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Attitudes towards antibiotic use in end-of-life care: a nationwide Italian physician survey

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SUMMARY

Background: Many patients receive antibiotics at the end of their lives: prudent use in this setting is essential to limit side effects and selective pressure. Evaluating benefits and harms of antibiotics in this context is complex, with many factors influencing final decisions, including transition to end-of-life care and diagnosis of impending death. We aimed to investigate attitudes towards antibiotic prescription among key specialists involved in end-of-life care, also as part of a consensus on antibiotic prescription at the end of life.
Materials and Methods: An anonymous ten-question survey was conducted in January 2025, over a one-month period, on the websites of the Italian Society of Infectious and Tropical Diseases (SIMIT), the Italian Society of Palliative Care (SICP), the Italian Society of General Practitioners (SIMG), and the Italian Federation of Associations of Internal Medicine Physicians (FADOI), with a denominator of 9224 potential respondents. Specialists were invited to respond questions about usual practice with both end-stage oncological and non-oncological patients. A descriptive analysis of the aggregated data was performed.
Results: 880 physicians (9.5% of the denominator) participated (59.2% female), most working in hospitals (56.7%) and internal medicine departments (39.9%). A plurality (40.8%) had less than 10 years of work experience. Attitudes towards infection management and antibiotic prescription varied widely. More than half of the respondents reported treating infections differently in oncological versus non-oncological patients. Only a minority used antibiotics to treat respiratory secretions. Most could not rely on institutional guidelines for antibiotic prescription in terminally ill patients.
Conclusion: The attitude towards antibiotic prescription at the end of life is influenced by many factors, including the physician's background and setting. Case-by-case decision-making and advanced care planning could be significantly supported by guidelines based on studies that provide real-life data and effectively stratify patients and scenarios.

Keywords: End-of-life care, antibiotic therapy, medical futility, palliative care, survey study.

INTRODUCTION

With the advent of antibiotics, treatment of infections shifted from supportive measures to curative possibilities, making bacterial infections the prototype of curable diseases. However, bacterial infections are common in the final stages of life and may even be considered part of the normal dying process [1, 2].

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Evidence on the benefits of antibiotic therapy in reducing discomfort for suspected or confirmed infections at the end of life is conflicting and guidelines are scarce.
Patients often experience high levels of antibiotic exposure at the end of life [6, 7], even in palliative care or hospice settings, suggesting that antibiotic prescription in this context could benefit from stewardship interventions [6-9].
This study aimed to investigate the attitudes of physicians towards managing infections and prescribing antibiotics for end-of-life care, identifying key topics for guidelines and targets for antibiotic stewardship. This work is preparatory to a consensus on antibiotic prescription at the end of life by the Società Italiana di Malattie Infettive e Tropicali (SIMIT), Società Italiana di Cure Palliative (SICP), Società Italiana di Medicina Generale (SIMG), and Federazione delle Associazioni dei Dirigenti Ospedalieri Internisti (FADOI).

MATERIALS AND METHODS

An anonymous survey was conducted from January 1 to January 31, 2025, over a one-month period, promoted via the institutional websites of the involved scientific societies and via email. At the time of survey dissemination, 9224 (cfr abstract) potential respondents were reached, as SIMIT had 1638 members, SICP 1126 members, SIMG 3450 members and FADOI 3010 members, based on the mailing lists of each society we had access to. The survey collected demographic data, working settings, and specialty areas of participants. Ten questions addressed the management of terminally ill patients, both with and without cancer (Table 1).
For the purpose of this survey, "end-stage" was defined, for cancer patients, as metastatic or locally advanced cancer with a performance status of ECOG ≥3 and, for non-cancer patients, based on the criteria of the Italian position paper on end-stage organ failures by SIAARTI [10].
The questionnaire was developed by a panel of experts from Infectious Diseases, Palliative Care, Internal Medicine, and General Practice specialties, based on the most relevant issues in the field of antibiotic use at the end of life (i.e. management of fever, withdrawal and withholding of antibiotic therapy, timespan of therapies, antibiotic stewardship, communication with patients, families and proxies, advanced care planning), as emerging from recent literature and guidelines (Figure 1).
Descriptive statistics were applied to the aggregated results.
Consent was waived due to non-interventional nature of the study and guaranteed anonymity of physicians participating in the survey. Ethical approval (ID 7270) was obtained by the territorial Ethics Committee of the Center promoting the study (Comitato Etico Territoriale Lazio Area 3).

