The Place and the Efficacy of Infectious Disease Consultations in the Hospitals

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Abstract: Our study aims to determine the efficacy of infectious disease consultations and the interrelations between doctors in this social laboratory. This study was conducted at 34 centers located in 22 cities across Turkey and contributed by 210 infectious disease specialists (IDSs) and 970 non–infectious disease specialists (NIDSs), totaling 1180 medical doctors. Infectious disease specialists and NIDSs have separately contributed by responding to questionnaires designed specifically for the consultation process. It appears that a satisfactory collaboration has been established between IDSs and NIDSs during the consultation practices. There are some discrepancies in the perceptions of some of the NIDSs. These are the evaluation of patients holistically, the expectation of NIDSs in critical infection cases to start the therapy immediately, losing the support of drug companies by NIDSs, and the restriction of NIDSs in routine medical practice. On the other hand, NIDSs seem to have real problems in the diagnosis or treatment of infectious diseases. The consultation service provided by the IDSs in Turkey is widely accepted among other clinicians and appears to be of a crucial importance.

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The threat of antibiotic resistance has never been so great, and the issue of recommending antibiotics, which have a wide array of spectra, has been a matter of complex debate as to who should prescribe these agents. Patients seen by the infectious disease (ID) consultants are more likely to receive effective and appropriate empirical therapy, likely to have decreased costs, to survive, and to be cured.[1–4] Clinicians expect that the ID specialists (IDSs) should help them in selecting prompt and accurate microbiological diagnosis methods, planning antibiotic policies in the health care settings, recommending rational antibiotics, surveillance of drug resistance, featuring hospital epidemiology, controlling resistance, and maintaining infection control programs.[5] Various policies for antibiotic use exist throughout the world. We believe that some clarification is needed on the expectations of medical doctors to define when to use antibiotics, which antibiotics should be used, and how infected patients should be supervised. Is complying with ID guidelines for a medical doctor adequate, or is it better to consult IDSs?

In February 2003, the Turkish Ministry of Health issued a "Budget Enforcement Document" that delineated the antibiotic prescription policy in the country. According to this regulation, extended-spectrum and parenteral antibiotics should be prescribed only by the IDSs in Turkey. Any prescription incompliant with this regulation is not reimbursed by the state. As a result of this policy, non–infectious disease specialists (NIDSs) were restricted in management of their patients. This policy also forced IDSs to share medical and legal responsibility for patients hospitalized outside ID departments. There were agreements and disagreements, as well as satisfaction and dissatisfaction during the management of infected patients for both IDSs and NIDSs. Thus, Turkey appears to be a perfect social laboratory to assess the perceptions of IDSs and NIDSs to determine the place and efficacy of consultation service for the IDs. In this study, we carried out a nationwide survey involving IDS and NIDSs to evaluate the beneficial and problematic aspects of this enforced teamwork.

METHODS

The Infectious Disease Consultations survey was conducted in 34 centers at 22 major cities across Turkey between

October 2009 and February 2010. Only the IDSs who provide adult consultation services and the NIDSs who work in the hospitals and request ID consultation service were included. We obtained ethics committee approval and consent of the participants before the start of our research. One of each of the 2 standard questionnaires was given to both IDSs and NIDSs by the voluntary interviewers. Answering the questionnaire was optional. The institutional and demographic data of the participants were included in the questionnaires. There were 22 questions related to the ID consultation process in the study. Thirteen questions were common in both questionnaires. Eight additional questions were asked to NIDSs, and 1 more question targeted IDSs. Ethical consent was obtained for the study from the Cukurova University ethical council.

In some questions, the participants were asked to validate their approaches with numerical values ranging from 0 to 10. The mean values were interpreted as worst (0.1–2), poor (2.1–4), moderate (4.1–6), good (6.1–8), and excellent (8.1–10) for quality assessment. For time-dependent questions, the evaluation was as follows: rarely (0.1–2), occasionally (2.1–4), sometimes (4.1–6), frequently (6.1–8), and always (8.1–10). For the rest of the questions, the participants were asked to mark the most suitable choice offered.

