q6h **ORAL**

Second Choice

 Amoxicillin+clavulanic acid 875 mg+125 mg q8h **ORAL**

----- **OR** -----

 Doxycycline 100 mg q12h **ORAL**

Guide AWaRe de l'OMS sur les antibiotiques

R_x Cas bénins à modérés

Toutes les posologies sont indiquées pour une fonction rénale normale
Les antibiotiques sont présentés par ordre alphabétique et doivent être considérés comme des options thérapeutiques équivalentes, sauf indication contraire

Première intention

 Amoxicilline 1 g q8h **VOIE ORALE**

----- **OU** -----

 Phénoxyéthylpénicilline (de potassium) 500 mg (800 000 UI) q6h **VOIE ORALE**

Deuxième intention

 Amoxicilline + acide clavulanique 875 mg + 125 mg q8h **VOIE ORALE**

----- **OU** -----

 Doxycycline 100 mg q12h **VOIE ORALE**

Population: Patients with mild or moderate CAP (Pneumonia Severity Index I to IV or based on trial author's description of patients as being mild/moderate or if patients were treated outside the hospital using oral antibiotics)				
Kuratschka 2024 (trials published from 1999 to November 2022); 24 trials with 9,361 patients				
Frequentist random-effects network meta-analysis				
Antibiotic	Mortality		Clinical response ^a	
	Absolute risk difference per 1000 patients (95% CI)	GRADE Simple Language Summary	Absolute risk difference per 1000 patients (95% CI)	GRADE Simple Language Summary
Comparator: Clarithromycin ^{b, c, d}				
Levofloxacin	-10 (-10 to 19) RR: 0.04 (0 to 2.84) Low	Levofloxacin may have little or no effect on mortality compared to clarithromycin.	8 (-42 to 59) RR: 1.01 (0.95 to 1.07) Moderate	Levofloxacin probably has little or no effect on clinical response compared to clarithromycin.
Azithromycin	-9 (-10 to 11) RR: 0.11 (0.01 to 2.09) Low	Azithromycin may have little or no effect on mortality compared to clarithromycin.	-8 (-50 to 33) RR: 0.99 (0.94 to 1.04) Moderate	Azithromycin probably has little or no effect on clinical response compared to clarithromycin.
Moxifloxacin	-4 (-8 to 8) RR: 0.62 (0.21 to 1.81) Low	Moxifloxacin may have little or no effect on mortality compared to clarithromycin.	0 (-33 to 33) RR: 1 (0.96 to 1.04) Moderate	Moxifloxacin probably has little or no effect on clinical response compared to clarithromycin.
Telithromycin	-1 (-8 to 32) RR: 0.91 (0.2 to 4.22) Low	Telithromycin may have little or no effect on mortality compared to clarithromycin.	8 (-42 to 50) RR: 1.01 (0.95 to 1.06) Moderate	Telithromycin probably has little or no effect on clinical response compared to clarithromycin.
Lefamulin	0 (-8 to 52) RR: 1.03 (0.17 to 6.15) Low	Lefamulin may have little or no effect on mortality compared to clarithromycin.	-17 (-75 to 42) RR: 0.98 (0.91 to 1.05) Moderate	Lefamulin probably has little or no effect on clinical response compared to clarithromycin.
Amoxicillin	-3 (-9 to 23) RR: 0.68 (0.14 to 3.29) Low	Amoxicillin may have little or no effect on mortality compared to clarithromycin.	-59 (-109 to 0) RR: 0.93 (0.87 to 1) Low	Amoxicillin may have little or no effect on clinical response compared to clarithromycin.
Amoxicillin/clavulanate	-9 (-10 to 146) RR: 0.12 (0 to 15.49) Very low	We are very uncertain of the effect of amoxicillin/clavulanate on mortality.	-8 (-50 to 42) RR: 0.99 (0.94 to 1.05) Moderate	Amoxicillin/clavulanate probably has little or no effect on clinical response compared to clarithromycin.
Clarithromycin + cefuroxime	0 (-10 to 486) RR: 1 (0.02 to 49.33) Very low	We are very uncertain of the effect of the combination of clarithromycin + cefuroxime on mortality.	0 (-84 to 92) RR: 1 (0.9 to 1.11) Moderate	The combination of clarithromycin + cefuroxime probably has little or no effect on clinical response compared to clarithromycin.
Cefpodoxime			0 (-84 to 92) RR: 1 (0.9 to 1.11) Moderate	Cefpodoxime probably has little or no effect on clinical response compared to clarithromycin.
Cethromycin			-25 (-67 to 25) RR: 0.97 (0.92 to 1.03) Moderate	Cethromycin probably has little or no effect on clinical response compared to clarithromycin.
Penicillin			-125 (-251 to 25) RR: 0.85 (0.7 to 1.03) Low	Penicillin may reduce the proportion of patients who achieve clinical response compared to clarithromycin.

Not for dissemination
Non diffusé

Unpublished data
Données non publiées

GRADE ratings and interpretation

High certainty	Definitely more effective	Definitely worse	Definitely no different
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En anglais seulement

En anglais seulement



Unpublished data **Données non publiées**Not for dissemination | **Non diffusé**

Comparison		Absolute risk difference per 1000 patients (95% CI) <i>RR or OR (95% CI)</i>	GRADE Simple Language Summary
Population: Patients with CAP			
Ashy 2022 (trials published up to November 2021)			
Frequentist random-effects pairwise meta-analysis			
Erythromycin vs. clarithromycin^a			
Clinical cure^b	4 trials (572 patients)	-178 (-280 to -43) RR: 0.67 (0.48 to 0.92) Low (due to serious risk of bias and serious imprecision)	<i>Erythromycin may reduce the proportion of patients who achieve clinical cure compared to clarithromycin.</i>
Population: Patients with CAP			
Choi 2023 (trials published up to March 2022)			
Frequentist random-effects pairwise meta-analysis			
Doxycycline vs. macrolide or fluoroquinolone			
Clinical cure^{g,h} (only in outpatients; compared to macrolides (erythromycin, spiramycin))	2 trials (128 patients)	89 (-69 to 175) OR: 1.76 (0.71 to 4.34) Moderate (due to serious risk of bias)	<i>Doxycycline is probably little or no different than macrolides or fluoroquinolones for achieving clinical cure.</i>
Adverse eventsⁱ (in hospitalized and in- patients; compared to macrolides (spiramycin) or fluoroquinolones (fleroxacin, levofloxacin))	3 trials (580 patients)	-57 (-134 to 29) OR: 0.78 (0.54 to 1.13) Moderate (due to serious imprecision)	<i>Doxycycline is probably little or no different than macrolides or fluoroquinolones in the proportion of patients experiencing adverse events</i>

