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► **To cite this version:**

B. Melot, M. Amsilli, F. Drouet, L. Rodriguez, J. Salomon, et al.. Appropriateness of Antibiotic Prescription During Teleconsultation. Digital Professionalism in Health and Care: Developing the Workforce, Building the Future, IOS Press, 2022, Studies in Health Technology and Informatics, 10.3233/SHTI220924 . hal-03778053

**HAL Id: hal-03778053**

<https://hal.sorbonne-universite.fr/hal-03778053v1>

Submitted on 21 May 2024

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# Appropriateness of Antibiotic Prescription During Teleconsultation

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**Abstract.** Teleconsultation has become a new means of using care which has taken off significantly since the COVID crisis. The pooling of the technological environment within the TC makes it possible to set up practice reviews by reusing the data collected. Our aim was to evaluate the relevance of antibiotic therapy during teleconsultations carried out on the national teleconsultation platform “Qare” in 4 common infections. 143,428 TCs with structured prescriptions were analyzed, with an appropriate prescription in more than 82% of cases, higher than in the literature. The use of data makes it possible to quickly assess practices and inform doctors to improve their practices.

**Keywords.** Teleconsultation, antibiotics prescription, data-reuse, real world data

## 1. Introduction

Teleconsultation (TC) is a technology that provides remote patient care. It has become a new modality of practicing medicine since the COVID pandemic (5.5 million TC in March and April 2020 in France). In addition to an infrastructure allowing video, TC platforms provide common electronic health record for all consultants, which makes it possible to harmonize data collection and federate it. This environment is also mature enough to promote the reuse of data (structuring of the data collected, coding, patient information on the purposes of reuse of personal data). The consultation for infectious disease has its place in teleconsultation [1].

The objective of this paper is to evaluate in common situations of infection (cystitis, upper respiratory infection including COVID-19) the relevance of antibiotic therapy during teleconsultations carried out on a national platform of teleconsultation named Qare.

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## 2. Material and Methods

The consultations carried out on the Qare telemedicine platform between 01/03/2021 and 15/02/2022 were studied. We extracted all consultations for which the diagnosis was coded in one ICD-10 code and the prescriptions were structured prescriptions (drugs name). Consultations relating to one of the following infections: acute nasopharyngitis (Rh) (ICD-10=J000, J029), acute bronchitis (Br) (ICD-10=J203-J206, J209, J40), acute cystitis (UTI) (ICD-10=N300, N309) and COVID-19 (ICD-10=U07x) have been analyzed.

The study of French clinical guidelines identified the first line of treatment. The prescriptions were deemed adequate in the absence of prescription of antibiotics for Rh, Br, COVID-19, and in the presence of prescription of an oral form of fosfomycin trometamol, pivmecillinam, or nitrofurantoin in ITUs. As antibiotics are listed with their substance names in clinical guidelines and the prescription uses trade name of the medicinal product, the list of medicinal products containing these antibiotic substances and referred to by their brand names have been listed from the French regulatory agency composition file.

The diagnosis coding rate was calculated by relating the number of consultations with an ICD-10 diagnosis code to the total number of consultations.

The percentage of structured prescriptions was calculated by relating the number of these to the number of consultations with prescription (in free or structured text).

To categorize the antibiotics used, the fifth level of anatomical therapeutical classification (ATC) was used, and aggregated results were calculated with an upper level.

## 3. Results

Of the 875,161 TCs performed over the period by 829 physicians, 143,428 had an ICD-10 code and a structured prescription (16.4% of all CTs). 45,918 CTs were related to the four studied infections and they were performed by 517 GPs, 32 pediatricians and 2 infectious diseases specialists.

These infections were managed most of the time by non-infectiologists (45,667 vs 251, 99.4%) (Table 1). Prescriptions were appropriate in 83.4% of teleconsultations (Figure 1). There was no antibiotic prescription in 82.8% of RTIs, 88.1% of Coids, 82.4% of RhS and 67.7% of Brs. In 85.0% of UTIs, the 1st line antibiotic is prescribed. Fosfomycin was prescribed in 77.0% of patients, pivmcelinam in 11.9% and nitrofurantoin in 3.1%. 1,981 prescriptions were inappropriate with a predominance of Fluoroquinolones (56.3%) followed by cephalosporins (29.6%) (Figure 2).