For statistical analysis, analysis of variance, t test, and χ^2 test were performed to display the similarities and/or differences between the given groups. All statistical analyses were performed using SPSS 16.0 program (SPSS Inc, Chicago, Ill), and $P < 0.01$ was accepted as statistically significant.

RESULTS

In this study, 210 IDSs (78 in state hospitals, 3 in private hospitals, 23 in state training hospitals, and 106 in university hospitals) and 970 NIDSs (317 in state hospitals, 53 in private hospitals, 101 in state training hospitals, and 499 in university hospitals) (overall 1180 medical doctors) were included.

TABLE 1. Comparisons of Responses to Descriptive Questions

		IDSs	NIDSs
What do you think about the IDS consultation service, which is carried on a mandatory basis?	It will help to share the medical responsibility	5.2%	14%
	There will be problems in evaluating the patient on a complementary basis	10.5%	17.6%
	Provides collaborative patient management	84.4%	68.4%
	$\chi^2_2 = 22.25$, $\mathbf{P = 0.001}$		
		Surgeons	**IMS**
How do you interpret your approach in microbiological diagnosis in managing an ID patient?	My approach is sufficient	32.8%	32.1%
	My approach is not sufficient	40%	44.4%
	I depend on IDSs for microbiological tests	21.7%	18.5%
	I don't demand microbiological tests	5.5%	5.1%
	$\chi^2_2 = 11.15$, $\mathbf{P = 0.001}$		
How were the educational supports of drug companies (financing of congresses, symposia, etc) affected with mandatory consultation policy?	These supports decreased (NIDSs)/increased (IDSs) with mandatory consultation policy	40.8%	42.2%
	These supports were unaffected	26.5%	15.6%
	I don't care about these supports and don't want to make comments on this issue	32.7%	42.3%
	$\chi^2_2 = 15.898$, $\mathbf{P = 0.001}$		
What would you do for the IDS recommendations that you do not agree with?	I don't start therapy and try to shift to other antibiotics I agree with	3.7%	4.6%
	I consult to the same IDSs once again	85%	86%
	I consult to another IDSs	3.9%	3.7%
	I always comply with the recommendations and don't reconsult	7.4%	5.7%
	$\chi^2_3 = 1.620$, $P = 0.655$		
What do you think about the prescription approach to a critical infection patient?	NIDSs should be able to prescribe antibiotics without consulting IDSs	14.3%	30%
	NIDSs should call IDSs and make decision on the phone	44.8%	34.5%
	NIDSs should wait IDSs to evaluate the patient at the bedside	41%	35.5%
	$\chi^2_2 = 22.06$, $\mathbf{P = 0.001}$		
	Hemato-oncologists (n = 24), Other NIDSs (n = 946)	**Hm-Onc**	**Others**
	NIDSs should be able to prescribe antibiotics without consulting IDSs	58.3%	29.3%
	NIDSs should call IDSs and make decision on the phone	25%	34.8%
	NIDSs should wait for IDSs to evaluate the patient at the bedside	16.7%	35.9%
	$\chi^2_2 = 9.685$, $\mathbf{P = 0.008}$		

Values in bold font are statistically significant.

IMS indicates internal medicine specialists; Hm-Onc, hemato-oncologists.

TABLE 2. Approaches of the NIDSs to Antibiotic Therapy for Methicillin-Resistant *Staphylococcus aureus* (MRSA) Infections