GRADE ratings and interpretation

High certainty	Definitely more effective	Definitely worse	Definitely no different
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En anglais seulement

Overview of guidelines

Aperçu des autres directives

- American Thoracic Society and IDSA 2019
- National Institute for Health and Care 2019 (NICE)
- Swedish Society of Infectious Diseases
- Société Américaine de Thoracologie et IDSA 2019
- Institut National de la Santé et des Soins 2019 (NICE)
- Société Suédoise des Maladies Infectieuses

AMMI PHAC mild to moderate CAP in Adults

AMMI l'ASPC légère à modérée [...] chez les adultes

Antibiotics

First choice:

- **Amoxicillin** (1 g TID for 5 days) **ADOPT**

Second choice:

- **Azithromycin** (500 mg on day 1, followed by 250 mg once daily for 4 days OR 500 mg QD for 3 days) OR **Clarithromycin** (500 mg po bid for 5 days) **ADAPT**
- **Doxycycline** 100 mg bid **ADOPT**

Removed Penicillin as a First choice **ADAPT**

Removed Amoxicillin + clavulanic acid as a Second choice **ADAPT**

Duration

The panel noted that in situations in which patients may be reassessed at 3 days and are shown to have clinically improved, a shorter duration of therapy is reasonable and may reduce the potential for antibiotic resistance. However early reassessment is not feasible in most clinical situations, and thus the panel suggests 5 days of therapy

Antibiotiques

Premier choix:

Amoxicilline (1 g TID for 5 days) **ADOPTER**

Deuxième choix:

- Azithromycine (500 mg le premier jour, suivi de 250 mg une fois par jour pendant 4 jours OU 500 mg QD pendant 3 jours) OU Clarithromycine (500 mg po bid pendant 5 jours) **ADAPTER**
- Doxycycline 100 mg bid **ADOPTER**

Retiré la pénicilline comme premier choix **ADAPTER**

Retiré Amoxicilline + acid clavulanique comme deuxième choix **ADAPTER**

Durée

Le panel a noté que dans les situations où les patients peuvent être réévalués au bout de 3 jours et montrent une amélioration clinique, une durée de traitement plus courte est raisonnable et peut réduire le potentiel de résistance aux antibiotiques. Cependant, la réévaluation précoce n'est pas réalisable dans la plupart des situations cliniques, et donc le panel suggère une durée de traitement de 5 jours

Next steps | Prochaines étapes

- Have completed 3 syndromes
 - Adult Mild-Moderate CAP
 - Adult Severe CAP
 - Pharyngitis
- Ongoing evaluation and development of Canadian empiric guidelines
- Firstline
- Explore multiple modalities (webinars, pictograms) and collaboration opportunities with different associations to reach prescribers
- Develop metrics to evaluate uptake, impact on prescriptions of access/watch/reserve Abx, development of AMR

- Avoir complété 3 syndromes
 - Pneumonie acquise en communauté, légère à modérée chez l'adulte
 - Pneumonie communautaire sévère chez l'adulte
 - Pharyngite
- Évaluation continue et élaboration de lignes directrices empiriques canadiennes
- Firstline
- Explorer plusieurs modalités (webinaires, pictogrammes) et opportunités de collaboration avec différentes associations pour atteindre les prescripteurs.
- Développer des indicateurs pour évaluer l'adoption, l'impact sur les prescriptions d'accès/surveillance/réserve des ai développement de la RAM



Communicable Disease and Infection Control (CDIC)
Webinar Series

November 21, 2024

Development and Dissemination of National Antimicrobial Prescribing Guidelines

Michael Long, PhD
Chief Clinical Officer
Firstline

La série de webinaires sur la lutte contre les maladies
transmissibles et les infections (LMTI)

21 Novembre 2024

Élaboration et diffusion de lignes directrices nationales sur la prescription d'antimicrobiens

Michael Long, PhD
Chef du service clinique
Firstline

Introduction



Pan-Canadian Action Plan on Antimicrobial Resistance



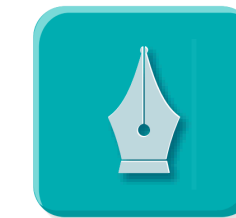
Pillar 3: Stewardship

Desired Outcome 1

“

Prescribers and other professionals in Canada have the resources, training, and tools to facilitate appropriate antimicrobial use in humans and animals.