RESULTS

A total of 880 physicians completed the survey (59.2% females). Most of them were working in Internal Medicine (39.9%) and Palliative Care (24.8%) settings, with hospitals being the most common workplace (56.7%).
The majority agreed that antibiotics should be prescribed for suspected or confirmed bacterial infections in terminally ill patients. In the presence of fever, most participants considered underlying pathologies and prognosis for further management. More than half respondents would treat infections differently whether a terminally ill patient has end-stage neoplasm as compared to a non-oncologic disease; however, this was less frequent among physicians working in a palliative care setting.
The primary reason for not starting or withdrawing antibiotics were signs of imminent death, followed by severe side effects. Internal Medicine physicians tended to rely on family members' consent more frequently for starting antibiotics, while General Practitioners and Palliative Care physicians often followed the patients' choices.
Coherent with reasons for withholding/withdrawing antibiotics, the most frequent reason for prescribing antibiotics for prolonged fever (>72 hours) in a non-septic patient was a life expectancy of at least 48 hours.
Regarding therapy timespan, most prescribers were uncertain or disagreed with stopping pneumonia treatment after five days despite favorable response, except for Infectious Diseases physicians. Only a minority of physicians considered using antibiotics exclusively to reduce dyspnea and respiratory secretions; in particular, about half of physicians working in Palliative Care (PC) agreed with this use.
The preferred antibiotics duration for upper uri-

Table 1 - Results of the survey.

	Infectious Disease N (%)	*Internal Medicine N (%)*	*General Practice N (%)*	*Palliative Care N (%)*	*All N (%)*
1) Antibiotic therapy should always be prescribed for suspected/confirmed bacterial infections					
Completely agree	13 (9.7)	27 (7.7)	8 (4.5)	6 (2.8)	54 (6.1)
Agree	33 (24.6)	94 (26.8)	42 (23.7)	16 (7.3)	185 (21)
Partially agree	60 (44.8)	149 (42.5)	86 (48.6)	131 (60.1)	426 (48.4)
Uncertain	17 (12.7)	48 (13.7)	10 (5.6)	15 (6.9)	90 (10.2)
Disagree	11 (8.2)	32 (9.1)	31 (17.5)	50 (22.9)	124 (14.1)
No reply	0	1 (0.3)	0	0	1 (0.1)
Total	134	351	177	218	880
*2) How do you manage fever?**					
It depends on underlying pathology/prognosis	84 (62.7)	258 (73.5)	135 (76.3)	185 (84.9)	662 (75.2)
It depends on current setting	34 (25.4)	60 (17.1)	39 (22)	5 (2.3)	138 (15.7)
Always order diagnostic tests	40 (29.9)	35 (10)	25 (14.1)	6 (2.8)	106 (12)
Always order diagnostic tests plus empiric antibiotics	18 (13.4)	70 (19.9)	13 (7.3)	5 (2.3)	106 (12)
Always prescribe empiric antibiotic	1 (0.7)	15 (4.3)	2 (1.1)	2 (0.9)	20 (2.3)
Share decision with patient	34 (25.4)	87 (24.8)	89 (50.3)	20 (9.2)	230 (26.1)
Total respondents	134	351	177	218	880
Total replies	211	525	303	223	1262
3) Your approach to managing a suspected infection is different depending on whether the patient has cancer or not					
Completely agree	14 (10.4)	52 (14.8)	32 (18.1)	23 (10.6)	121 (13.8)
Agree	66 (49.3)	108 (30.8)	55 (31.1)	55 (25.2)	284 (32.3)
Partially agree	20 (14.9)	63 (17.9)	27 (15.3)	39 (17.9)	149 (16.9)
Uncertain	26 (19.4)	91 (25.9)	50 (28.2)	67 (30.7)	234 (26.6)
Disagree	8 (6.0)	35 (10.0)	13 (7.3)	33 (15.1)	89 (10.1)
No reply	0	2 (0.6)	0	1 (0.5)	3 (0.3)
Total	134	351	177	218	880
*4) Which factors lead you to not start/suspend antibiotic therapy?**					
No administration route	34 (25.4)	119 (33.9)	76 (42.9)	92 (42.2)	321 (75.2)
Clear signs of imminent death	108 (80.6)	312 (88.9)	164 (92.7)	208 (95.4)	792 (90)
Persistence of symptoms despite target therapy	50 (37.3)	158 (45)	66 (37.3)	126 (57.8)	400 (45.5)
Severe side effects	85 (63.4)	204 (58.1)	111 (62.7)	128 (58.9)	528 (60)
Diagnosis of chronic-progressive disease	35 (26.1)	114 (32.5)	48 (27.1)	56 (25.7)	253 (28.8)
Diagnosis of metastatic cancer	34 (25.4)	91 (25.9)	48 (27.1)	43 (19.7)	216 (24.5)
Request of the patient/ family members	60 (44.8)	140 (39.9)	90 (50.8)	84 (38.5)	374 (42.5)
I never suspend antibiotics	2 (1.5)	5 (1.4)	0	0	7 (0.8)
I have never considered this possibility	6 (4.5)	6 (1.7)	7 (4)	1 (0.5)	20 (2.3)
I don't know	1 (0.7)	0	0	0	1 (0.1)
Total replies	415	1149	610	738	2912

