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Prospective study of telephone calls to a hotline for infectious disease consultation

Analysis of 7,863 solicited consultations over a 1-year period

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ABSTRACT (191 words)

Purpose

To respond to the increasing requests of noninfectious disease physicians for access to infectious diseases expertise, a hotline was created in the infectious diseases consultation (IDC) unit of the Grenoble university-affiliated hospital (GUH). This study describes the patterns of solicited consultations provided by the hotline during a 1-year period.

Methods

We conducted a prospective study of consecutive solicited IDCs requested by physicians in 2008.

Results

A total of 7,863 consultations were requested by physicians over 1 year; 4,407 (56.0%) by ambulatory physicians, 2,933 (37.3%) by GUH physicians, and 523 (6.7%) by physicians in public or private hospitals. The majority of consultations were requested via cell phone (58.7%). The main reasons for requesting a consultation were related to antimicrobial treatment for hospital-based physicians and prophylaxis for ambulatory physicians ($p<0.001$). Recommendations to perform diagnostic or monitoring tests were less frequent in ambulatory medicine (16%) than in the GUH (59%) or other hospitals (63%, $p<0.001$). The route of consultation for patients with nosocomial infections was more likely to be formal ($p<0.001$).

Conclusions

The activity of the IDC hotline attests to an important need for such expertise consultation, both in hospitals and ambulatory medicine.

Key words: Solicited consultations, recommendations, infectious disease specialist, hotline

INTRODUCTION

Access to the expertise of infectious disease specialists (IDSs) by non-ID physicians managing patients with IDs is an ongoing challenge reflected by high numbers of solicitations in different settings [1-3]. In 2000, a hotline for ID consultation (HIDC) was created at Grenoble university-affiliated hospital (GUH), aiming to respond to increasing requests from non-ID physicians.

Analysis of ID consultations brings out their main characteristics and indicates fields that require closer involvement or improvement [2]. In this study, we describe the consultation patterns of solicited ID consultations provided during a 1-year period by the HIDC and examine differences in requests depending on the attending physician setting.

MATERIALS AND METHODS

Study design

We conducted an observational prospective study of consecutive solicited ID consultations between 1 January and 31 December 2008. All consultations requested by physicians were included. Consultations requested by patients, private nurses, or pharmacies were excluded. The Institutional Ethics Review Board waived the requirement for informed consent and approved the study protocol **conjointly with the French Consultative Committee for data processing in medical research (CCTIRS).**

Setting

The GUH is a 2,200-bed hospital located in southeastern France. The HIDC is part of the IDC unit, which also includes an international vaccination center, tropical medicine consultations, and follow-up consultations after hospitalization. The HIDC is available 7 days a week, 24 h a day through a dedicated cell phone. Consultations may also be requested via the secretariat, fax, e-mail, or face to face. Working hour coverage is provided by both a board-certified infectious disease specialist and a resident, whereas overnight and weekend coverage is provided by one of the five board-certified specialists working in the ID department.

Data collection

Data were prospectively collected by IDSs using a standardized consultation form and included the reason and route of consultation, the requesting physician's place of work, diagnosis, and IDS recommendations. Place of work was categorized as GUH, other public or private hospital, and ambulatory medicine. Route of consultation was categorized as formal

when the patient was examined by the IDS (consultation at bedside or in the IDC unit) and informal in all other cases (consultation by phone, face to face, e-mail, or fax).

Statistical analysis

Descriptive statistics were presented as numbers and percentages for categorical variables or median and 25th and 75th percentiles for continuous variables. Differences in characteristics according to the requesting physician's setting were compared using the χ^2 or Fisher exact tests for categorical variables and the Wilcoxon rank sum test for continuous variables. Two-sided *p*-values of less than 0.05 were considered statistically significant. Analyses were performed using Stata statistical software (version 10.0, Stata Corp, College Station, TX, USA).