Plan d'action Pan-Canadien sur la résistance aux antimicrobiens



Pilier 3 : Gérance

Résultat Souhaité 1

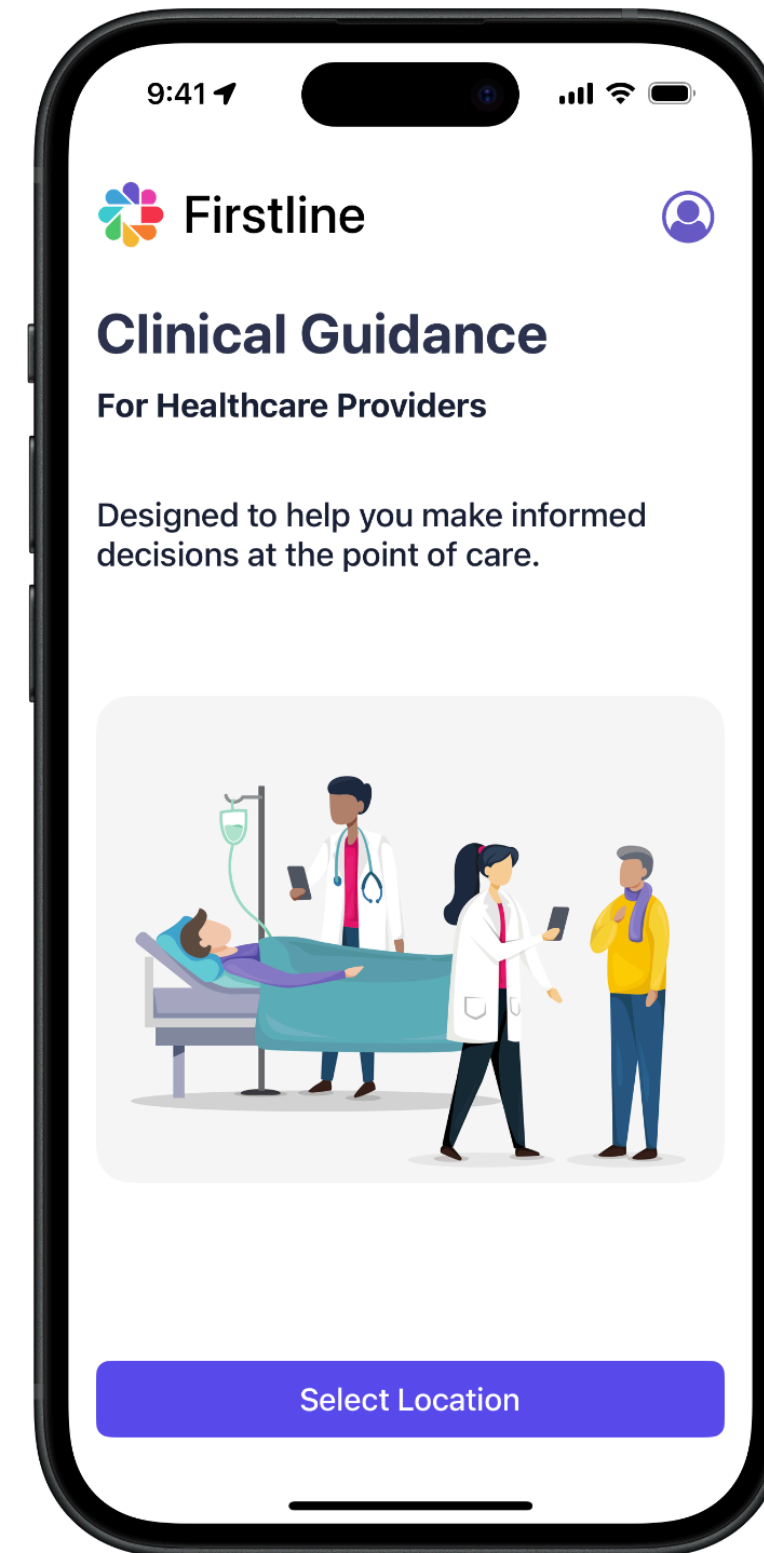
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Au Canada, les prescripteurs et autres professionnels disposent des ressources, de la formation et des outils nécessaires pour faciliter l'utilisation appropriée des antimicrobiens chez l'homme et l'animal.

Firstline

Clinical decision support at the point of care

- Empiric therapy guidelines
- Antimicrobial information
- Pathogen information
- Antibigrams
- Infection prevention
- Vaccination schedules
- Push notifications
- Additional features



Firstline

Aide à la décision clinique sur le lieu de soins

- Lignes directrices relatives au traitement empirique
- Informations sur les antimicrobiens
- Informations sur les agents pathogènes
- Antibigrammes
- Prévention des infections
- Calendriers de vaccination
- Notifications push
- Caractéristiques supplémentaires



Firstline

Supporting antimicrobial stewardship globally

- Firstline is the official infectious disease reference at over 400 hospitals, in 12 countries
- Available in 6 languages
- Partner types include hospitals, health systems, cities, provinces, nations and international organizations

Firstline

Soutenir la gestion des antimicrobiens au niveau mondial

- Firstline est la référence officielle en matière de maladies infectieuses dans plus de 400 hôpitaux, dans 12 pays
- Disponible en 6 langues
- Les partenaires sont des hôpitaux, des systèmes de santé, des villes, des provinces, des nations et des organisations internationales.



Outcomes

Résultats



Highlights

- Decreased antimicrobial consumption
- Increased prescribing appropriateness

Points forts

- Diminution de la consommation d'antimicrobiens
- Amélioration de la pertinence des prescriptions

RESEARCH ARTICLE

Impact of a mobile decision support tool on antimicrobial stewardship indicators in St. John's, Canada

Daniel Doyle¹, Gerald McDonald², Claire Pratt¹, Zahra Rehan¹, Tammy Benteau³, Jennifer Phillips², Peter Daley^{1,2*}

1 Memorial University of Newfoundland, St. John's, Newfoundland and Labrador, Canada, **2** Eastern Health Region, St. John's, Newfoundland and Labrador, Canada, **3** Choosing Wisely Newfoundland and Labrador, St. John's, Newfoundland and Labrador, Canada

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Abstract

Objectives

Inappropriate antibiotic use contributes to antimicrobial resistance. The Spectrum™ app provides antibiotic decision support, based on local antimicrobial resistance rates. We determined the impact of regional implementation of the app on inpatient antimicrobial appropriateness, inpatient antimicrobial usage (AMU), population-based *Clostridioides difficile* infection (CDI) rates and cost, using a retrospective, before and after quasi-experimental design, including a one-year study period.

Methods

The Spectrum™ app was released to prescribers in February, 2019. We performed two one-day inpatient point prevalence surveys using the National Antimicrobial Prescribing Survey tool, six months before (June 25, 2018) and six months after (June 25, 2019) app dissemination. Inpatient AMU in Defined Daily Dose/1000 patient days and CDI incidence were compared, before and after app dissemination.

Results

The pre-survey included 184 prescriptions, and the post-survey included 197 prescriptions. Appropriateness was 97/176 (55.1%) pre, and 126/192 (65.6%) post (+10.5%, $p = 0.051$). Inpatient AMU declined by 6.6 DDD/1000 patient days per month, and CDI declined by 0.3 cases per month. Cost savings associated with reduced AMU were \$403.98/bed/year and associated with reduced CDI were \$82,078/year.

Conclusion

We observed improvement in antimicrobial stewardship indicators following Spectrum™ implementation. We cannot determine the cause of these improvements.

OPEN ACCESS

Citation: Doyle D, McDonald G, Pratt C, Rehan Z, Benteau T, Phillips J, et al. (2021) Impact of a mobile decision support tool on antimicrobial stewardship indicators in St. John's, Canada. PLoS ONE 16(6): e0252407. <https://doi.org/10.1371/journal.pone.0252407>

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Data Availability Statement: All relevant data are within the manuscript and its [S1](#) and [S2](#) Datas.

Funding: The authors received no specific funding for this work.