**Table 1.** Volume of TC in Qare Plateform for the four selected infectious diseases coded with ICD-10 and having a structured prescription from 01.03.22 to 15.02.22

Infectious disease	GP + P	ID
Covid	15.963	72
Rh	11.250	45
Bc	5.359	41
UTI	13.095	93

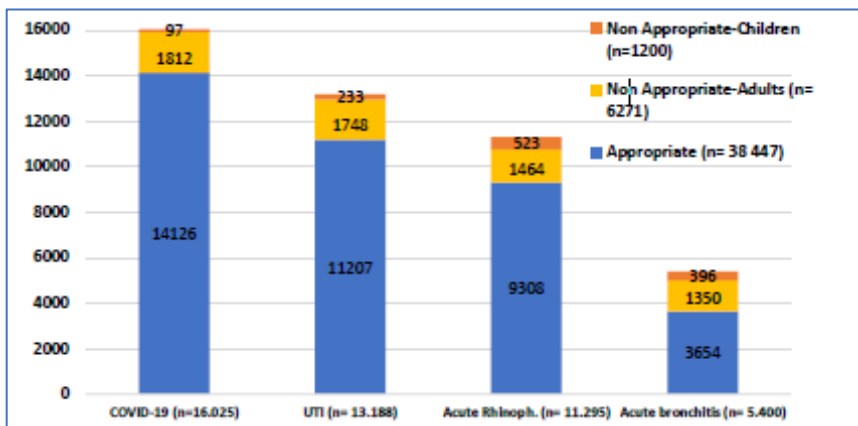


Figure 1. Appropriateness of antibiotic prescriptions for four common infections, Qare from 01.03.2021 to 15.02.2022

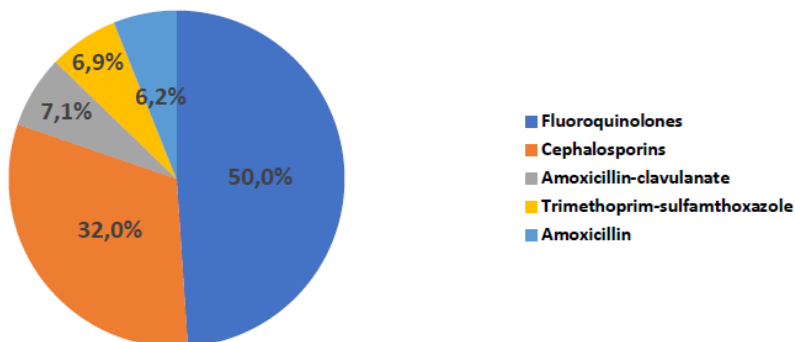


Figure 2. Inappropriate antibiotic prescription in UTI (n=1,981), Qare, 01.03.22 to 15.02.22 (Fluoroquinolones = ATC-J01MA, Cephalosporins= ATC-J01DB and J01DC and J01DD and J01DE, Amoxiciline-clavulanate=ATC-J01CR01, Trimethoprim-sulfamethoxazole=ATC-J01EE01, Amoxicilin=ATC-J01CA04)

#### 4. Discussion

This study is the first to assess the quality of antibiotic prescription in TC in France. Other French studies on data from community medicine or via medico-economic databases have estimated the frequency of inappropriate prescriptions in France and show higher rates [2,3].

Although the federative infrastructure of the TC Qare platform removes the constraints of interoperability and promotes the collection of data from a large number of actors, the feasibility of its reuse remains questionable if it is based solely on the structured data. Indeed, physicians who already have a heavy cognitive load [4] are reluctant to use forms that limit their expressiveness and take a long time to complete. Similarly, they are reluctant to carry out the coding of their diagnoses, a task without direct use for them [5]. Thus 84% of TCs are not included in this study for lack of

availability of structured data. This limitation can lead to a selection bias, as studious physicians may prescribe more appropriately. The information is mainly in the text [6] because it is the most convenient and quickest mode of expression for doctors.

Considering the codes chosen for the analysis, imprecise code (ICD-10 ~.9) might be confusing when an infectious disease can be bacterial or viral and may lead to a classification bias with false positives or false negatives. Physicians may have use other codes as coding is poorly reproducible [7]. Such TCs have not been included in the study and it constitutes another bias. The quality of coding should be assessed by comparing the diagnosis conclusion and the chosen code.

Advances in medical informatics should be embedded natively in such innovative infrastructures with a patient record that adapts to the patient context, allowing structured input assistance without hindering the use of free text (such as interface terminology [8], coding assistance [9], natural language processing [10] and automatic annotation [11], automatic coding [12], Semantic Electronic Medical Record [13]). Moreover, professional education approaches (initial and continuous formation, stewardship) could improve the clinical practice during teleconsultation.

## 5. Conclusion

The organization underlying the realization of the teleconsultation allows GPs to be supported by specialists in infectious diseases who can have an awareness-raising role and who can lead to better follow the recommendations of good practices. The reuse of data also makes it possible to quickly assess practices and inform doctors to improve their practices.

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