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Optimizing patient referral and center capacity in the management of chronic hepatitis C: Lessons from the Italian experience

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Hepatitis C virus ;
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Abstract
Aims. — In 2017 the Italian Drug Agency (Agenzia Italiana del Farmaco, AIFA) revised the criteria for access to therapy for patients with chronic hepatitis C as part of a three-year plan to eradicate HCV. We conducted a Delphi study to determine strategies to identify and treat patients with HCV and to develop through a shared pathway, a model to manage patient referral and optimize prescription center capacity with the overall aim of increasing access to therapy.

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Methods. — The process took place in two phases — Phase I (January 2017), before the criteria for treatment of HCV were revised and Phase II (May 2017) when AIFA developed a framework for the eradication of HCV infection in Italy. Two questionnaires were devised with Q1 administered in Phase I and Q2 in Phase II.
Results. — Q1 was sent to 823 hepatitis specialists working in 235 Italian HCV centers authorized to prescribe direct-acting antiviral drugs (DAAs). Overall, 167 centers (71%) participated with a good geographical representativeness (North 69%, Centre 74%; South and islands 70%). 548 prescribers (68.8%) provided responses to Q1 and 443 (80%) specialists who responded to Q1 completed Q2. Over 70% considered that to meet the new therapy targets local/regional networks need to be consolidated and reinforced with GPs providing the 'missing link' in current regional networks. Adherence to therapy was considered important by 75% of clinicians with reduction in follow-up intervals/length considered important by 65% — to free up staff/resources to manage increasing numbers of new patients. About 80% of respondents stated that medical personnel were principally involved in follow-up with follow-up having a significant impact on center capacity.
Conclusion. — Enhancing patient referral, the need for an increased role of GPs, increasing center capacity in particular medical personnel in outpatient centers and greater liaison between Hub centers and healthcare professionals currently managing high-risk groups as yet untreated, were factors that need to be streamlined in order to meet treatment targets for eradication of HCV.

Introduction

The hepatitis C epidemic

Around 71 million people worldwide have chronic hepatitis C virus (HCV) infection and nearly 400 000 people die each year from HCV, mostly from cirrhosis and hepatocellular carcinoma [1]. There are large geographical variations in the prevalence of HCV worldwide — disease prevalence is low (< 1%) in Australia, Canada, and Northern Europe; it is approximately 1% in countries of medium endemicity, such as the USA and most of Europe, and reaches values > 3% in high prevalence regions [2]. Depending on the country, HCV infection is differently distributed in certain population settings (for example, among people who inject drugs, PWIDs) and/or in the general population.

In most European countries, the overall prevalence of HCV infection is low (0.5—2%) and is mainly concentrated among high-risk groups such PWID and prison inmates. Italy is peculiar among Western countries in that it has a much higher overall prevalence, with significant rates of infection in the general population [3,4]. The higher prevalence of HCV infection in Italy is due to a range of factors. A key distinguishing aspect of the Italian situation is that HCV infection is found in two distinct reservoirs — the general population, which makes up the majority of those affected and high-risk groups including PWID and prison inmates, which make up a smaller proportion of those affected with incidence/prevalence rates that are similar to that found in other European countries. This in part explains why healthcare initiatives in the past aimed at high-risk groups (PWID, recipients of blood products, organ transplants, hemodialysis, children born to HCV-positive women, tattooing or piercing practice, emergency medical and public safety workers) only detected a small proportion of HCV-infected people, leaving undetected a large segment of HCV-positive subjects in the general population [5].

Strategic three-year plan to eradicate HCV in the Italian healthcare system

The introduction of the direct-acting antiviral drugs (DAAs) represented a sea change for the treatment of HCV. Their high rates of sustained viral response (SVR) of 90—95%, good tolerability, safety profile and applicability, enable the disease to be cured in a large number of patients, with the resulting positive impact on the natural history of the infection and associated costs. With the increasing availability of highly effective DAA treatment regimens, governments had a moral obligation to provide care and treatment for all identified/unidentified HCV-infected individuals.

Following the WHO objective to eliminate viral hepatitis as a major public health threat by 2030 and the launch of the HCV Elimination Manifesto in Europe which made HCV and its elimination in Europe a public health priority, the Italian Ministry of Health dedicated a fund of 1 billion and 500 million euros to eradicate HCV in Italy [6]. The ambitious and innovative three-year eradication plan (2017—2019) predicted treatment of 80,000 patients per year from an estimated total of 163,148—187,756 diagnosed and eligible HCV patients who could be immediately cured [7]. The development and implementation of this strategic three-year plan placed Italy at the forefront of HCV eradication programs and as such was one of the first countries worldwide to guarantee resources and personnel to work