Highlights

- Decreased antimicrobial consumption
- Increased prescribing appropriateness
- Decreased 30-day readmissions

Points forts

- Diminution de la consommation d'antimicrobiens
- Amélioration de la pertinence des prescriptions
- Diminution des réadmissions à 30 jours

Enforcing surveillance of antimicrobial resistance and antibiotic use to drive stewardship: experience in a paediatric setting

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Implementation



SUMMARY

Background: Antibiotic stewardship (AS) interventions in paediatrics are still not standardized regarding methodology, metrics, and outcomes. We report the results of an AS intervention in the paediatric area based on education and guideline provision via an electronic App.

Materials and methods: The AS intervention was conducted in 2021 through observation, education, audit and feedback and provision of an electronic App (Firstline.org) to support antibiotic prescription based on local susceptibility data. The primary outcome was the antibiotic consumption in the 12 months following the intervention (year 2022) compared with a historical 12-month control (year 2019) via an interrupted time series analysis. Secondary outcomes were appropriateness of therapy, length of stay, 30-day readmission, transfers to the paediatric intensive care unit, in-hospital mortality, and prevalence of antimicrobial resistance (AMR).

Results: During the post-intervention phase, 29 cross-sectional audits and feedback were conducted including 467 patients. Prescriptions were appropriate according to the guidelines in 85.7% of cases, with a stable trend over time. A significant decrease in antibiotic consumption was measured in terms of defined daily doses per 1000 patient days (-222.13; $P < 0.001$) and days of therapy per 1000 patient days (-452.49; $P < 0.001$) in the post-intervention period with a clear inversion of the Access to Watch ratio (from 0.7 to 1.7). Length of stay, in-hospital mortality, intensive care unit transfers, and incidence of AMR infections remained stable, while 30-day readmission decreased from 4.9 per 100 admissions to 2.8 per 100 admissions ($P < 0.001$).

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En anglais seulement



Highlight

- The Firstline point-of-care electronic algorithm is reliable in identifying low risk pregnant patients, as compared to an allergist assessment

Points forts

- L'algorithme électronique Firstline sur le lieu de soins est fiable pour identifier les patientes enceintes à faible risque, par rapport à l'évaluation d'un allergologue.

RESEARCH

Open Access



Reliability and validation of an electronic penicillin allergy risk-assessment tool in a pregnant population

Joanne Wang^{1*}, Chelsea Elwood², Vanessa Paquette³, Natasha Kwan³, Stephanie Erdle^{4,6}, Melissa Watt⁵, Julie Van Schalkwyk², Jeffrey N. Bone⁶, Ashley Roberts⁷, Raymond Mak^{1,4} and Tiffany Wong^{4,6}

Abstract

Background Penicillin allergy adversely impacts patient care, yet most cases do not have true allergies. Clinicians require efficient, reliable clinical tools to identify low risk patients who can be safely de-labeled. Our center implemented the FIRSTLINE electronic point-of-care decision support tool to help non-allergist practitioners risk stratify patients with penicillin allergy. We sought to explore the reliability and validity of this tool in relation to allergist assessment and actual patient outcomes. We additionally compared it with two other published stratification tools, JAMA and PENFAST, to assess ability to accurately identify low risk patients appropriate for direct oral challenge.

Methods In this single-center, retrospective, observational study, 181 pregnant females with self-reported penicillin allergy between July 2019 to June 2021 at BC Women's Hospital, Vancouver, Canada were used to assess the reliability and validity of all three tools. Physician-guided history of penicillin use and symptoms were used for scoring. Results and recommendations were compared to actual patient outcomes after clinician decision for direct oral challenge or intradermal tests. We compared the performance of JAMA, PENFAST and FIRSTLINE.

Results 181 patients were assessed. 176/181 (97.2%) patients were deemed not allergic. Each risk stratification tool labelled majority of patients as low risk with 88.4% of patients PENFAST 0–2, 60.2% of patients JAMA low risk, 86.7% of patients FIRSTLINE very low risk.

Conclusion We demonstrate that our point-of-care electronic algorithm is reliable in identifying low risk pregnant patients, as compared to an allergist assessment. To our knowledge, this is the first study to provide direct comparison between multiple decision support tools using the same population, minimizing participant bias. Providing clinical algorithms to risk stratify patients, can enable healthcare professionals to safely identify individuals who may be candidates for direct penicillin oral challenges versus needing referral to specialists. This increases the generalizability and efficiency of penicillin allergy de-labeling.

Keywords Penicillin allergy, Penicillin de-labelling, FIRSTLINE, PENFAST, JAMA tool

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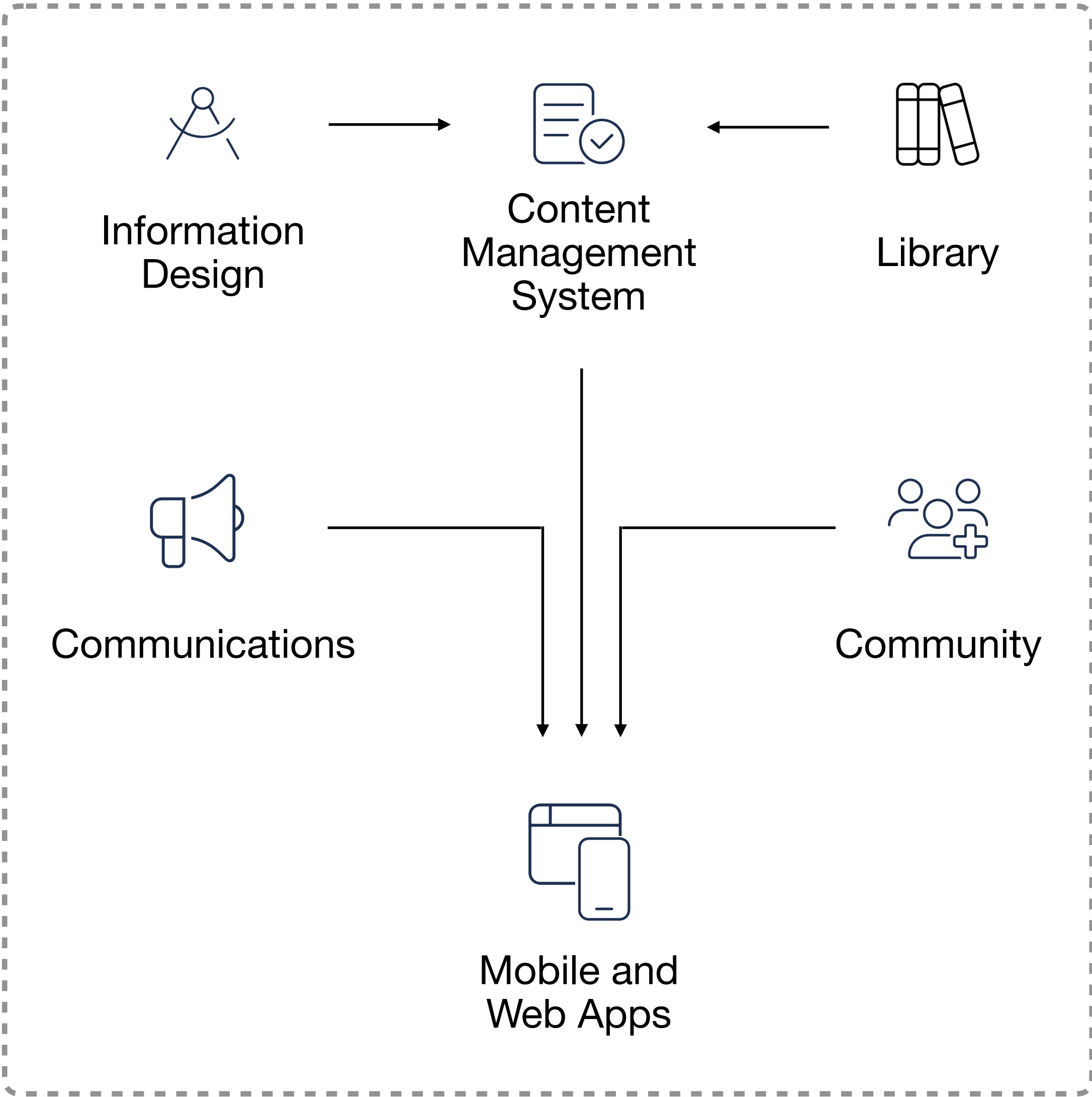
Knowledge Mobilization