RESULTS

The HIDC managed a total of 8,419 consultations during the 1-year study period. We excluded 480 consultations requested by outpatients and 76 others solicited by private nurses and pharmacies. Our final sample comprised 7,863 consultations: 4,407 (56.0%) were requested by ambulatory medicine, 2,933 (37.3%) by GUH physicians, and 523 (6.7%) by physicians in public or private hospitals (Table 1).

Figure 1 shows the main channels of infectious disease consultations. Hospital-based physicians principally used the cell phone, whereas the route for requesting consultation by ambulatory physicians was related to the motive for consultation. Consultations related to blood exposure, general information, antimicrobial treatment, and diagnosis were requested via cell phone in nearly all cases, whereas those related to prophylaxis were requested essentially (95%) via the secretariat. Requests by cell phone and via the secretariat were informal consultations in 55% and 100% of cases, respectively.

The reasons for requesting IDS consultation and patient characteristics differed depending on the requesting physicians' setting ($p < 0.001$) (Table 1). In hospitals, consultations were requested by residents in 45.6% of cases and medical students in 18.6% of cases. The latter were all working in GUH under the supervision of a resident or a senior physician. A total of 1,453 requests (50%) came from medicine, 1,203 (41%) from surgery, 140 (5%) from long-term care and rehabilitation, and 65 (2%) from intensive care departments at GUH.

The distribution of the 3,990 consultations related to the treatment or diagnosis of an ID differed with the setting ($p<0.001$) (Table 2). Bone and joint and orthopedic material infections were the most common infections for which ID advice was requested in hospitals, whereas in ambulatory care the most common diagnoses were unexplained fever or inflammatory syndrome and viral infection.

Approximately eight of ten consultations were conducted by ID residents (Table 3). In GUH only, formal consultations were more frequent than informal consultations. Furthermore, consultation for patients with nosocomial infection was more likely to be formal than for patients with community-acquired infection (44% [503/1,133] versus 12% [820/6,730], $p<0.001$). IDS recommendations on antibiotics and diagnostic or monitoring tests differed depending on the setting.

DISCUSSION

The high number of HIC requests suggests that the hotline responds to a need on the part of attending physicians. The success of the approach can be highlighted by an increasing number of consultations, from 328 per month in 2005 [4] to 655 in 2008. Moreover, in a previous analysis we evidenced that compliance with IDS recommendations for antimicrobial therapy was associated with better inpatient clinical outcomes [5]. Previous studies have reported lower numbers of ID consultations (from 220 to 233 monthly consultations) [2,6,7]. This may be explained by the hotline's easy accessibility based on dedicated human and material resources. IDSs were always prompt in answering questions, providing a service closely adapted to non-ID physicians' need for quick and adapted answers.

Hospital-based physicians were likely to request consultations for infection control. Indeed, 32% of inpatients had nosocomial infections, suggesting that requesting physicians were aware of the importance of specialized advice. Inappropriate antibiotic treatment is common in nosocomial infections [8,9], which are responsible for a high number of malpractice claims [10-12]. Their treatment requires good knowledge of local antibiotic-resistance patterns, one of the IDS's skills [13]. In this study, more than half of inpatients had previous antimicrobial treatment and for two-thirds of them, IDSs recommended modifying or withdrawing this treatment. IDS intervention can enhance antibiotic use and reduce health expenditure and ecological pressure [14-16].

In ambulatory medicine, requesters were mostly general practitioners, with two main channels for consultations identified. A high proportion (42%) of requests by fax concerned prophylaxis for travelers, while other studies found much lower rates, between 2 and 7%

[2,6]. The GUH unit running the hotline differs from others in that it also includes international vaccinations and tropical medicine consultation, the most likely explanation for this finding. Antimicrobial treatment and diagnosis issues, preferentially referred directly to the IDS via cell phone, made up the second channel.