*Multiple answers allowed for Question 2 and 4. **Percentages are calculated based on number of respondents.

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	*Infectious Disease N (%)***	*Internal Medicine N (%)*	*General Practice N (%)*	*Palliative Care N (%)*	*All N (%)*
5) Single most important criterion to start empirical antibiotics for prolonged fever (>72 hours) without clearly localized infection or sepsis					
Life expectancy >48 hours	54 (40.3)	157 (44.7)	80 (45.2)	101 (46.3)	392 (44.5)
Family members' consent	11 (8.2)	43 (12.3)	21 (11.9)	21 (9.6)	96 (10.9)
Diagnostic tests available	35 (26.1)	48 (13.7)	13 (7.3)	17 (7.8)	113 (12.8)
Patient's choice	10 (7.5)	30 (8.5)	33 (18.6)	31 (14.2)	104 (11.8)
Peak body temperature (≥38°C vs <38°C)	21 (15.7)	70 (19.9)	30 (16.9)	47 (21.6)	168 (19.1)
None of the above	3 (2.2)	3 (0.9)	0	1 (0.5)	7 (0.8)
Total	134	351	177	218	880
6) You suspend antibiotics for pneumonia after 5 days and clinical response					
Completely agree	33 (24.6)	34 (9.7)	4 (2.3)	7 (3.2)	78 (8.9)
Agree	56 (41.8)	94 (26.8)	32 (18.1)	32 (14.7)	214 (24.3)
Uncertain	28 (20.9)	91 (25.9)	41 (23.2)	56 (25.7)	216 (24.5)
Disagree	16 (11.9)	113 (32.2)	77 (43.5)	96 (44.0)	302 (34.3)
Completely disagree	1 (0.7)	19 (5.4)	23 (13.0)	27 (12.4)	70 (8.0)
Total	134	351	177	218	880
7) When pneumonia is suspected, empiric antibiotics can be considered with the sole purpose of reducing dyspnea and respiratory secretions					
Completely agree	9 (6.7)	27 (7.7)	23 (13.0)	23 (10.6)	82 (9.3)
Agree	42 (31.3)	136 (38.7)	57 (32.2)	88 (40.4)	323 (36.7)
Uncertain	27 (20.1)	65 (18.5)	39 (22.0)	39 (17.9)	170 (19.3)
Disagree	47 (35.1)	102 (29.1)	45 (25.4)	58 (26.6)	252 (28.6)
Completely disagree	9 (6.7)	20 (5.7)	12 (6.8)	10 (4.6)	51 (5.8)
No reply	0	1 (0.3)	1 (0.6)	0	2 (0.2)
Total	134	351	177	218	880
8) How many days of antibiotics do you prescribe for upper urinary tract infection?					
Five days	38 (28.4)	97 (27.6)	42 (23.7)	56 (25.7)	233 (26.5)
Seven days	55 (41.0)	169 (48.1)	80 (45.2)	111 (50.9)	415 (47.2)
Ten days	21 (15.7)	54 (15.4)	42 (23.7)	34 (15.6)	151 (17.2)
Fourteen days	15 (11.2)	25 (7.1)	7 (4.0)	12 (5.5)	59 (6.7)
I wait for a negative urine culture	4 (3.0)	6 (1.7)	6 (3.4)	5 (2.3)	21 (2.4)
No reply	1 (0.7)	0	0	0	1 (0.1)
Total	134	351	177	218	880
9) Care planning (including antibiotic therapy) in a patient unable to make decisions should be shared with a legal representative when present					
Completely agree	47 (35.1)	110 (31.3)	98 (55.4)	104 (47.7)	359 (40.8)
Agree	70 (52.2)	169 (48.1)	60 (33.9)	88 (40.4)	387 (44.0)
Uncertain	11 (8.2)	34 (9.7)	11 (6.2)	16 (7.3)	72 (8.2)
Disagree	5 (3.7)	32 (9.1)	6 (3.4)	7 (3.2)	50 (5.7)
Completely disagree	1 (0.7)	6 (1.7)	2 (1.1)	3 (1.4)	12 (1.4)
Total	134	351	177	218	880
10) Did your Institution release shared criteria for the treatment of infections at the end of life?					
YES	17 (12.7)	42 (12.0)	21 (11.9)	48 (22.0)	128 (14.5)
YES, Different specialists involved	20 (14.9)	27 (7.7)	8 (4.5)	14 (6.4)	69 (7.8)
NO	97 (72.4)	282 (80.3)	148 (83.6)	156 (71.6)	683 (77.6)
Total	134	351	177	218	880