Mobilisation des Connaissances



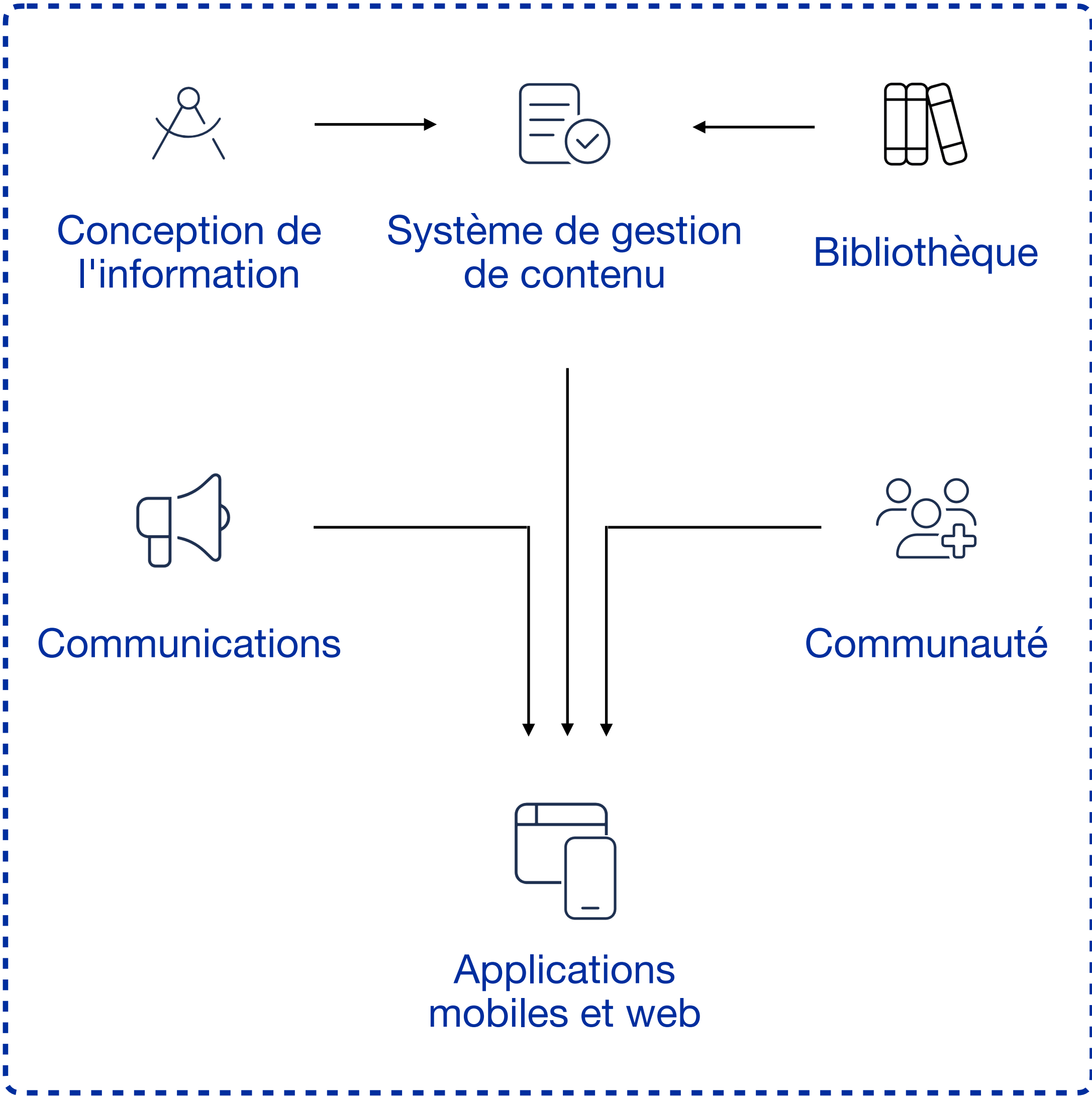
Firstline

Knowledge mobilization platform



Firstline

Plate-forme de mobilisation des connaissances



Information Design

“

I have made this longer than usual
because I have not had time to
make it shorter.

Blaise Pascal

Conception de l'information

“

Je l'ai fait plus longue parce que je
n'ai pas eu le temps de la faire
plus courte.

Blaise Pascal

Information Design

Making guidance easily accessible

Firstline Design System



Standardization: Specifies how colours, icons, fonts, layouts and other interface elements are to be used.



Crystallization: Enriches for content that is useful at the point of care.