Which is the most suitable choice in the management of an infection in which the MRSA is the infecting strain?	***P* = 0.015**	**Amp-Sulb**	**IMP**	**CFXN**	**Vanco**	**No Idea**
	Surgeons	5.3%	11%	3%	73.2%	7.5%
	IMS	3.5%	5.5%	3.1%	80.5%	7.4%
	Overall	4.5%	8.4%	3%	76.7%	7.5%
		$\chi^2_4 = 12.295$, $P = 0.015$				
	State hospitals	6.3%	11%	5.7%	67.5%	9.5%
	Private hospitals	5.7%	11.3%	3.8%	69.8%	9.4%
	State training hospitals	3%	7%	4%	82%	4%
	University hospitals	3.4%	6.7%	1%	82.2%	6.7%
	Overall	4.5%	8.4%	3%	76.7%	7.5%
		$\chi^2_{12} = 34.116$, $\mathbf{P = 0.001}$				
Which is the most suitable antibiotic choice in the management of an infection due to *S. aureus*, which was found to be penicillin and oxacillin resistant in the susceptibility testing?		**Pip-Tazo**	**CIP**	**CAZ**	**TEC**	**No Idea**
	Surgeons	17.7%	8.1%	5.8%	39.7%	28.8%
	IMS	12.9%	3.8%	4.4%	55.7%	23.3%
	Overall	15.4%	6.1%	5.1%	47.2%	26.2%
		$\chi^2_4 = 27.432$, $\mathbf{P = 0.001}$				
	Completing fellowship after 2000	15.0%	5.2%	6.0%	51.1%	22.8%
	Completing fellowship before 2000	16.3%	8.0%	3.3%	38.9%	33.6%
		$\chi^2_4 = 21.273$, $\mathbf{P = 0.001}$				
	State hospitals	17.6%	10.5%	8.9%	39.6%	23.3%
	Private hospitals	26.4%	3.8%	11.3%	39.6%	18.9%
	State training hospitals	15.0%	6.0%	4.0%	46.0%	29.0%
	University hospitals	12.9%	3.5%	2.2%	53.2%	28.2%
	Overall	15.4%	6.1%	5.1%	47.2%	26.2%
		$\chi^2_{12} = 55.662$, $\mathbf{P = 0.001}$				

Values in bold font are statistically significant.

Amp-Sulb indicates ampicillin sulbactam; IMP, imipenem; CFXN, ceftriaxone; Vanco, vancomycin; Pip-Tazo, piperacillin tazobactam; CIP, ciprofloxacin; CAZ, ceftazidime; TEC, teicoplanin; IMS, internal Medicine Specialists.

Among the NIDSs, 512 were surgeons, and 458 were internal medicine specialists. Infectious disease specialists had been working in the area of IDs for 8.66 (SD, 6.59) years, while NIDSs were working in their specialties for 8.74 (SD, 6.59) years ($t = 0.868$, $P > 0.05$).

The results of responses to time- and quality-dependent approaches, which were graded from 1 to 10, were as follows. The use of antibiotics under the supervision of IDSs was thought to be an excellent strategy for the IDSs (mean, 9.03) and was good for NIDSs (mean, 7.98) ($P < 0.01$). Mandatory IDS consultation service was found to be excellently useful in sharing the legal responsibility by the IDSs (mean, 8.33) and the NIDSs (mean, 8.18) ($P > 0.01$). The optimum timing of consultation should be when the origin of fever was not detected by the

TABLE 3. Nonparametric Evaluations of the Approaches of NIDSs on an Institutional Basis

	Comments	**State Hospitals**	**Private Hospitals**	**State Training Hospitals**	**University Hospitals**
How were the educational supports of drug companies (financing of congresses, symposia, etc) affected with mandatory consultation policy?	These supports decreased with mandatory consultation policy	34.7%	26.4%	55.4%	45.9%
	These supports were unaffected	19.6%	22.6%	10.9%	13.2%
	I don't care these supports and don't want to make comments on this issue	45.7%	50.9%	33.7%	40.9%
		$\chi^2_6 = 25.143$, $\mathbf{P = 0.001}$			
How do the IDSs in your institution make their decision during the consultation?	IDSs make decision due to the information I have given.	9.8%	9.4%	7.9%	5.4%
	IDSs make decision due to microbiological data.	15.1%	11.3%	18.8	12.6%
	IDSs combine the information I have given, microbiological data and clinical findings.	75.1%	79.2%	73.3%	82.%
		$\chi^2_6 = 9.969$, $P = 0.126$			

Values in bold font are statistically significant.