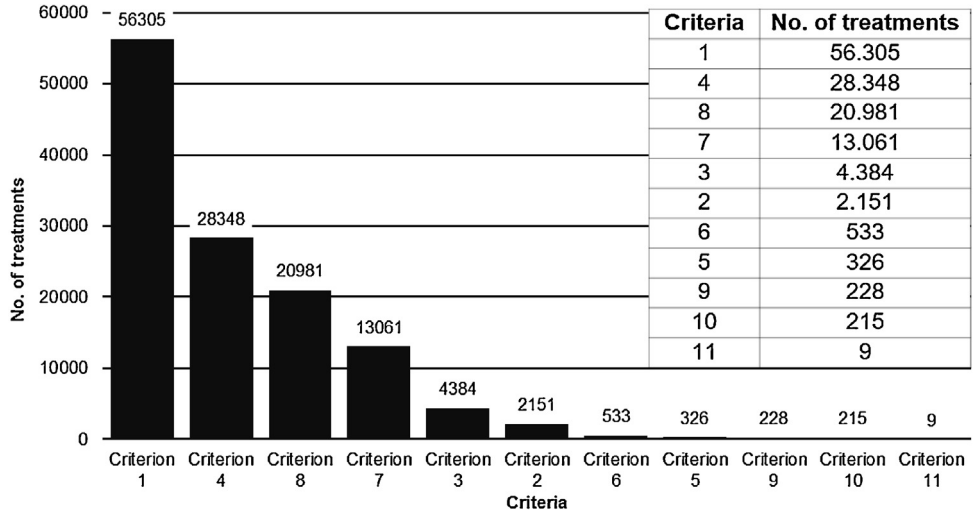

Figure 1 Number of patients treated to March 2018 according to AIFA criteria 1—11 [17].

towards the complete eradication of HCV in a relatively short period of time.

In order to achieve this ambitious objective, it was imperative that both national and regional programs were developed to first identify/diagnose and then effectively treat all patients with HCV by carrying out systematic interventions to:

- increase the rate of HCV diagnosis both in the general population and at-risk groups;
- facilitate access of all eligible patients to effective antiviral therapy;
- optimize and simplify the 'take-up' and 'follow-up' paths;
- ensure the elimination of HCV in Italy in a timely and effective manner.

Our study was conducted in two phases:

- phase I — to define the overall size of the 'hepatitis C problem' in Italy both in the general population and at-risk groups by a shared evaluation among incidence/prevalence and experts in epidemiology;
- phase II — to develop a shared organizational model using the Delphi method, to optimize screening, diagnosis, referral, therapy, follow-up pathway in different contexts. The use of a shared and structured model ensures that the necessary processes are in place so that all patients with HCV in Italy are offered therapy.

The overall objective of our Delphi study was therefore to develop, through a shared pathway, an effective model to manage patient referral and to optimize the capacity of prescription centers to facilitate access to therapy. The process took place in two phases — Phase I in January 2017, before the Italian Ministry for Health changed the criteria for treatment of HCV and Phase II in May 2017 when the Italian Drug Agency (Agenzia Italiana del Farmaco, AIFA) in conjunction with scientific societies developed a framework for the eradication of HCV infection in Italy by treating all patients 'for whom the therapy is indicated and appropriate' based on eleven treatment criteria [8].

Patients treated to date

Latest reported figures (March 2018) indicate that over 126,000 have been treated (Fig. 1) — about 50% of the 240,000 patients to be treated over the three-year plan. Most patients treated in this first phase were patients with advanced or progressive disease who were already known to healthcare practitioners or within specialized centers. This does not bode well for the rapid eradication of the disease as it leaves groups of infected individuals untreated who can continue to spread disease [9]. Historically high-risk groups (PWIDs, prison inmates) were not actively sought out for a variety of reasons including their perceived lack of adherence to treatment and ineffectiveness of therapies in these groups.

Importance of treatment of both 'emerged and non-emerged' populations

In order to work towards eradication of the disease, healthcare authorities need to target, not only the 'emerged' infected population but also 'non-emerged' infected subjects by using proactive strategies and policies to enable the emergence of unknown cases in the whole population of infected patients, and especially among the younger members of the population at risk.

Materials and methods

The Delphi method is a validated, agreement-building process to develop consensus and to make group-based decisions in a variety of fields [10—13]. Conceived and developed in the mid-1950s to predict the impact of technologies or interventions on complex systems, it is now routinely used in healthcare research and clinical disputes [14—17]. The method is traditionally based on three fundamental concepts. The first is anonymity: participants do not meet during the process and they submit their opinions independently by completing a specially designed questionnaire. Replies are then disclosed to all participants,