Localization: Adapts guidance to reflect regional susceptibilities, patient populations, drug availability, diagnostic methods and so on.

Conception de l'information

Faciliter l'accès aux orientations

Système de conception en Firstline



Normalisation: Spécifie comment les couleurs, les icônes, les polices, les mises en page et les autres éléments de l'interface doivent être utilisés.



Cristallisation: Enrichissement du contenu utile au point de service.



Localisation: Adaptation des orientations en fonction des susceptibilités régionales, des populations de patients, de la disponibilité des médicaments, des méthodes de diagnostic, etc.

Information Design

WHO AWaRe Antibiotic Book - Infographics

Conception de l'information

Livre des antibiotiques AWaRe de l'OMS - Infographie

PRIMARY HEALTH CARE

ADULTS

Conjunctivitis

Bacterial eye infection

Definition

Infection of the conjunctiva (i.e. the mucosa that covers the inside part of the eyelids and the sclera, which is the white part of the eye)

Diagnosis

Clinical Presentation

- **Most cases are mild and self-limiting**
- Usually the eye is red, watery and itchy and patients have a feeling of “sand in the eye”
- Vision is normal and there is no pain (if pain is present consider corneal involvement)
- Thick purulent eye discharge can be present in bacterial infection

Hyperacute Bacterial Conjunctivitis:

- Severe infection that presents with decreased vision, purulent eye discharge, eyelid swelling, pain on palpation and preauricular adenopathy
- Consider urgent referral to an ophthalmologist due to risk for rapid progression to corneal perforation

Microbiology Tests

Usually not needed unless *Neisseria gonorrhoeae* or *Chlamydia trachomatis* are suspected

Other Laboratory Tests

Usually not needed

Imaging

Usually not needed

Treatment

Clinical Considerations

- Most cases resolve without treatment in 7-10 days
- Antibiotics can be considered in case of suspected bacterial conjunctivitis or conjunctivitis in the context of a sexually transmitted infection

Antibiotic Treatment Duration

Since treatment duration varies, please refer to the corresponding treatment section

Bacterial Conjunctivitis

ACCESS

Gentamicin 0.3% **EYE DROPS**
1 drop in the affected eye q6h
Treatment duration: 5 days

OR

WATCH

Ofloxacin 0.3% **EYE DROPS**
1 drop in the affected eye q6h
Treatment duration: 5 days

OR

ACCESS

Tetracycline 1% **EYE OINTMENT**
1 cm in the affected eye q6h
Treatment duration: 5 days

Gonococcal Conjunctivitis

All dosages are for normal renal function

WATCH

Ceftriaxone 250 mg **IM**
Treatment duration: Single dose

SOINS DE SANTÉ PRIMAIRES

ADULTES

Conjonctivite

Infection oculaire bactérienne

Définition

Infection de la conjonctive (muqueuse qui tapisse la face postérieure des paupières et la face antérieure de la sclère — la partie blanche de l’œil)

Diagnostic

Tableau clinique

- **La plupart des cas sont bénins et se résolvent spontanément**
- Habituellement, l’œil est rouge et larmoyant, démange, et les patients ont la sensation d’avoir du « sable dans l’œil »
- La vision est normale et aucune douleur n’est présente (en cas de douleur, envisager une atteinte de la cornée)
- Un écoulement purulent épais peut être présent en cas d’infection bactérienne

Conjonctivite bactérienne aiguë :

- Infection grave avec baisse de la vision, écoulement purulent, œdème palpébral, douleur à la palpation et adénopathie préauriculaire
- Envisager une orientation en urgence vers un ophtalmologiste en raison du risque d’évolution rapide vers une perforation de la cornée

Analyses microbiologiques

Habituellement pas nécessaires, sauf en cas d’infection présumée à *Neisseria gonorrhoeae* ou à *Chlamydia trachomatis*

Autres analyses de laboratoire

Habituellement pas nécessaires

Imagerie

Habituellement pas nécessaire

Traitement

Considérations cliniques

- La plupart des cas guérissent sans traitement en 7 à 10 jours
- Une antibiothérapie peut être envisagée en cas de conjonctivite bactérienne présumée ou de conjonctivite dans le contexte d’une infection sexuellement transmissible

Durée de l’antibiothérapie

Étant donné que la durée du traitement varie, veuillez consulter la rubrique consacrée au traitement

Conjonctivite bactérienne

ACCESS

Gentamicine à 0,3 % **COLLYRE**
1 goutte dans l’œil touché q6h
Durée du traitement : 5 jours

OU

A SURVEILLER

Ofloxacin à 0,3 % **COLLYRE**
1 goutte dans l’œil touché q6h
Durée du traitement : 5 jours

OU

ACCESS

Tétracycline à 1 % **POMMADE OPHTALMIQUE**
1 cm dans l’œil touché q6h
Durée du traitement : 5 jours

Conjonctivite gonococcique

Toutes les posologies sont indiquées pour une fonction rénale normale

WATCH

Ceftriaxone 250 mg **IM**

Information Design

WHO AWaRe Antibiotic Book - Digital

- Algorithmic format
- Integrated scoring systems
- Linked antimicrobial information
- Additional translations in development
- Localization in collaboration with other national action plans

Conception de l'information

Livre des antibiotiques AWaRe de l'OMS - Numérique

- Format algorithmique
- Systèmes de notation intégrés
- Informations antimicrobiennes liées
- Autres traductions en cours de développement
- Localisation en collaboration avec d'autres plans d'action nationaux