TABLE 4. Parametric Evaluations of the Approaches of NIDSs on an Institutional Basis

Hospitals	n	Mean	SD	Comment	F	Post Hoc Test (Tamhane)
I believe that my knowledge on antibiotics is sufficient						
State hospital	317	6.2303	1.92764	Good	4.947*	2
Private hospitals	53	6.9811	1.58709	Good		1–4
State training hospitals	101	6.3168	1.67887	Good		—
University hospitals	499	5.9719	2.07374	Moderate		2
Total	**970**	**6.1474**	**1.97662**	**Good**		
I believe that antibiotics are used on a rational basis throughout Turkey by the NIDSs						
State hospitals	317	3.6562	2.10899	Poor	0.878	
Private hospitals	53	3.7358	2.03952	Poor		
State training hospitals	101	3.9802	2.16786	Poor		
University hospitals	499	3.6172	2.04365	Poor		
Total	970	3.6742	2.07771	Poor		

Values in bold font are statistically significant.
*$P < 0.01$.

evaluation of NIDSs was an excellent strategy for both IDSs (mean, 8.25) and NIDSs (mean, 8.51) ($P > 0.01$). The other approach that the optimum timing of consultation was when the clinical diagnosis had been established, but rational therapy had been unknown, was an excellent strategy for IDSs (mean, 8.10), and it was a good strategy for NIDSs (mean, 7.95) ($P > 0.01$). Infectious disease specialists thought that NIDSs sometimes referred to IDSs immediately when they detected fever (mean, 4.34), whereas NIDSs thought that they occasionally do (mean, 3.75) ($P > 0.01$). Accordingly, both IDSs (mean, 3.77) and NIDSs (mean, 3.23) assumed that NIDSs occasionally refer to IDSs as soon as they detect leukocytosis ($P < 0.01$). Either IDSs (mean, 3.12) or NIDSs (mean, 3.52) thought that IDSs give telephone consultation service in their institutions occasionally ($P > 0.01$). But, IDSs (mean, 6.09) believed that this service should be given frequently, although NIDSs (mean, 5.57) thought that it should sometimes be given ($P > 0.01$). Infectious disease specialists assumed that they always evaluated the patient rapidly (mean, 9.08) following the consultation, whereas NIDSs believed that IDSs frequently consulted rapidly (mean, 7.96) ($P < 0.01$). When the same question was turned upside down, the response was similar. That is, both IDSs (mean, 2.02) and NIDSs (mean, 2.62) thought that IDSs occasionally evaluated the patient with substantial delays following the consultation ($P < 0.01$). Both IDSs (mean, 8.81) and NIDSs (mean, 8.13) believed that IDSs personally evaluated the patient at the bedside ($P < 0.01$). Infectious disease specialists assumed that IDS recommendations were followed on a regular basis in their institutions in a good way (mean, 7.87), although NIDSs thought that they followed the recommendations excellently (mean, 8.84) ($P < 0.01$). Infectious disease specialists believed that this consultation service decreased nosocomial infections excellently (mean, 8.09), whereas NIDSs believe that the service decreased hospital-acquired infections (mean, 7.51) in a good way ($P < 0.01$). Both IDSs (mean, 7.61) and NIDSs (mean, 7.51) were satisfied with the current mandatory IDS consultation service in a good way ($P > 0.01$).

The responses of the study participants are presented in Tables 1 to 5. According to our data, satisfactory collaboration has been established between IDSs and NIDSs in general following the implementation of mandatory ID consultation practices. However, there are some differences in the perceptions of some of the participants. The possible discrepancies can be identified as the evaluation of patients holistically, the expectation of NIDSs in critical infection cases to start the therapy immediately, NIDSs losing the support of the drug companies, and the restriction of NIDSs in routine medical practices. On the other hand, NIDSs seem to have real problems in the diagnosis and treatment of IDs. Overall, IDSs seem to be more enthusiastic in their involvement in the management of patients with IDs.

