# Outpatient Telehealth and Antimicrobial Stewardship

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# Key Points

- Telehealth: multiple tools employed in multiple ways
- Antimicrobial stewardship within outpatient telehealth warrants unique attention
- Telehealth antimicrobial stewardship has unique challenges and opportunities

# Telehealth encompasses multiple tools employed in multiple ways

## Technology

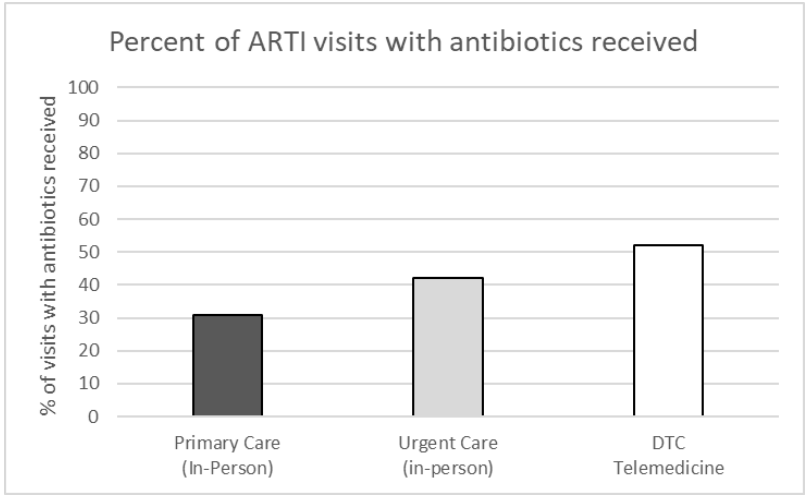
- Synchronous v Asynchronous
- Audio-video v Audio-only
- Peripheral devices (e.g., tele-otoscopy)
- Accessibility of interface
- Bandwidth & device requirements

## People

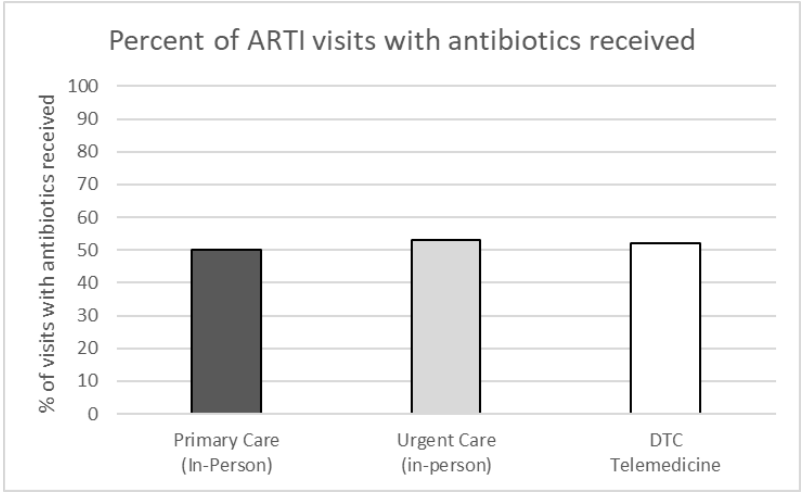
- Medical training
- Clinical experience
- Telehealth training & experience
- Communication skills
- Employment status

## Processes

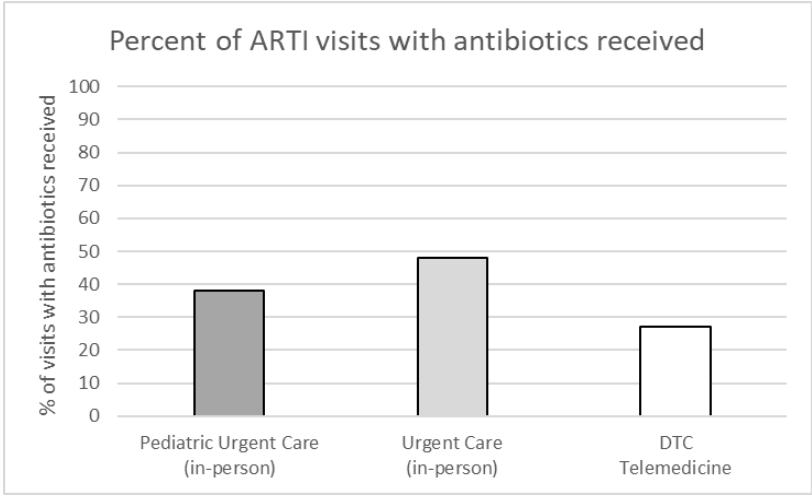
- Triage
- Laboratory testing capabilities
- Referral for in-person evaluation
- Interpreter services
- Digital health navigators
- Organizational culture
- Volume & quality incentives
- Antimicrobial Stewardship
- Virtual-only v Hybrid Model