Informal consultations accounted for 73% of HIDC activity, consistent with previous studies [1,17,18]. They provide rapid answers and replace certain formal consultations and hospitalizations [19]. However, questions on the quality of the information exchanged, the transfer of responsibility [3,17,20-23], and payment [17,24] have been raised. Also, whether IDCs contribute toward training physicians in managing IDs or instead lead to physicians losing competence in this domain [13,22,25] is a subject of debate. Indeed, it may seem easier to request advice than to search for information oneself [2].

The limitations of our study deserve mention. First, we could not identify whether several consultations were made for the same patient, as the analysis unit was the consultation. Second, we did not assess the quality of the recommendations given by IDSs, but a previous study demonstrated that physician's adherence to the IDS's recommendations for antibiotic treatment was high and associated with better clinical outcomes [5]. Third, this study was conducted in a single university hospital and the results may not apply to patients managed in other settings with different referral patterns.

In conclusion, the HIDC provides a highly valuable service to the medical community. Its activity is very important in terms of the volume of consultations but its financial support remains unresolved.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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Table 1: Characteristics of the 7,863 infectious disease consultations in hospitals or ambulatory medicine.

| | Grenoble university- affiliated hospital | | Public or private hospitals | | Ambulatory medicine | | <i>P</i> -value |
|---|--|------|--------------------------------|------|------------------------|-------|-----------------|
| | N=2933 | (%) | N=523 | (%) | N=4407 | (%) | |
| Route for requesting consultation | | | | | | | |
| Cell phone | 2849 | (97) | 520 | (99) | 1247 | (28) | <0.00 |
| Secretariat | 0 | (0) | 0 | (0) | 3153 | (72) | |
| E-mail | 36 | (1) | 3 | (1) | 7 | (0) | |
| Face to face | 48 | (2) | 0 | (0) | 0 | (0) | |
| Requesting physician | | | | | | | |
| Senior physician | 794 | (27) | 442 | (85) | 4407 | (100) | <0.00 |
| Resident | 1495 | (51) | 81 | (15) | - | - | |
| Medical student | 644 | (22) | - | - | - | - | |
| Reason for requesting consultation | | | | | | | |
| Antimicrobial treatment / diagnosis | 2576 | (88) | 445 | (85) | 969 | (22) | <0.00 |
| Antimicrobial prophylaxis | 201 | (7) | 36 | (7) | 3318 | (75) | |
| Blood exposure | 79 | (3) | 30 | (6) | 74 | (2) | |
| General information | 77 | (3) | 12 | (2) | 46 | (1) | |
| Patient characteristics | | | | | | | |
| Male ^c | 1566 | (55) | 253 | (51) | 1525 | (46) | <0.00 |
| Age in years, mean (SD) ^c | 57 (21) | | 58 (23) | | 34 (23) | | <0.00 |
| Ongoing antimicrobial treatment | 1752 | (60) | 275 | (53) | 235 | (0) | <0.00 |
| Nosocomial infection | 985 | (34) | 112 | (21) | 36 | (1) | <0.00 |
| Contact isolation for infection control | 236 | (8) | 38 | (7) | 13 | (0) | <0.00 |
| Seasonal distribution | | | | | | | |
| December, January, February | 858 | (29) | 169 | (32) | 1079 | (24) | <0.00 |
| March, April, May | 783 | (27) | 131 | (25) | 1196 | (27) | |
| June, July, August | 559 | (19) | 105 | (20) | 1050 | (24) | |
| September, October, November | 733 | (25) | 118 | (23) | 1082 | (25) | |

^a by Fisher's exact test.

^b by χ^2 test.

^c Data were missing in 1233 patients for sex and in 2974 patients for age.