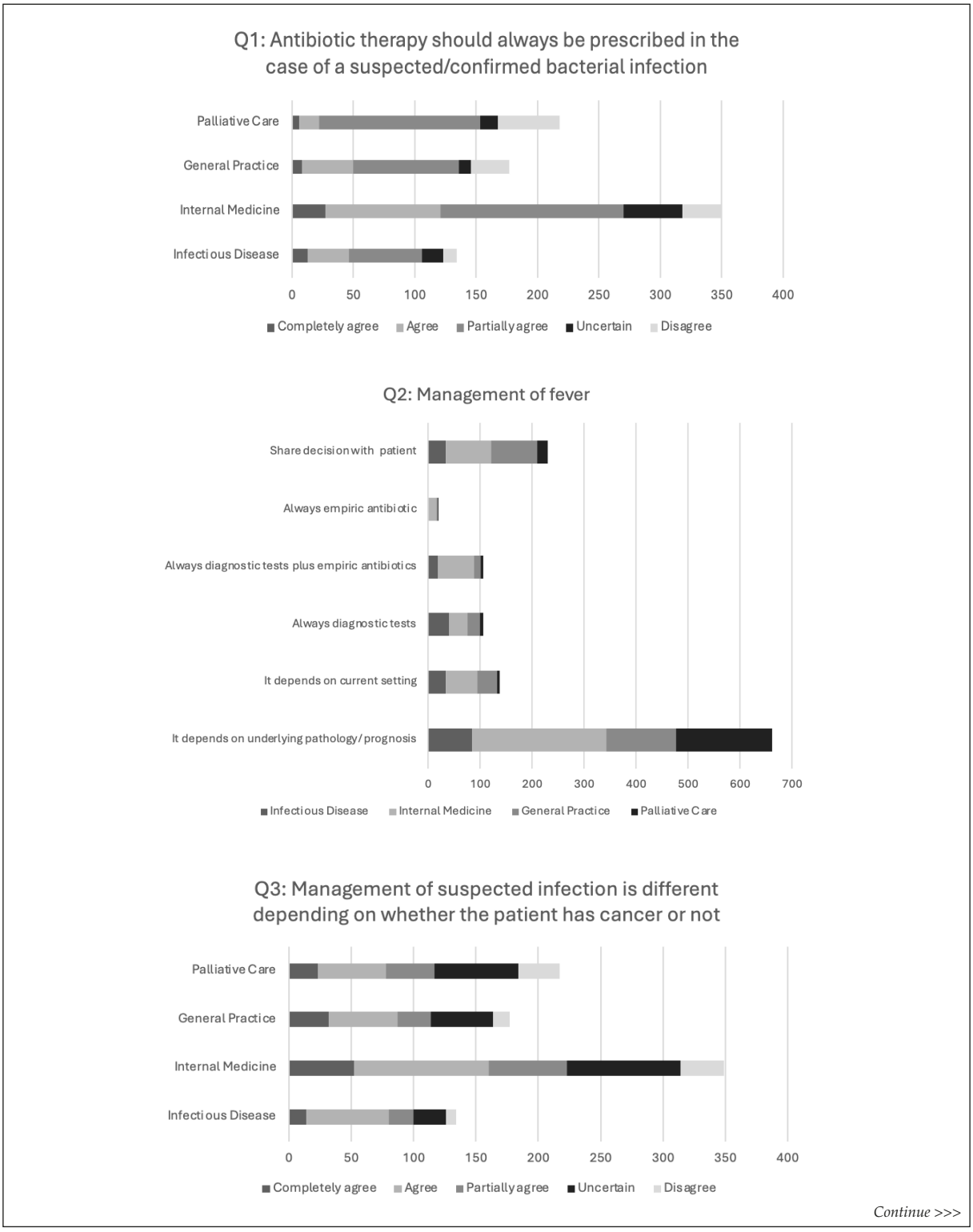

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Figure 1 - Graphs of responses from Question 1, Question 2, Question 3, Question 4 and Question 9 of the survey.