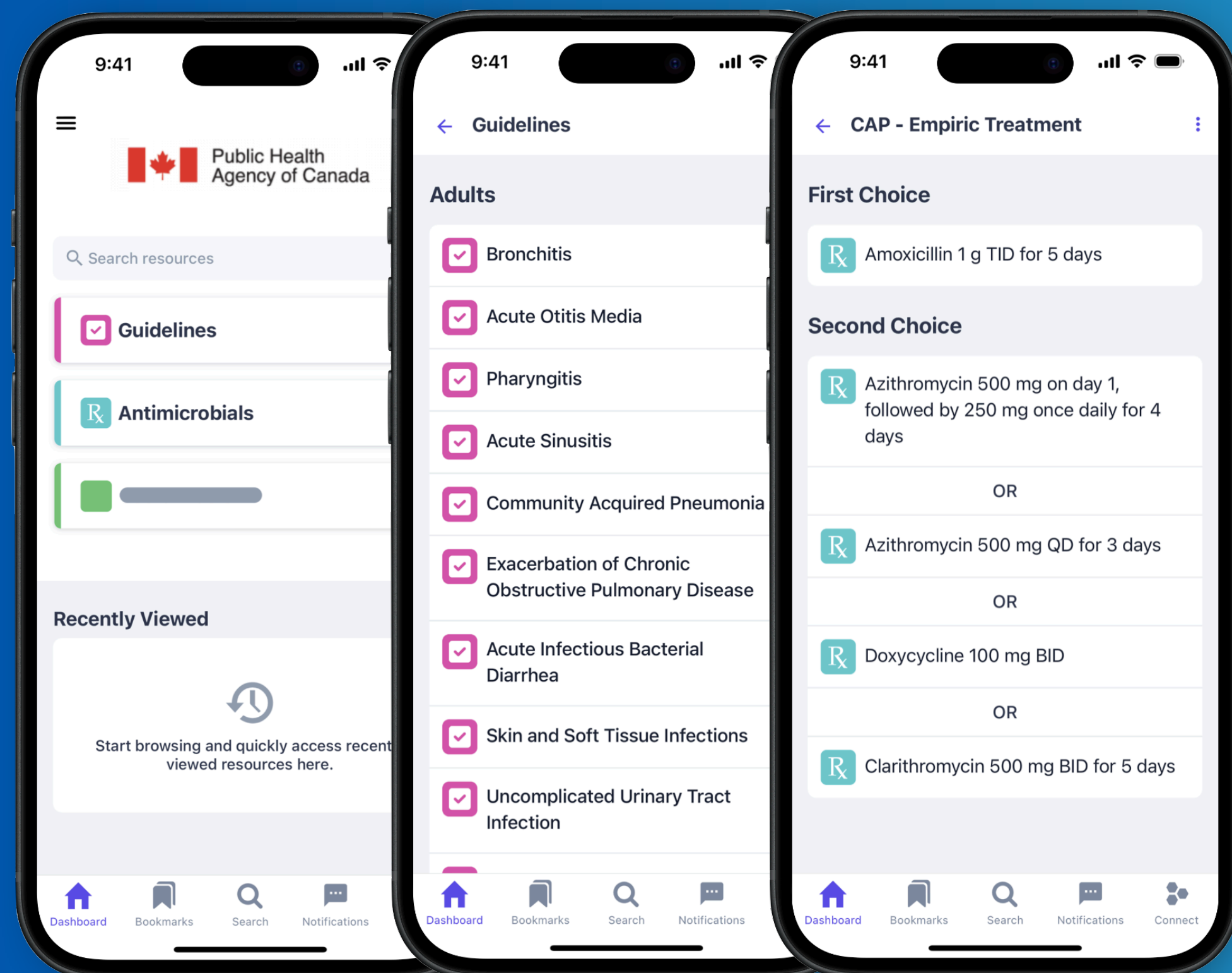


En anglais seulement

Information Design

National Antimicrobial Prescribing Guidelines

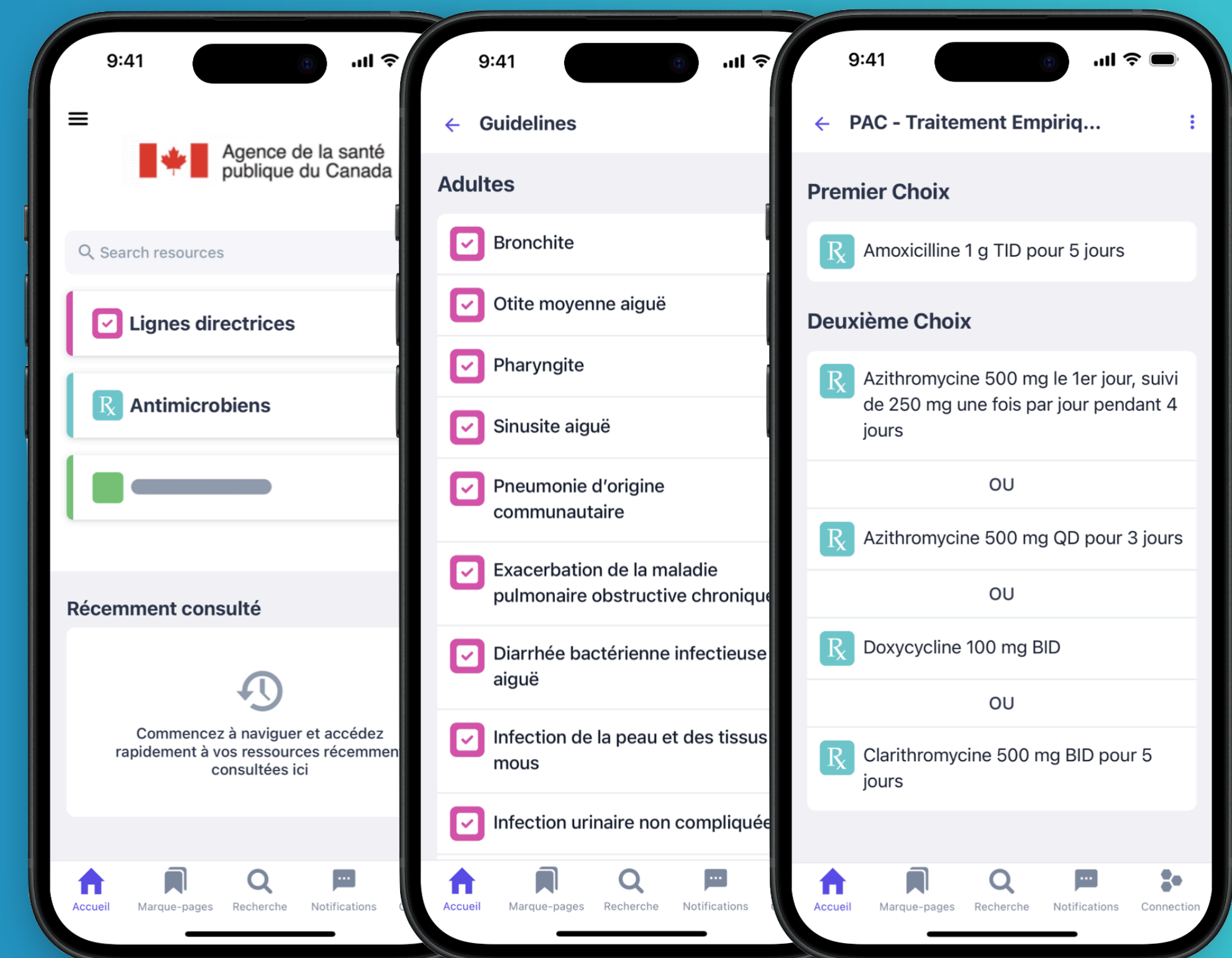
- Design and mobile optimization of the guidelines produced by AMMI
- Free access on web and mobile