Table 2: Infectious diseases specialist diagnosis for the 3,990 consultations for treatment or diagnosis.

| | Grenoble university- affiliated hospital | Public or private hospitals | Amn me N=96 |
|--|---|--|----------------------------|
| | <i>N</i> =2576 (%) | <i>N</i> =445 (%) | <i>N</i> =96 |
| Bone and joint infection and orthopedic material | 359 (14) | 89 (20) | 8 |
| Respiratory tract infection | 283 (11) | 50 (11) | 5 |
| Soft tissue infection | 244 (9) | 40 (9) | 9 |
| Abdominal infection | 224 (9) | 35 (8) | 6 |
| Urogenital tract infection | 222 (9) | 33 (7) | 6 |
| Unexplained fever or inflammatory syndrome | 138 (5) | 33 (7) | 10 |
| Colonization, contamination or false-positive result | 161 (6) | 13 (3) | 4 |
| Sepsis or bacteremia | 189 (7) | 17 (4) | |
| Material infection (excluding orthopedic material) | 173 (7) | 15 (3) | |
| Viral infection | 50 (2) | 13 (3) | 10 |
| Central nervous system infection | 131 (5) | 21 (5) | 1 |
| Cardiovascular infection (excluding material) | 133 (5) | 14 (3) | |
| Noninfectious pathology | 52 (2) | 11 (2) | 7 |

Table 2: Infectious diseases specialist diagnosis for the 3,990 consultations for treatment or diagnosis (cont).

| | Grenoble university- affiliated hospital | Public or private hospitals | Amn me n=90 |
|--------------------------------|---|--|----------------------------|
| | <i>n=2576 (%)</i> | <i>n=445 (%)</i> | |
| Parasitology - mycology | 40 (1) | 12 (6) | 6 |
| Anthropozoonosis | 19 (1) | 7 (2) | 8 |
| Tuberculosis | 52 (2) | 5 (1) | 3 |
| Antimicrobial adverse event | 38 (1) | 15 (3) | 1 |
| Ear, nose and throat infection | 31 (1) | 6 (1) | 1 |
| Other infectious disease | 37 (1) | 16 (4) | 5 |

Table 3: Characteristics of answers provided by infectious diseases specialists.