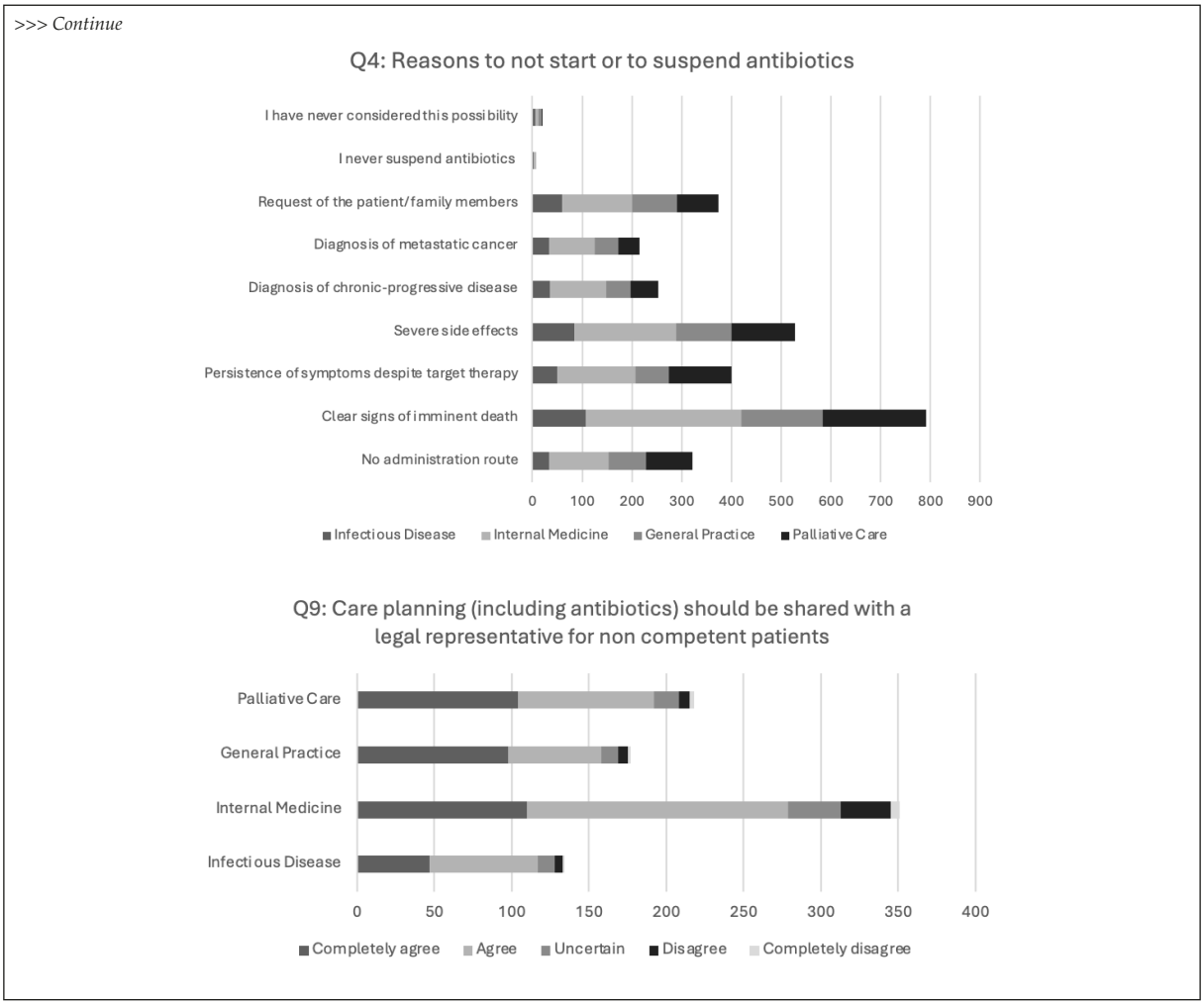

Figure 1 - Graphs of responses from Question 1, Question 2, Question 3, Question 4 and Question 9 of the survey.

nary tract infection treatment was seven days.
Finally, most respondents agreed with sharing care planning with a legal representative for non-competent patients and only a minority of physicians reported that their institutions had guidelines for antibiotic use in terminally ill patients.
Complete results of the survey are reported in Table 2.

DISCUSSION

This survey aimed to investigate the attitude of physicians from different specialties towards the management of suspected or confirmed infections and antibiotics prescription at the end of life.

The results highlight the complexity of antibiotic usage as perceived by respondents, who appear to consider several factors in their decision-making.
Imminent death was a common reason to withdraw antibiotics in this survey, which is very reasonable but differs from what is reported in some real-life experiences: nearly half of terminally ill patients receive antibiotics up to the day of death, and deterioration discourages deprescribing, as reported in a recent antibiotic stewardship intervention study in Singapore [11].
Additionally, a previous survey conducted by Crispim *et al.*, based on clinical vignettes, showed a definite tendency towards antibiotic prescription and escalation in end-of-life patients, even among