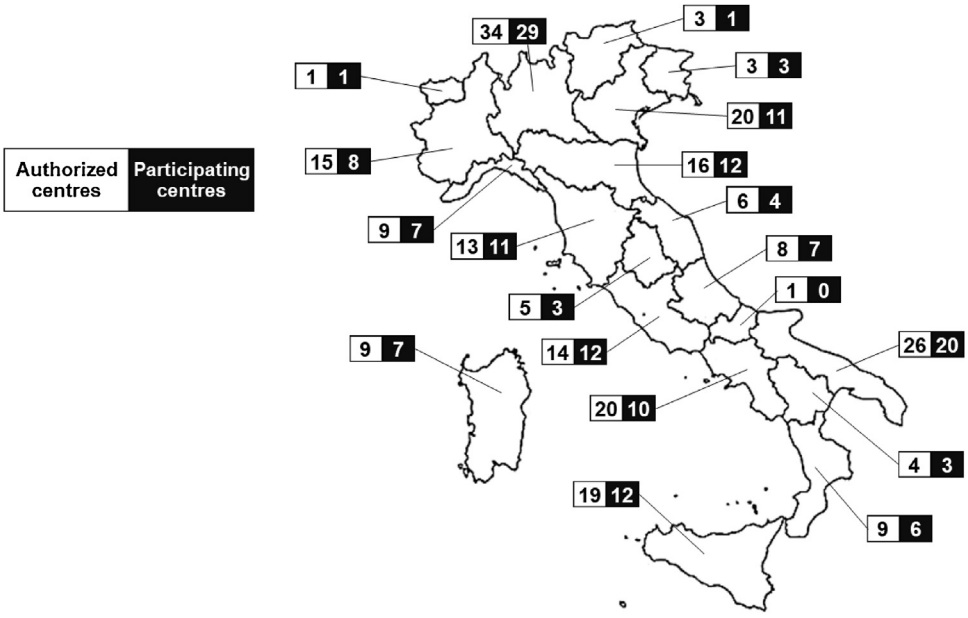

Figure 2 Specialist centres participating in the survey according to geographical location.

without identifying the respondent. The second concept is controlled feedback: the process consists of several rounds, during which respondents are asked to comment on opinions expressed in previous rounds. The final concept is the statistical group response: the Delphi method reaches a collective decision expressed in terms of statistical scores.

As the objective of this study was to develop a shared model for managing patient referrals and to optimize center capacity, a Delphi consensus was conducted by working with clinical experts from referral centers to define and share pathways to improve patient access to therapy, referral activities and center capacity in HCV patient management. This Delphi study, unique in that all centers in Italy authorized to prescribe DAAs, provided much needed information and consensus to optimize patient referral with the overall aim of ensuring the centers are in a position to manage the increased flow of patients according to AIFA's eradication goal. In addition, this study can contribute at a national healthcare level to increasing the overall knowledge on the pathology and epidemiology of HCV in Italy. Finally, by including all physicians involved in the management of HCV, the expectations and difficulties in the expansion of the access to therapy criteria can be explored and defined.

To assess agreement among experts, the RAND appropriateness method for measuring the appropriateness of medical care, uses a Scale ranging from 1 (maximal disagreement) to 9 (maximal agreement), with 5 corresponding to neutral opinion about a given statement.

Scores given by experts are analyzed statistically to obtain an appropriate ''index of consensus''. The most recommended, according to ''the RAND/UCLA Appropriateness Method User's Manual'', is the IPRAS (Interpercentile Range Adjusted for Symmetry). The first step in this process was to convene an Advisory Board of nine experts in the field representing all geographical regions of Italy. The first assignment was to review the relevant scientific literature on the subject and to devise questionnaires focusing on epidemiological, diagnostics, therapeutic choices and management aspects.

Two questionnaires were devised and administered: Q1 in January 2017 and Q2 in May 2017, following the development of the AIFA framework for the eradication of HCV infection in Italy — essentially to treat all patients 'for whom the therapy is indicated and appropriate' based on 11 criteria — criteria for treatment not reimbursement [18].

Certain questions required answers expressed on a Scale of 0—4 where 0 indicated total disagreement and 4 complete agreement while other questions asked responders to rank a series of options in terms of relevance following their clinical opinion, or to complete open-ended questions. Statistical analyses were performed after two rounds to assess the level of agreement of the EP in their responses to questionnaires.

Results

Questionnaires and respondents

Questionnaire Q1 was sent on 11 January 2017, to 823 hepatitis specialists working in 235 Italian HCV referral centers, authorized to prescribe HCV DAAs, according to the official list from AIFA. In total, 167 centers (71%) participated in the survey with a good geographical representativeness (North Italy: 69%, Centre Italy: 74%; South Italy and islands: 70%) (Fig. 2). A total of 548 prescribers (68.8%) provided responses to Q1. Two months after the HCV eradication plan was launched (5 May 2017), Q2 was sent to all prescribers who had responded to Q1. A total of 443 (80%) specialists who had responded to Q1 completed Q2 (Table 1).

Epidemiology

There was a lack of consensus among experts on the prevalence of chronic HCV infection and chronic liver disease in

Table 1 Characteristics of physicians on the expert panel (EP).

	First round	Second round
Number of participants	548	443
Age (mean, range years)	51.1 (29–69)	50.4 (30–69)
Gender (%)		
Male	322 (58.8)	266 (60.0)
Female	226 (41.2)	177 (40.0)
Specialty (%)		
Infectious disease	46	45
Gastroenterology	27	28
Hepatology	4	5
Internal medicine	20	18
Other	3	4
Geographical location of the centres (%)		
North Italy	44	44
Central Italy	18	18
South Italy	38	38

their region. Opinions differed, both at national and regional levels and were significantly influenced by geographical area. For 43% of centers the prevalence of chronic HCV infection in their region was between 2–3%, for 36% it was < 2% and for 22% it was > 3% (Fig. 3A). Importantly, over 50% of clinicians in the South and islands considered the prevalence of chronic HCV infection in their region was > 3%, while < 10% of clinicians in the North quoted a prevalence of > 3%. The number of patients treated in HCV centers throughout Italy mirrors the epidemiological HCV incidence with over 35% of centers treating more than 500 patients and 30% treating 200–500 patients.

Screening programs

Over 80% of respondents from the Hub centers considered it was important to implement screening programs in Italy to identify patients with chronic HCV infection.