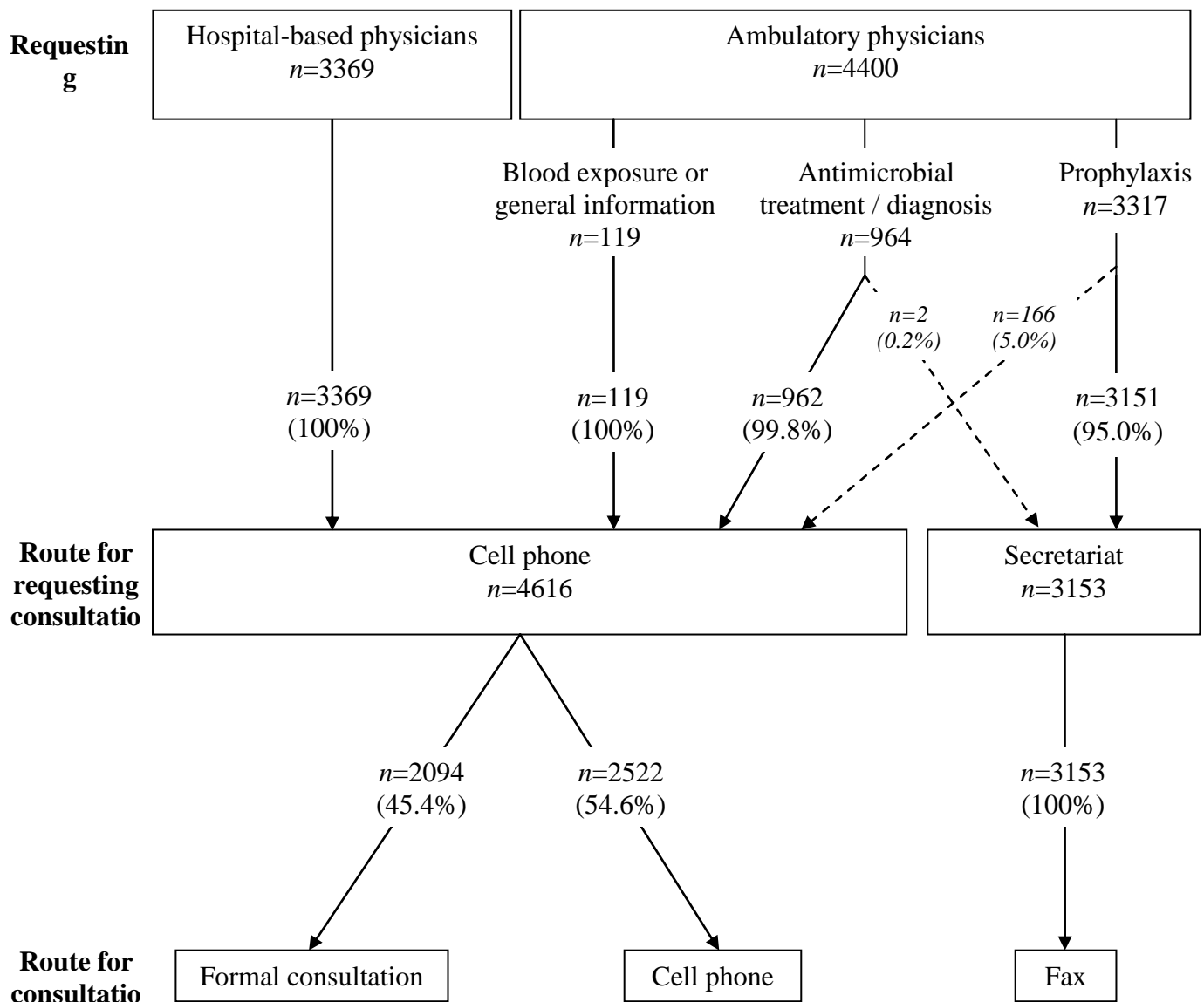
| | Grenoble university- affiliated hospital | | Public or private hospitals | | Ambulatory medicine | | <i>P</i> |
|--|---|------|--|------|--------------------------------|------|----------|
| | N=2933 | (%) | N=523 | (%) | N=4407 | (%) | |
| Infectious diseases specialist | | | | | | | |
| Senior physician | 1001 | (34) | 169 | (32) | 583 | (13) | <0 |
| Resident | 1932 | (66) | 354 | (68) | 3824 | (87) | |
| Route of consultation | | | | | | | |
| <i>Formal</i> | 1595 | (54) | 57 | (11) | 442 | (10) | <0 |
| Bedside consultation | 1323 | (45) | 0 | (0) | 0 | (0) | |
| Consultation in the ID unit | 272 | (9) | 57 | (11) | 442 | (10) | |
| <i>Informal</i> | 1338 | (46) | 466 | (89) | 3965 | (90) | |
| Fax | 0 | (0) | 0 | (0) | 3153 | (72) | |
| Cell phone | 1254 | (43) | 463 | (89) | 805 | (18) | |
| Face to face | 48 | (2) | 0 | (0) | 0 | (0) | |
| E-mail | 36 | (1) | 3 | (0) | 7 | (0) | |
| Type of therapeutic recommendations | | | | | | | |
| Modification | 1053 | (36) | 157 | (30) | 85 | (2) | <0 |
| Continuation | 557 | (19) | 98 | (19) | 106 | (2) | |
| Beginning | 618 | (21) | 116 | (22) | 3479 | (79) | |
| No treatment | 563 | (19) | 132 | (25) | 693 | (16) | |
| Withdrawal | 142 | (5) | 20 | (4) | 44 | (1) | |
| Type of exam advice | | | | | | | |
| Diagnostic test | 1223 | (42) | 249 | (48) | 611 | (14) | <0 |
| Monitoring test | 509 | (17) | 77 | (15) | 105 | (2) | <0 |

Abbreviation: ID, infectious diseases.

^a by χ^2 test.

^b by Fisher's exact test.

Figure 1: Major patterns of communication for hotline infectious diseases consultation.*



*Consultations by E-mail and face-to-face were excluded in this figure.