Conception de l'information

Lignes directrices nationales sur la prescription d'antimicrobiens

- Conception et optimisation mobile des lignes directrices produites par l'AMMI
- Accès gratuit sur le web et sur mobile



Firstline Library

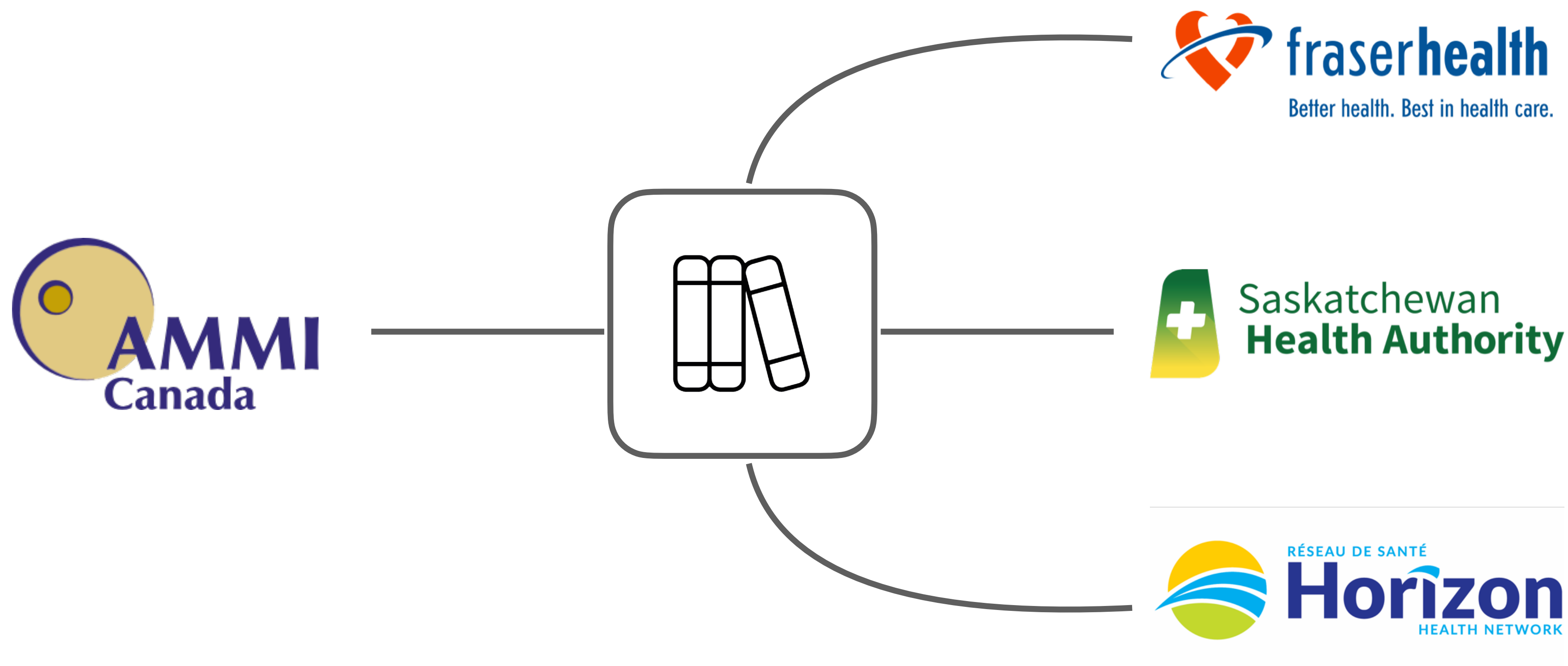
National Antimicrobial Prescribing Guidelines

Healthcare organizations will be able to distribute national guidance through their own Firstline version if desired.

Bibliothèque Firstline

Lignes directrices nationales sur la prescription d'antimicrobiens

Les organismes de santé pourront, s'ils le souhaitent, diffuser les orientations nationales par le biais de leur propre version de Firstline.



Communications

Firstline's SCALE Framework

Helps to create a culture of antimicrobial stewardship, using a customizable communications toolkit.

- App cards
- Digital graphics
- Posters
- Web pages



Communications

Le cadre SCALE de Firstline

Aide à créer une culture de gestion des antimicrobiens, à l'aide d'une boîte à outils de communication personnalisable.

- Cartes d'application
- Graphiques numériques
- Affiches
- Pages web



Communications

Antimicrobial Ambassadors Campaign

Launched November 18, 2024

- Online pledge
- Social media graphics
- Shirts, posters, enamel pins and more

Communications

Antimicrobial Ambassadors Campagne

Lancement le 18 Novembre 2024

- Engagement en ligne
- Graphiques pour les médias sociaux
- Chemises, posters, épingles en email etc.

Antimicrobial Ambassadors

Let's mobilize and take action today!
#WAAW2024



Fighting antimicrobial resistance (AMR) takes all of us

People around the world are committing to safeguarding the health of our communities and promoting the responsible use of antibiotics.

Will you pledge to protect the medicines that protect us?



Take the pledge

My role ...

As an Antimicrobial Ambassador, I pledge to:

- ☐ Continue to prescribe antibiotics judiciously and/or educate patients, colleagues, friends, and family about antimicrobial resistance.

I PLEDGE

*Firstline is collecting anonymous data points and no personal information is transmitted or stored.

1M

Deaths annually linked to AMR ¹

39M

Additional deaths projected by 2050 ²

\$1T

Additional healthcare costs in USD by 2050 ³

En anglais seulement

Communications

Poll Question



Would you be willing to provide feedback or become a communications champion for this project?

1. Yes
2. No

If you answered “Yes”, please contact hello@firstline.org for more information.

Communications

Question du sondage



Seriez-vous prêt à fournir un retour d'information ou à devenir un champion de la communication pour ce projet?

1. Oui
2. Non

Si vous avez répondu « oui », veuillez contacter hello@firstline.org pour plus d'informations.