Territorial relationships between Hub and Spoke centers

Less than half (44%) of Hub centers reported that patients were referred to their centers from peripheral Spoke centers. Importantly, a large portion of clinicians reported that there was no formal structure tasked with organizing the relationship between the Hubs and Spokes with around 46% of clinicians in the Hub centers stating that they did not have a direct relationship with Spoke centers despite the existence of a regional network. These centers are not part of the regional network and do not take an active role in patient management. Conversely, the Hub centers that work in conjunction with Spoke centers are organized as follows:

- 60% of these Hub centers do not use a regional network;
- 52% said they mainly made use of direct contact with clinicians in the Spoke center;
- 30% of centers reported that there was no organizational structure in place to manage relations with the Spoke centers.

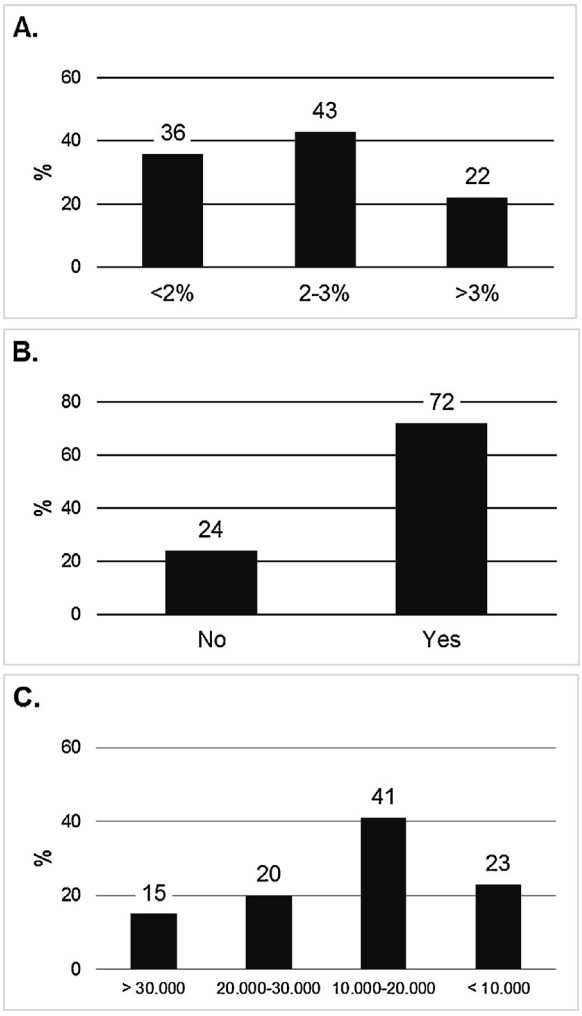

Figure 3 Expert opinion on different topics in the study: A. prevalence of chronic HCV infection (anti-HCV-positive patients) in their region; B. percentage of patients referred to Hub centres by territorial specialist physicians; C. numbers of patients (%) waiting for antiviral treatment.

Territorial specialists

Around 70% of Hub centers reported that they also received patients from territorial specialists (Fig. 3B). In the main, these were patients with long-standing disease already known to the healthcare system before the instigation of the new AIFA criteria – as evidenced by the fact that over 55% of centers did not have a program in place to target high-risk groups (IVDU, prison inmates and immigrants from countries with a high prevalence of HCV).

Relationships with general practitioners (GPs)

Overall 88% of respondents from hub centers reported that they received referrals from GPs — mainly patients with advanced disease who were treated when the AIFA criteria were more restrictive. Following the changes in access to therapy outlined by AIFA in February 2017, 80% of Hub centers considered that to effectively identify patients, referral programs must include communications with GPs.

Relationships with at risk populations (PWID, prisoners)

Despite the fact that the importance of effectively targeting and treating at-risk populations (PWID, prisoners) in eradication programs is well known (approximately 90% of new infections affect PWID and one in three prisoners are infected with HCV), 55% of hub centers reported that they did not have an access program for at-risk groups in place. Furthermore, only 45% of hub centers collaborated with SerDs (public services for pathological addictions responsible for primary prevention, treatment, prevention of related diseases, rehabilitation and social and work reintegration) and prison doctors.

Patients waiting to be treated

Around 40% of hub centers estimated that there were between 10,000 and 20,000 patients in their regions waiting to receive treatment according to the modified AIFA criteria, with 15% reporting that the number was > 30,000 (Fig. 3C). A significant portion of centers (67%) declared that they had a specific structure/program to recall patients who should receive DAA treatment according to the new criteria (Fig. 4A). Only 32% of centers had a program in place to collaborate with Spoke centers to recall patients waiting for treatment (Fig. 4B).

Barriers to increasing flow of patients to treatment

Our study identified the following barriers that limit the increase in flow of patients with HCV requiring treatment:

- lack of sufficient personnel and time, in particular 70% reported that lack of the necessary medical staff;
- lack of sufficient nursing staff—45%.

Also reported but considered to be less important:

- lack of economic resources;
- lack of administrative/computer personnel;
- lack of structured relationships with the GPs.

Centre capacity

When questioned on the need to increase the flow of patients in light of changes in the AIFA criteria, over 65% of respondents did not consider that their center would experience any particular problems in dealing with the increased numbers of patients referred following the new guidelines and 80% considered that they would not have organizational problems due to the increased numbers of patients.