Patients <18 years, Ray 2019




Patients ≥18 years, Shi 2018




Patients ≤18 years, Hersh 2019

# Antibiotic management during telehealth encounters varies with context

# Recent Telehealth Data

- Increased awareness & use of live interactive telehealth with covid-19 pandemic
- 3 million ARTI encounters with 6 thousand physicians, 2019-2021 (Linder et al, 2024)
  - 20% used video, 80% audio
  - 54% of visits received a diagnoses indicating antibiotics were potentially appropriate
  - 43% of visits received a diagnosis indicating antibiotics were not appropriate (19% received antibiotics)
- Pandemic policy created first opportunity for most brick-and-mortar practices to adopt hybrid care models (in-person and telehealth)
- 2.4 million primary care visits in an integrated delivery system, 2021 (Reed et al, 2023)
  - 20% used video, 31% telephone (49% office visit)
  - Across all visits (not limited to ARTIs): 7% received antibiotics among video, telephone, and office visits

# Challenges: Defining Metrics

- Defining Metrics of Success

## Policy

American Telemedicine Association Operating Procedu
for Pediatric Telehealth

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**Preamble**

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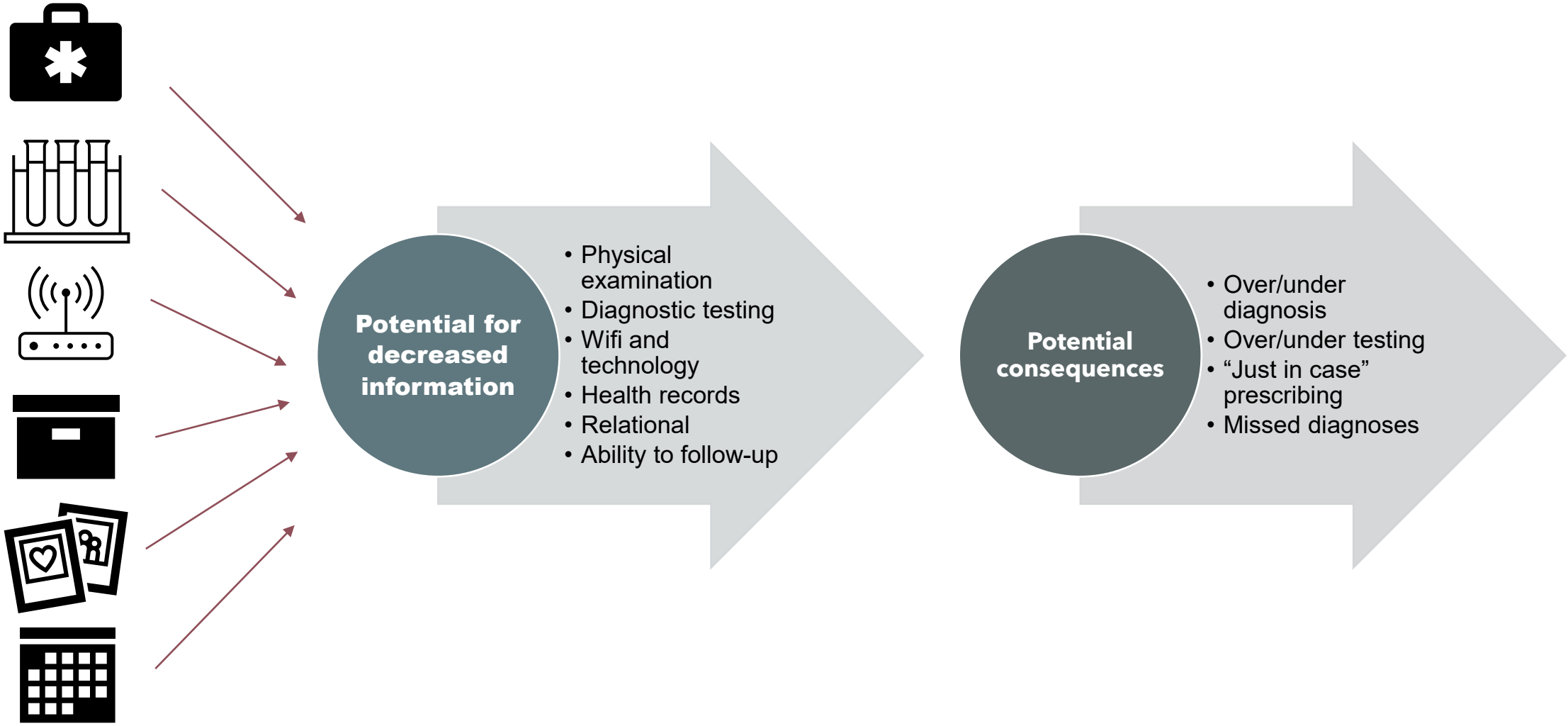
that seeks to bring t
medicine, academia,
companies, e-health,