Table 2 - Complete content of the survey

All questions refer to the management of patients considered terminally ill, with and without cancer.	
1) Is antibiotic therapy always to be used in the case of a suspected or confirmed bacterial infection in the considered population?	a. Strongly agree b. Agree c. Partially agree d. Uncertain e. Strongly disagree
2) How do you manage the presence of fever in the considered population? (Multiple answers allowed)	a. I share the care plan with the patient b. It depends on the underlying disease and its related prognosis c. I always start antibiotic therapy d. I always initiate a diagnostic process and antibiotic therapy e. It depends on the setting f. I always initiate a diagnostic process
3) Your approach to managing a likely infectious condition varies depending on whether it concerns an oncological patient in an advanced metastatic stage or a non-oncological "end-stage" patient.	a. Strongly agree b. Agree c. Uncertain d. Disagree e. Strongly disagree
4) What are the factors, if any, that lead you to not start or to discontinue antibiotic therapy? (Multiple answers allowed)	a. Clear signs of imminent death b. Absence of administration routes c. I have never considered this possibility d. Diagnosis of advanced metastatic oncological disease e. Patient's or family's request f. Persistence of symptoms/fever despite appropriate therapy g. Onset of severe side effects h. Diagnosis of end-stage chronic progressive disease i. I never suspend antibiotics" (cfr Figure 1)
5) Which parameter do you consider a priority when deciding to start empirical or targeted antibiotic therapy in a patient from the considered population with a fever lasting more than 72 hours, in the absence of signs of sepsis or organ/system infection?	a. Life expectancy >48 hours b. Family agreement c. Availability of diagnostic tests d. Patient's choice e. Highest recorded daily body temperature (≥38°C vs <38°C)
6) In a patient from the considered population with infectious pneumonia who is showing clinical improvement on the fifth day of antibiotic therapy, you decide to discontinue the antibiotics.	a. Strongly agree b. Agree c. Uncertain d. Disagree e. Strongly disagree
7) In suspected infectious pneumonia in the considered patient population, empirical antibiotic therapy can be considered solely to reduce dyspnea and respiratory secretions. Do you agree?	a. Strongly agree b. Agree c. Uncertain d. Disagree e. Strongly disagree
8) In a patient from the considered population with a suspected or confirmed upper urinary tract infection who is clinically responding to the ongoing antibiotic treatment, after how long do you discontinue the antibiotic therapy?	a. Five days b. Seven days c. Ten days d. Fourteen days e. After a negative urine culture
9) Shared care planning (including antibiotic therapy) for a patient unable to make decisions due to cognitive impairment (non-competent) must be agreed upon with the legal representative (proxy, support administrator, guardian, or curator), when present. Do you agree?	a. Strongly agree b. Agree c. Uncertain d. Disagree e. Strongly disagree
10) Have criteria been shared within your Unit/Service/ Clinic for treating an infectious clinical condition in the considered patient population?	YES Yes, with the support of other specialists NO

palliative care physicians [12]. While stopping antibiotics due to severe side effects, a prevalent attitude in our survey, is common sense, imminent death seems to pose a greater dilemma for prescribers.