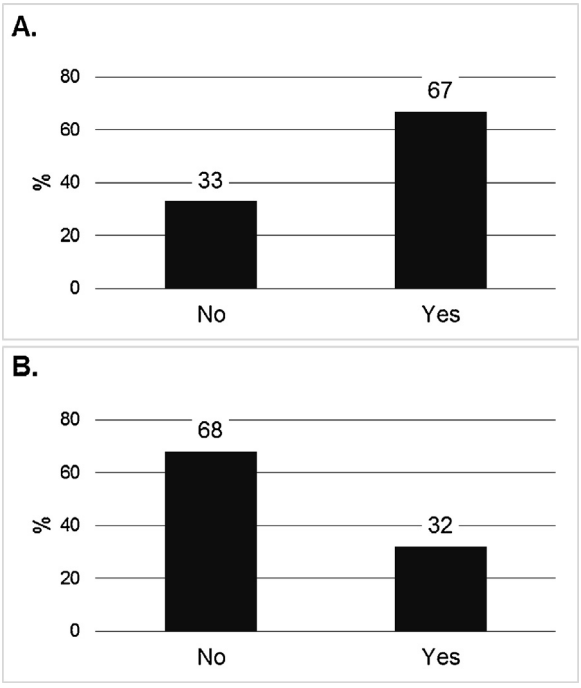

Figure 4 Presence/absence of an organizational structure/program in participating centres to recall patients who should receive antiviral therapy (A) and to collaborate with Spoke centres to recall patients waiting for antiviral therapy (B).

However, 30% of respondents considered that there might be difficulties with follow-up requirements of the increased numbers of patients. When questioned about the need for increased personnel, around 65% considered that there were not enough doctors/medical personnel while 30%, 20% and 15% considered there were not enough nurses, administrative staff and data managers, respectively. To improve the treatment and management of increased numbers of patients — 40% considered increased numbers of medical staff, 30% more nursing staff and 20% more data managers were necessary in day hospitals, while in outpatient centers 90%, 60% and 55% considered there was a need for more doctors, nurses and data managers, respectively.

Increasing the number of prescribing centers

Despite the problems of capacity as a result of the extended AIFA criteria there was no general agreement between the clinicians on how to increase the number of prescribing centers in Italy, with 51% stating that the number of existing centers was sufficient and 37% considered the number of prescribing centers needed to be increased (Fig. 5A). What respondents agreed on was the increasingly important role to be played by GPs in identifying and referring patients with less severe/mild symptoms to regional Hubs for initiation of treatment.

Strengthening local networks with GPs

Over 70% considered that in order to meet therapy targets in the future local/regional networks need to be consolida-