DISCUSSION

The 2003 legal regulations for the IDS consultations in Turkey had mainly financial objectives. The use of broad-spectrum antibiotics in Turkey (piperacillin/tazobactam, imipenem,

TABLE 5. Descriptive Statistics on the Attitudes of IDSs and NIDSs

Do NIDSs prescribe all oral antibiotics freely? (Question to IDSs)	Yes	19%
	No, they should not prescribe oral antibiotics	8%
	NIDSs should not prescribe extended-spectrum oral antibiotics	73%
How do the IDSs in your institution make their decision? (Question to NIDSs)	IDSs make decision due to the information I have given	7.3%
	IDSs make decision due to microbiological data	14%
	IDSs combine the information I have given, microbiological data, and clinical findings	78.7%
If IDS consultation service on the mandatory basis is terminated in the country, how would your attitude be? (Question to NIDSs)	I would ask for more IDS consultations	2.5%
	My IDS consultation needs would not change	57.7%
	I would design antibiotic therapy by myself and demand IDS consultation less	39.8%

meropenem, cefoperazone/sulbactam, ceftazidime, cefepime, teicoplanin, vancomycin, and amphotericin B) decreased to 0.135 defined daily dose (DDD)/1000 inhabitant-days in 2004 from 0.137 DDD/1000 inhabitant-days in 2003.[6] Because Turkey is a reorganizing country, there are other factors that affected the prescription of antibiotics in that period. For example, a new reimbursement policy following the implementation of a social insurance reform in 2005 was reported to have facilitated the prescription and consumption of antibiotics compared with previous era.[7] Seemingly, this reform has confounded the efficacy of 2003 regulations. But, a few initial reports on the financial gains, along with decreasing nosocomial infection and resistance rates related with 2003 regulations in the country, are already known.[8,9]

Furthermore, adherence to the IDS recommendations for antibiotic treatment was known to be associated with a higher rate of early clinical improvement, shorter length of hospital stays, and comparable in-hospital mortality.[10–12] Our study aimed to evaluate the implications of IDS consultation service, the controversies between the doctors who refer and who provide consultations, and the potential shortcomings of this process.

In our study, most NIDSs perceived themselves as inadequate in microbiological diagnosis. They considered that their knowledge on antibiotic use was sufficient, although antibiotics were believed to be used irrationally throughout the country by other doctors. This understanding might imply overconfidence in their own abilities, while being concerned about the others. When 2 of the easiest questions in ID practices were asked to the NIDSs, the results were concerning. One fourth of the participants did not mark a glycopeptide as the best therapeutic choice in the management of an infection due to methicillin-resistant *Staphylococcus aureus*. In this question, the other choices did not offer an anti–gram-positive agent, but β-lactams or a quinolone. Accordingly, the situation was worse in interpreting the antibiotic susceptibility test results of an infecting *S. aureus* strain, which was reported to be penicillin and oxacillin resistant. More than half of the participants did not choose the glycopeptide for the treatment of such infections. Vancomycin and teicoplanin are 2 glycopeptides used in Turkish medical practice since 1988 and 1996, respectively. Hence, these drugs were not newcomers in the market, and the clinicians were familiar with these antibiotics.[13] Inappropriate answers to these 2 questions were more frequent among surgeons and older specialists who completed fellowship before the year 2000. The situation was a little bit better for NIDSs working in the hospitals, which provide medical training.