**Patient Safety**

Providers shall comply with relevant standards for each clinical situation, as determined by state medical boards and regulatory agencies, in both the state where the provider is located and the state where the patient is located, just as they would for an in-person encounter. The provider shall have enough evidence from the history, physical exam, and/or an established prior patient relationship to make an appropriate clinical decision. If the provider is unable to comply with the standard of care for diagnosis and management in any clinical situation, due to technical limitations or provider comfort level, the provider shall refer the patient for additional evaluation where they can receive the appropriate standard of care, whether that is an in-person encounter or a telehealth encounter that is not subject to the specific limitations.

# Challenges: Decreased Information



# Challenges : Communication

| | | |
|---|---|---|
| Patient expectations | Provider perspectives of patient's expectations | Communication skills |
| Satisfaction scores & incentives | Prior relationship | Interpreter availability |
| Communication scripts | Symptomatic relief scripts | Potential for follow-up |


# Antibiotic Stewardship in Outpatient Telehealth

- Establish standards for telediagnosis & antibiotic prescribing during virtual visits
- Identify populations at risk of inequities
- Use highest level of audio/visual technology available
- Systems to triage and to refer to alternative care sites

https://www.cdc.gov/antibiotic-use/core-elements/outpatient/telemedicine.html

**Table 2. Considerations for Outpatient Telemedicine Antibiotic Stewardship Interventions**

| INTERVENTION | INTERVENTION DESCRIPTION | CONSIDERATIONS FOR TELEMEDICINE IMPLEMENTATION[a] |
|---|---|---|
| Public commitment posters | • Posters in clinic examination rooms featuring a public commitment to using antibiotics appropriately<br>• Posters may also promote leadership or organizational commitments to antibiotic stewardship | • Poster interventions might be reproduced by displaying virtual commitments to patients and clinicians, when relevant |
| Clinical decision support | • Systems or applications which provide guidance to clinicians to assist in diagnostic and therapeutic choices ranging from printed guidelines to electronic health record workflow integration | • Can be integrated into telemedicine software and clinician interfaces, such as providing access to guidelines and education, displaying guideline-recommended therapies in preferential order, or requiring written justification for nonrecommended management |
| Delayed prescribing and watchful waiting | • Delayed prescribing refers to patients receiving a postdated prescription and instructions to fill it after a set time period if symptoms do not improve.<br>• Watchful waiting means providing symptomatic relief with a follow-up plan if symptoms do not improve (e.g., mild acute otitis media) | • Ensure appropriate patient follow-up can be facilitated, if necessary, and focus delayed prescribing strategies for conditions for which they have been associated with safe reductions in antibiotic use (e.g., acute sinusitis or acute otitis media) |
| Financial or other quality performance incentives | • Financial incentives or other rewards are provided to clinicians who meet quality improvement goals involving antibiotic prescribing | • Appropriate antibiotic prescribing quality measures can be included in incentive programs for providing high-quality virtual care |
| Rapid diagnostics and point of care testing | • Use of rapid diagnostic or point of care testing diagnoses can improve appropriate antibiotic use for viral and bacterial infections | • Establish processes for patients to obtain rapid diagnostic testing and laboratory testing for patients<br>• Redirect visits to in-person settings, as needed |

Sanchez et al, 2023.

| | | |
|---|---|---|
| Communication skills training | • Communication skills training for clinicians can be effective for improving prescribing practices and have been associated with improvements in antibiotic prescribing | • Similarly applicable to outpatient telemedicine settings |
| Audit and feedback plus peer comparison | • Individualized tracking and reporting of clinician antibiotic prescribing can guide changes in practice and assess progress toward improvement goals<br>• Specific appropriate prescribing targets or recommended actions can be included during feedback<br>• Effective interventions have included comparison of clinicians' performance with that of their peers, such as peers who perform in the top 10% on quality measures | • Similarly applicable to outpatient telemedicine settings<br>• Improve effectiveness by enlisting the help of "top-performing" clinicians to provide peer-to-peer feedback |
| Patient education | • Patient education may include information on harms of antibiotic use, expected illness recovery times, symptom relief and self-care recommendations, and instructions on when to return to care, if necessary | • Similarly applicable to outpatient telemedicine settings |
| Clinician education | • Active clinician education (e.g., consensus building sessions or peer-to-peer education) is more effective than passive education (e.g., print educational materials or webinars)<br>• Clinician education may be tailored to address psychosocial contributors to inappropriate prescribing (e.g., concern for patient satisfaction) | • Similarly applicable to outpatient telemedicine settings |

Adapted from King et al.[63] and Centers for Disease Control and Prevention (https://www.cdc.gov/antibiotic-use/core-elements/outpatient/implementation.html).