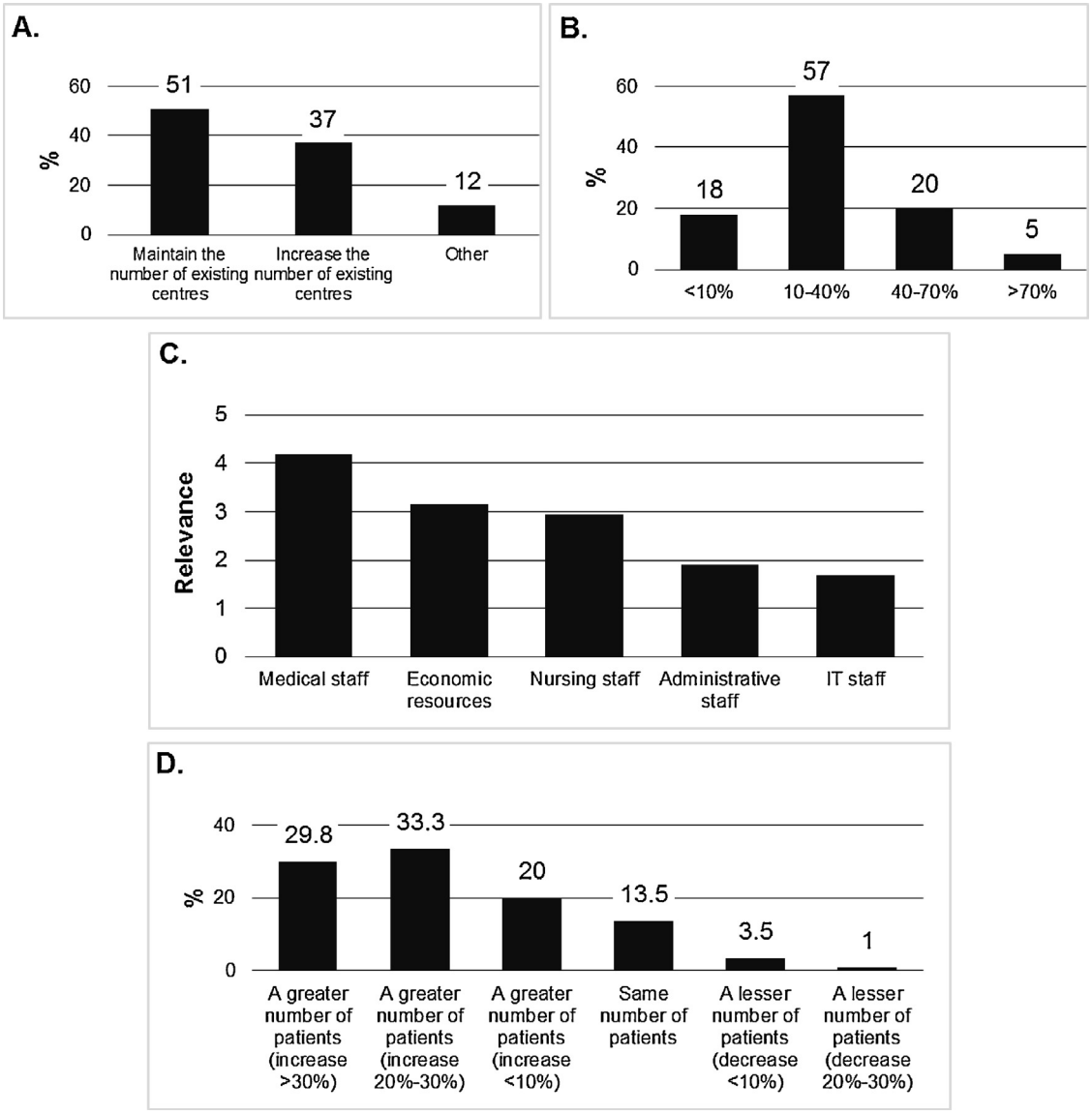

Figure 5 Participating clinicians' suggestions and impact on centre capacity of different topics in the study: A. Suggestions on measures to facilitate access to therapy and improve patient management over the next 3 years; B. Impact of follow-up of patients successfully treated on centre capacity; C. Impact of follow-up visits of cured patients on resources; D. Ability of participating centres to increase capacity to manage increased numbers eligible for treatment based on revised AIFA criteria.

ted and reinforced with GPs to provide the 'missing link' in current regional networks. Personnel at Spoke centers believe that a program of collaboration with GPs is the best strategy for identifying and treating patients who have not yet known to the centers of reference. In order for Spoke centers to facilitate access to therapy and improve patient management there are a number of possible solutions:

- increase the number of prescribing centers;
- allow specialists in territorial services to prescribe treatment(s).

Reduction of follow-up activities

Follow-up of 'cured' patients takes up a disproportionate amount of resources (personnel and economic) with 57% of the Hub centers stating that follow-up takes up between 10 and 40% of resources and 20% reporting that they consider follow-up takes up between 40 and 70% of resources (Fig. 5B).

A significant majority (90%) of Hub centers considered that follow-up involves, in the main, medical staff followed by economic resources and nursing staff, while the impact on administrative staff and IT staff was considered less important (Fig. 5C). Reduction in follow-up intervals/length is therefore considered to be paramount (65%) to free up staff and resources, to be in a position to manage increasing numbers of new patients. Respondents stated (80%) that medical personnel were principally involved in follow-up and that the number of follow-up visits had a significant impact on center capacity. Interestingly 70% of respondents stated that in cured patients one follow-up check-up after 6 months was

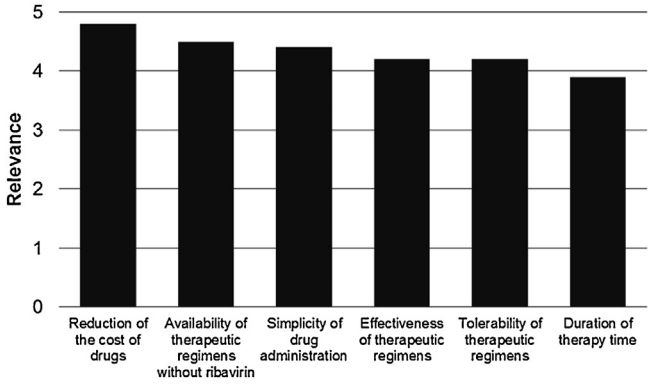

Figure 6 Aspects of therapy considered most relevant in the coming years in light of revised AIFA criteria.

sufficient and 30% considered one check-up after 3 months was sufficient.

Capacity to treat new patients

About 85% of respondents indicated that they have the capacity to treat larger numbers (an increase of 10-40%) in line with the new AIFA recommendations, despite capacity problems resulting from the extensive follow-up procedures currently in place for cured patients (Fig. 5D).

Additional points to consider moving forward

Answers to the questionnaires indicate that the most relevant aspects of therapy in the coming years will be (Fig. 6):

- reduction of the cost of drugs;
- availability of therapeutic regimens without ribavirin;
- ease of administration.

Less relevant are:

- effectiveness of therapeutic regimens in all genotypes;
- tolerability of therapeutic regimens.

Much less relevant:

- reductions in length of therapy (for example 8 weeks instead of 12 weeks).

Organizational aspects that will most likely influence the efficiency of therapy in the coming years:

- development of collaboration programs with GPs (77%);
- organization of regional/local patient management networks (74%);
- an increase in the number of prescribing centers in the territory and the reduction of outpatient checks did not appear particularly relevant.

Determination of genotype

Despite the introduction of the new pangenotypic DAAs, 85% of respondents believe is necessary to perform viral genotype determination before prescribing therapy. Determination of genotype is always made before starting the therapy or if the test has not been done in the previous 5 years.

Improving quality of care

To improve the quality of care offered through Day Hospital, Day Service, and the clinic, the Hub centers confirmed the importance of increasing the medical staff in particular in the outpatient department, in the Day Service and to follow less importantly in the Day Hospital. Less important is increasing nursing staff and, following, administrative and IT staff in all these services.