The IDS consultation service in the intensive care units was reported to improve the appropriateness of antimicrobial therapy and was associated with a reduction in mortality.[4] In our study, although most NIDSs reported that they consulted IDSs in the supervision of a critical patient either by telephone or at the bedside, 30% of the NIDSs and 14% of IDSs prefer that the antibiotics should be prescribed by the patient's doctor. In fact, writing of antibiotic orders by the primary service is not necessarily erroneous, as long there is a good communication between the services, and the primary service follows ID recommendations appropriately along with the subsequent IDS confirmation. Moreover, hematologists and oncologists, as a separate group, preferred to prescribe antibiotics by themselves in critical cases when compared with the rest of NIDSs. These preferences, which had been frequently debated in various scientific platforms particularly by hematologists and oncologists, appeared to be predominantly due to the need for rapid administration of antibiotics in critically ill patients such as those with febrile neutropenia. In fact, telephone consultation is an integral and important part of an ID practice,[14] and the use of mobile communication systems may provide rapid contact between IDSs and NIDSs.[15] Accordingly, consultations can be performed entirely by phone for some minor issues or can be merely initiated by phone to facilitate rapid administration of appropriate antibiotics to seriously ill patients. The participants of our study believed that performing consultations on the phone more frequently would be a better strategy as well.

In this study, NIDSs agreed that the IDS recommendations were followed regularly in their institutions. If NIDSs disagreed with the IDSs' suggestions, they were willing to find a compromise with the help of the IDSs. However, a small percentage of NIDSs (≤5%) preferred to manage the case on their own. On the other hand, NIDSs reported better compliance with the IDS suggestions when compared with the understanding of the IDSs. Both sides reported that the IDSs consult the patient rapidly, although there seemed to be occasional delays. The IDSs believed that they provided better consultation service than reported by the NIDSs. According to the NIDSs, the majority of the IDSs evaluated the patient on a regular basis by combining clinical and laboratory data with the information given by the patient's doctor at the bedside. However, there were some negative concerns about the patient evaluation by the IDSs solely with laboratory data or with only the information the NIDSs provided. Apparently, this perception did not differ between various health care institutions.

It is reported that the IDSs faced excessive consultation work from time to time.[8] In our study, the common points for both the IDSs and NIDSs on the timing of consultations were that the clinician should consult when the origin of fever was not detected after necessary evaluation or when the physician did not know which antibiotic to use after the establishment of diagnosis. However, when the NIDSs detected fever or leukocytosis on initial examination according to our data, the IDSs may have been asked for routine evaluation, diagnosis, and treatment of the patient, thus leading to overwork. Both sides accepted these erroneous applications of the IDS consultation, and more objections seemed to arise on the IDSs who suffer overwork. However, most participant clinicians appeared to believe that using parenteral antibiotics under the supervision of the IDSs was a rational strategy, and it was recognized that the mandatory IDS consultation service provided better patient management. In addition, consultation process was believed to contribute in sharing the legal responsibility. However, it seemed that the IDSs were more enthusiastic about the policy and advocated broadening the impact of the mandatory consultation service to include the extended-spectrum oral antibiotics.

Another important point is that antibacterial consumption is high in Turkish hospitals. Systemic antibacterial medications consumed in 2006 were 31.36 DDDs/1000 inhabitant-days in the country.[7] Most of the parenteral antibiotics used have been managed by the IDSs after 2003. Thus, the IDSs are the main targets of the commercial antibiotic marketing companies in Turkey today. In our study, a significant portion of the participants ignored the support of drug companies such as financing of congresses or symposia. However, approximately 40% of the specialists from both sides reported that the educational assistance of drug companies has shifted in favor of the IDSs, and this particular concern was more obvious in NIDSs working in hospitals; which do not provide medical training. The reasons for this may be that NIDSs working in these institutions directly faced these negative impacts because they worked on an individual basis, and for those who worked in training hospitals, the institutions financed educational activities to a degree so that the NIDSs did not need to depend as much on drug companies. This

consideration might have negative impacts in complying with the mandatory IDS consultation. We suggest the provision of governmental support to clinicians working in state hospitals for postgraduate training.

CONCLUSIONS

In conclusion, reasonable collaboration appeared to be established between IDSs and NIDSs in Turkey according to our data, and it appeared that the role of the IDSs in the management of IDs is of critical importance. However, the IDS consultation service may need some revisions to overcome the aforementioned problematic issues.

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