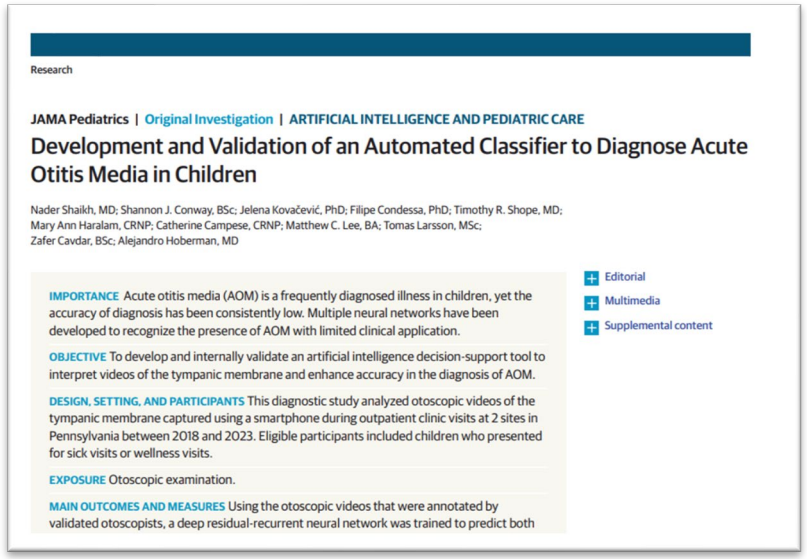
[a]Further adaptation and implementation of outpatient antibiotic stewardship interventions in a virtual environment may be necessary to optimize intervention success.

Sanchez et al, 2023.

# Antibiotic Stewardship in Outpatient Telehealth

| | |
|---|---|
| Aligning metrics | • Establish standards for telediagnosis<br>• Consider specific & general metrics<br>• Monitor potential inequities in access & quality<br>• Align incentives with priorities |
| Optimizing Information | • Strive to use information-rich technology<br>• Guidelines, decision support, order sets<br>• Processes for testing and for referral to alternative care sites |
| Enhancing Communication | • Manage expectations<br>• Patient-facing materials<br>• Triage processes<br>• Scripts & skills<br>• Health literacy & interpreter services |

# Opportunities to use telehealth to further advance AMS



Research

JAMA Pediatrics | Original Investigation | ARTIFICIAL INTELLIGENCE AND PEDIATRIC CARE

**Development and Validation of an Automated Classifier to Diagnose Acute Otitis Media in Children**

Nader Shaikh, MD; Shannon J. Conway, BSc; Jelena Kovačević, PhD; Filipe Condessa, PhD; Timothy R. Shope, MD; Mary Ann Haralam, CRNP; Catherine Campese, CRNP; Matthew C. Lee, BA; Tomas Larsson, MSc; Zafer Cavdar, BSc; Alejandro Hoberman, MD

+ Editorial
+ Multimedia
+ Supplemental content

**IMPORTANCE** Acute otitis media (AOM) is a frequently diagnosed illness in children, yet the accuracy of diagnosis has been consistently low. Multiple neural networks have been developed to recognize the presence of AOM with limited clinical application.

**OBJECTIVE** To develop and internally validate an artificial intelligence decision-support tool to interpret videos of the tympanic membrane and enhance accuracy in the diagnosis of AOM.

**DESIGN, SETTING, AND PARTICIPANTS** This diagnostic study analyzed otoscopic videos of the tympanic membrane captured using a smartphone during outpatient clinic visits at 2 sites in Pennsylvania between 2018 and 2023. Eligible participants included children who presented for sick visits or wellness visits.

**EXPOSURE** Otoscopic examination.

**MAIN OUTCOMES AND MEASURES** Using the otoscopic videos that were annotated by validated otoscopists, a deep residual-recurrent neural network was trained to predict both

- Tele-stewardship
- Artificial intelligence decision support to aid tele-diagnosis
- Video directly observed therapy (vDOT) to support adherence
- Telehealth visits to support allergy delabeling

# Key Points

Telehealth is a tool employed in multiple ways
- Technology, People, Processes

Antimicrobial stewardship within outpatient telehealth warrants unique attention
- Metrics, Information, Communication

Telehealth antimicrobial stewardship has unique challenges and opportunities
- Varying need for adaptation to telehealth
- Metrics, Information, Communication
- Opportunity to enhance reach & rigor

# Thank you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