Comorbidities

The most frequent and relevant co-morbidities in new patients related to centers are:

- diabetes mellitus;
- chronic non-viral liver diseases;
- obesity.

Less important are:

- HBV/HIV coinfections;
- hemoglobinopathies and congenital coagulopathies.

Management priorities of the centers:

- chronic non-viral liver diseases;
- HBV coinfections;
- HIV coinfections;
- obesity;
- diabetes mellitus.

Therapeutic failure

If therapy fails there is no consensus on how to proceed — suggestions (and percentages of responders) include performing a viral resistance test (85%), checking adherence to treatment (85%), repeating genotype investigations (65%).

HCV management algorithm in Italy

Clinicians were also asked how the management/treatment algorithm for HCV patients should be revised/adapted/streamlined following the revised AIFA criteria. A number of items emerged — enhancing patient referral in particular, the need for an increased role of GPs, increasing center capacity in particular medical personnel in outpatient center and greater liaison between Hub centers and healthcare professional currently managing high-risk groups as yet untreated (Fig. 7).

Discussion

Management of patients with HCV-related liver disease has advanced considerably during the last two decades due to a range of factors including increased understanding of the pathophysiology of the disease, developments in diagnostic procedures and improvements in therapy and prevention. For patients with chronic or acute HCV, the new European Association for the Study of the Liver (EASL) guidelines call for universal access to therapy and emphasize that all HCV patients 'must be considered for therapy including treatment-naive patients and individuals who failed to achieve sustained virological response after prior treat-

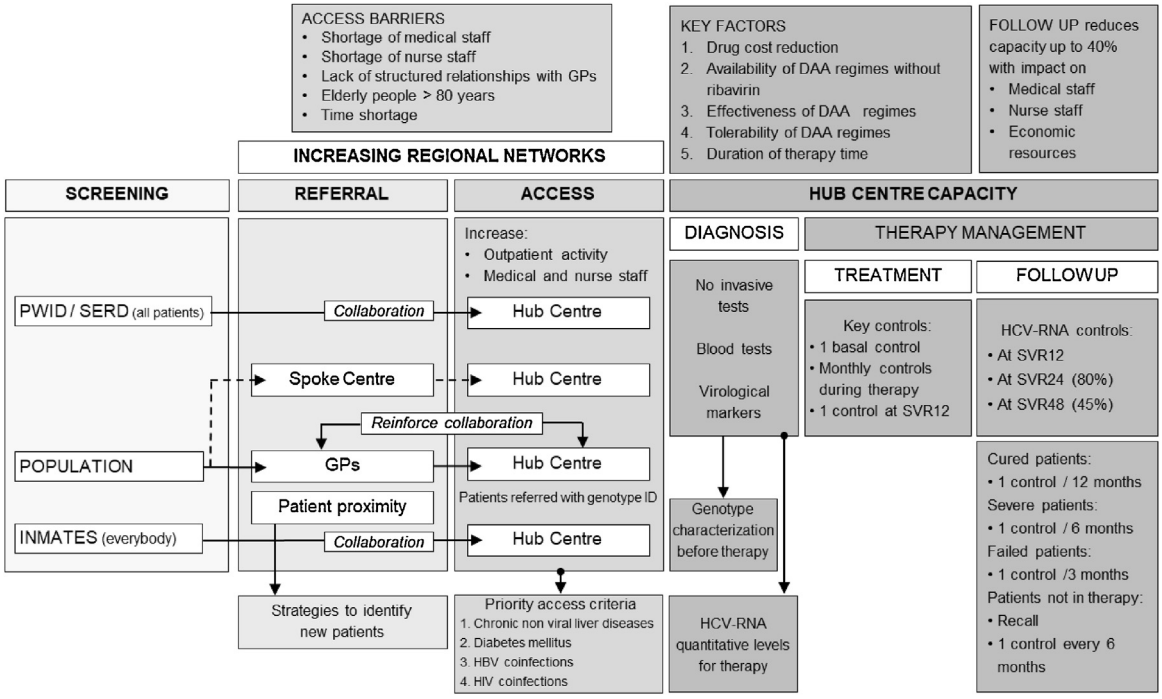

Figure 7 Overview of study results: key elements in the management/treatment of HCV patients in Italy.

ment' [19]. The guidelines reiterate that the treatment of everyone with HCV infection is a workable goal and they include physicians, healthcare providers, as well as patients and other interested individuals, in the clinical decision-making process.

The DAAs have revolutionized the treatment of HCV, due their high rates of SVR and good tolerability allowing treatment at all stages of the disease. Initially they were used in patients who had previously been 'warehoused' — i.e. those known to medical professionals but who were not treated due the lack of effective therapies. At the beginning, the organizational structure and necessary budgets were not available to treat all patients immediately and so patients with the greatest need were given priority. Since then, in addition to increasing clinical data on the benefits, both intrahepatic and extrahepatic, that accompany HCV eradication—increased budgets were set aside to treat the more patients. As we have seen from the latest EASL guidelines (April 2018), treatment is now recommended for the majority of patients with chronic HCV infection. This necessitates the development to national and regional Diagnostic and Therapeutic Care Paths (PDTA) in order to optimize therapeutic outcomes.