Accurate prediction of impending death (i.e., last few days of life) is essential in terms of supporting patients, families, caregivers, and healthcare professionals to clarify goals of care, promote shared decision-making process, avoid aggressive care, and achieve a good death and best possible quality of life. In addition, a proper diagnosis of impending death improves a better communication of prognosis with patients and families and helps in End-of-Life care, also to provide better symptom management.

Although many international studies have been conducted to investigate signs and symptoms of impending death both in cancer patients (CPs) and in non-cancer patients, uncertainty in prognostication is still a major issue [13-15]. Further research is needed to allow a better identification of end-of-life patients and a better diagnosis of impending death. Dissemination of some skills from Palliative Care Physicians to other specialists is desirable.

When investigating reasons to antibiotic prescription for terminally ill patients, Durand *et al*. found that it was frequently reported as symptom driven [16]. We found that many respondents consider peak body temperature as a reason to treat fever with antibiotics, perhaps for the same palliative reason. It has been shown that fever response is often blunted in elderly people, but no correlation between higher body temperature and bacterial etiology or worse prognosis has been established [17]. Prescribing antibiotics to manage respiratory secretions was uncommon among all categories of respondents. In fact, this is debated in literature, with conflicting results about the benefits even in confirmed lower respiratory tract infections [3, 4]. The setting of care was the third most-commonly mentioned factor when deciding to start antibiotics for fever. Respondents were not asked to justify their responses further, but this is coherent with "No administration route" being the fourth most common reason to withdraw antibiotics. Additionally, physicians working in the hospitals (ID and IM) seem to value diagnostic testing before antibiotic prescription, possibly because they generally have more resources compared to those working outside of hospitals.

The setting of infection treatment is indeed very relevant, as it may limit feasible care, truncating the decision-making process from the beginning. For example, in a modern scenario of growing bacterial resistance, especially in our country, antibiotic therapies available outside hospitals are becoming predictably ineffective for many pathogens. In this context, starting an antibiotic without microbiological data may be questionable.

IM physicians are most represented among those who share decisions about antibiotic therapies with families, while GP and PC physicians more often share decisions with the patient. This is coherent with PC physicians being specifically trained to comprehensively assess and manage the physical, psychological and spiritual distress of patients and their social needs, determining goals of care, recognizing and respecting their cultural values; likewise, GPs often support patients through their whole lifespan and disease trajectory, becoming a crucial counterpart in decision making, including during advanced disease and terminal phases of life. On the other hand, IM physicians may often lack the opportunity to build a long-lasting relationship with their patients, due to in-hospital care dynamics (shorter inpatient stay, focus on acute care) as well as they may lack specific training in addressing end-of-life conversations.