The introduction of wider access criteria to HCV treatment outlined by AIFA in March 2017 represented a major step forward in the eradication of HCV in Italy for two fundamental reasons. First, Italy in contrast with other developed countries and in particular with other neighboring European countries, has a different prevalence and distribution of HCV with the virus occurring in two reservoirs of patients — the general population and PWIDs. Second Italy is one of the few counties that has developed and instigated a comprehensive and ambitious three-year strategy (2017—2019), to treat all patients with the ultimate objective of eradicating HCV by 2020. In order to meet this objective at least 8000 patients must be treated per year or 6667 every month. It is important that patients have access to therapy in this period when funds are available as it is not yet certain if this fund, due to expire at the end of 2019, will be renewed. It is therefore vital to develop effective procedures now to speed up the identification of patients who need to be treated for HCV. This involves not only treating patients who are aware of their HCV status but also identifying, diagnosing and treating those who are not aware they have HCV — the so called 'hard to reach' patients. The objectives of local and regional programs are three-fold: to increase the percentage of HCV diagnosis within the general population and high-risk hard to reach groups, to facilitate and optimize access to therapy of all eligible patients and to optimize patient pathways and follow-up activities.

The suggested model

An important objective of this study was to develop a model to improve center capacity and patient referral in HCV management. Centre capacity is fundamental in any strategy developed to streamline the management of patients with HCV. Most of the responders indicated that adequate numbers of healthcare professionals (medical and nursing staff) in the outpatient setting are fundamental to providing an accessible and efficient service for patients and their carers. In addition, the role of support staff —data managers, administrative and computer staff— should not be underestimated as they also have a significant influence on center capacity. Centre capacity may also be significantly affected by need for regular follow-up of patients already in therapy. Follow-up of patients who have been already been treated accounts for a large portion of resources (up to 40%). If all the above are not in place, access to therapy for new

patients may be sub-optimal with the resulting reduction in efficacy of treatment options. One possibility to reallocate time and resources would be to consider reducing follow-up activities in line with the recommendations provided by EASL and ASLD international guidelines. The key aspects that may optimize patient referral and center capacity are summarized in Fig. 7.

In order to achieve these objectives, the involvement of both GPs and specialists is critical as well as the development of an integrated model for collaboration between authorized and non-authorized centers throughout Italy. A streamlined, effective step-wise local and national model involving screening/identification, referral, therapy and follow-up is crucial to the efficacy of the eradication program.

The results of the Delphi Study reported here provide an overview of the Italian context offering significant considerations and suggestions to develop national/local models to optimize diagnosis and treatment. The new wave of patients with access to therapy will be characterized by less severe disease states and in most cases, are not known to the healthcare structures authorized to manage and treat HCV. This represents a very different clinical scenario as patients treated previously tended to be older with more severe disease and were already known to healthcare professionals at Hub centers authorized for HCV treatment.

In a significant number of subjects (50%) the infection has not yet been identified. As most of these patients are not known, or in some cases they are not aware they have the infection, it is very important to establish a close collaboration with the GPs and to set up regional networks that create an optimal patient pathway from the territory to the Hub center where the patient may be treated. Data collected in this Delphi study indicate that there is a lack of a regional network structure in Italy. In addition, relationships and collaboration with GPs are not structured making it difficult to have a reliable estimate of the number of patients waiting to be treated. Moreover, some patients are not referred to the more specialized centers and remain untreated in less specialized centers. The new criteria developed by AIFA mean that increasing numbers of patients should be treated (6667 every month), and to achieve this it will be necessary to increase center capacity. This can be done in two ways: increasing the number of medical staff working within the Hub centers, as this seems to be the most important barrier to capacity, and/or reducing patient follow-up activities that absorb a significant amount of resources.

Conclusion

This Delphi study identified — improved patient referral, the need for an increased role of GPs, increasing center capacity in particular medical personnel in outpatient centers and greater liaison between Hub centers and healthcare professionals currently managing high-risk groups as yet untreated — as factors that need to be streamlined in order to meet treatment targets for eradication of HCV.

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Authors contributions

All authors contributed to the research, development and writing of the manuscript. AA acted as manuscript coordinator.

Author agreement/declaration

All authors have seen and approved the final version of the manuscript being submitted. They warrant that the article is the authors' original work, has not received prior publication and is not under consideration for publication elsewhere.

Disclosure of interest

A. Alberti is a consultant for AbbVie, Gilead Science, Merck, BMS; G. Angarano is a consultant for AbbVie, Gilead Science, Merck, BMS; M. Colombo is a consultant for Merck, Roche, Novartis, BMS, Gilead Sciences, Tibotec, Vertex, Janssen Cilag, Achillion, AbbVie; A. Craxì is a consultant for Merck, BMS, Gilead Sciences, Janssen Cilag, Achillion, AbbVie; V. Di Marco is a consultant for AbbVie, Gilead Science, Merck, BMS; G. Di Perri is a consultant for AbbVie, Gilead Science, Merck, BMS; G.B. Gaeta is a consultant for AbbVie, Gilead Science, Merck, BMS; A. Mangia is a consultant for AbbVie, Gilead Science, Merck, BMS.

G. Ippolito and P. Pasqualetti declare that they have no competing interest.

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