Another survey by Larnard *et al.* showed that patient/family preference was a leading factor in prescribing antibiotics during the transition to comfort measures only [18]. A retrospective study by Servid S *et al.* found that almost one in four antibiotic prescriptions for terminally ill patients was attributed to patients/family requests [19]. The ability to share difficult decisions directly with patients is a skill worth cultivating, even beyond end-of-life care settings. At the same time, complying with patients and caregivers' requests should be balanced with the physician's view of what is the best decision. Physicians and Palliative Care teams should indeed be prepared to provide guidance to share responsibility and relieve all parties from uncertainty and guilt as much as possible [20].

As previously stated in literature, promoting Advanced Care Planning (regardless of the setting) can help both healthcare professionals and patients (together with caregivers, or the proxy in case of non-competent patients) to share a deci-

sion-making process to avoid medical futility and to respect patients' wills and needs [21-24]. Conversely, timely discussion of goals of care appears infrequent, as reported in a previous survey conducted in USA nursing homes [25].
Another interesting finding of our survey is that more than half of the respondents in all categories - except for PC physicians - declared to consider oncologic and non-oncologic terminally ill patients differently when deciding the management of a suspected infection. This may be due to the hard skills and expertise in end-of-life care by palliative care specialists, which is worth disseminating as a soft skill among healthcare professionals in the modern context of an aging population.
Regarding the timespan of therapies, ID physicians seem to show a stronger expertise of shorter antibiotic courses as compared to other specialists.
Finally, the majority of institutions of respondents did not have internal guidelines for antibiotic prescription in terminally ill patients; this constitutes a gap that deserves action.
The main limitation of this study lies in the survey methodology. The fact that physicians participated on a voluntary basis may have resulted in a respondent population unbalanced toward those with a particular sensitivity to appropriate antibiotic prescribing at the end of life, so generating a convenience sample bias. This nevertheless provides a picture of physicians engaged in this topic. Nonetheless, this approach could still be considered valid, as it provides a snapshot of current practices regarding antibiotic prescription at the end of life.
Multiple-response options were included for some items to reflect the diverse approaches reported in the literature.
It also must be mentioned that the study did not address at least two important categories of clinicians dealing with end-of-life patients, namely Oncologists and Intensive Care Specialists. Oncologists were not included in this study primarily because our focus was on EOL - regardless of the underlying disease- so we addressed physicians with a broader span of different patients as compared to oncologists. It must also be noted that, according to the Global Atlas of Palliative care, cancer accounts for 23% of deaths in the European region [26]. As to intensivists, we believe that their major focus on acute care and the fact that the great majority of terminally ill patients die outside of an ICU (at home, in hospice, long-term care facilities and medicine wards) justifies their exclusion. Further studies should address these peculiar categories of prescribers.
Finally, we acknowledge that doctors were asked to respond for themselves only, not considering a team-based approach to problems. Finally, the cultural setting is likely very relevant to Palliative Care, so results from Italy may be difficult to generalize to other contexts.

CONCLUSIONS

There is still much difficulty in correct identification of "End of life", especially in non-oncological, co-morbid patients and in chronically progressive diseases. Greater involvement of Palliative Care specialists could promote appropriateness in care, increase in shared and advanced care planning with the patient and a reduction in disproportionate and futile treatments, including antibiotic treatment. Effective communication with patients and families is considered crucial, so that communication skills are key in this setting. Further research is needed to address knowledge gaps, such as better definition of "end-of-life" and of desirable outcomes for terminally ill patients.
Physicians involved in end-of-life care recognize the challenges of antibiotic prescription and consider multiple factors when deciding to start or stop therapy. Protocols for the treatment of infections at the end of life, drafted by Infectious Disease specialists and taking into account the specific microbial resistance pattern, could undoubtedly help in the management of terminally ill patients.

Conflict of interest
Nothing to declare.

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