

Title:
Strategy for the Elimination of Hepatitis C in Cantabria

Authors:
Javier Crespo, Ana Tejerina Puente, Antonio Cuadrado,
Susana Llerena , Joaquín Cabezas, Joaquin Cabezas on behalf
of Grupo de Trabajo para la Eliminación de la Hepatitis C en
Cantabria*

* Grupo de Trabajo para la Eliminación de la Hepatitis C en
Cantabria: Joaquin Cabezas, Fernando Andrés Mantecon, Ana
Batlle López, Javier Cloux Blasco, Marta Cobo, Inés De Benito
Polación, Aroa Delgado Uría, Carmen Fariñas Álvarez, Susana
Fernández Iglesias, María Eliecer Cano García, Miguel García
Ribes, Pablo González Astorqui, Aitzibe Illaro Uranga, Beatriz
Josa Fernandez, Soledad Melgosa Moreno, Purificación
Mellado Encias, Maria del Mar Navarro Córdoba, Rosa Ortiz
Diego, Lius Miguel Otero García, Guillermo Pombo Alles,
Isabel Priede Díaz, Montserrat San Martín Aparicio, Carlos
Armiñanzas, Jesús Artal, Jose Manuel Cifrián Martínez,
Carmen Cobo Pelayo, Jose Enrique Gutierrez Mora, María
Yolanda Jubete Castañedo, Miguel Mateo Soler, Enrique
María Ocio San Miguel, Manuel Pereda Beaure, Juan Carlos
Ruiz San Millan, Jose Antonio Vallejo Correas, Javier Zueco Gil

DOI: 10.17235/reed.2020.7108/2020

Link: [PubMed \(Epub ahead of print\)](#)

Please cite this article as:
Crespo Javier, Tejerina Puente Ana, Cuadrado Antonio,
Llerena Susana, Cabezas Joaquín , Grupo de Trabajo para la
Eliminación de la Hepatitis C en Cantabria. Strategy for the
Elimination of Hepatitis C in Cantabria. Rev Esp Enferm Dig
2020. doi: 10.17235/reed.2020.7108/2020.



This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

AE 7108 inglés

Strategy for the Elimination of Hepatitis C in Cantabria

Javier Crespo¹, Ana Tejerina Puente², Antonio Cuadrado¹, Susana Llerena¹, Joaquín Cabezas¹ and Work Group for the Elimination of Hepatitis C in Cantabria

¹Department of Digestive Diseases and Hepatology. Hospital Universitario Marqués de Valdecilla. IDIVAL. Santander, Cantabria. Spain. ²Healthcare Deputy Direction. Cantabria Health Service. Health Department. Government of Cantabria. Santander, Cantabria. Spain

Received: 08/04/2020

Accepted: 12/04/2020

Correspondence: Joaquín Cabezas. Department of Digestive Diseases. Hospital Universitario Marqués de Valdecilla. Instituto de Investigación Sanitaria Valdecilla, IDIVAL. Av. Vadequilla, s/n. 39008 Santander, Cantabria. Spain
e-mail: Joaquin.cabezas@scsalud.es

Author's contribution: Javier Crespo and Ana Tejerina Puente have contributed equally in the manuscript.

BACKGROUND

The hepatitis C virus (HCV) is one of the leading causes of liver-related morbidity and mortality worldwide, affecting more than 70 million people (1,2). Approximately, between 55 % and 85 % of infected people will develop chronic HCV infection and between 15 % and 30 % of this group will develop liver cirrhosis and associated complications in the following 20-30 years. In our country, the seroprevalence of anti-HCV ranges from 0.8 to 1.2 % of adult population, while 0.2 % to 0.4 % show active HCV infection (3,4). In recent years, with the appearance of direct-acting antiviral agents (DAAs), which achieve cure rates of over 95 % (5-7), the elimination of HCV is a

real possibility. In fact, in 2016 the World Health Organization (WHO) established a global strategy with the goal of achieving its elimination by 2030 (8). This strategy defines elimination as an 80 % reduction in new HCV infection and a 65 % reduction in HCV mortality. In the particular case of Spain, the National Strategic Plan for tackling Hepatitis C infection (PEAHC) has established different lines of action against hepatitis C (9). As a result of the implementation of this program by the Government of Cantabria, since May 2015, almost all known hepatitis C patients from our autonomous community have been treated with DAAs, besides those previously treated with regimens based on interferon. Although a considerable part of the patients has already been treated, the existence of subjects who know the diagnosis of the infection but have not undergone treatment or are unaware of being infected with HCV is rather frequent (10). Multiple reasons exist, including belonging to vulnerable social and at risk of exclusion groups, such as those subject to custodial and non-custodial sentences or intravenous drug users (IDU), and those who have access difficulties (immigrants). In addition, fear or social stigmatization and lack of knowledge of the risk factors for acquiring this infection are other reasons that explain the absence of diagnosis and treatment in some patients. Particularly, in the age groups between 40 and 69. This group, which escapes the system and therefore does not benefit from current therapies, leads to diagnostic burnout (10), which is the impossibility of treating current infections due to a lack or difficulty in diagnosing prevalent cases or incidents. If we consider treatment as profitable in this age range, the search for untreated and/or undiagnosed patients seems to be a desirable goal for health systems.

Considering this background, a plan for the elimination of HCV has been designed in our autonomous community. Its main objective is the elimination of hepatitis C in Cantabria in the 2019-2021 period, understanding by elimination the diagnosis and treatment of 90 % of hepatitis C cases. As secondary objectives, we aim to: a) know the burden of C virus in the different primary sources of infection; b) achieve the joining of disadvantaged groups to health services; c) decrease the prevalence of severe liver disease (cirrhosis and hepatocellular carcinoma) secondary to hepatitis C; and d) obtain health results for the shaping of medical knowledge and planning and organizing of future sanitary actions.

MACRO-ELIMINATION AND MICRO-ELIMINATION

The strategy for the elimination of hepatitis C in Cantabria is based on the active search for cases and the immediate treatment of infections detected with DAAs. This strategy is focused in two different groups (macro-elimination and micro-elimination), depending on whether it is directed at a population age group or the primary sources of infection. Therefore, the target populations will be (Fig. 1):

1. In the macro-elimination strategy, the population between 40 and 69. Cases will be systematically searched in primary care consultations, in which about 75 % of the viremic patients not detected so far are found, according to previous studies (3,11).
2. In the micro-elimination strategy, the entire population belonging to a risk group or primary focus of hepatitis C infection. Micro-elimination will be implemented, at the same time, in the vast majority of the primary focal points. These focus include, among others, the following: patients with alcohol user disorder, men who have sex with men (MSM) and have risky practices, immigrants from countries with high prevalence of HCV infection, pregnant women with risky practices or belonging to a primary focus, patients coinfecting with human immunodeficiency virus (HIV), patients with advanced liver disease (regardless of the primary etiology of the liver disease), hemophiliacs, patients in hemodialysis programs (active or previous) and/or undergoing a solid or hematological organ transplant, patients with severe chronic mental illness (whether institutionalized or not), subjects in harm reduction programs (substitution treatment with methadone or buprenorphine/naloxone), injecting drug users (active or prior), subjects with group sex and *chemsex* practices, individuals sentenced to custodial and non-custodial penalties and those living with an HCV-infected person.

The simultaneous implementation of both, macro-elimination and micro-elimination strategies represents, to our knowledge, the first structured experience worldwide that addresses the elimination of HCV in the population of a general community. This program will generate first-rate evidence that can be shared in other regions, both Spanish and foreign, which will allow them to propose their own elimination programs.

IMPLEMENTATION OF MACRO-ELIMINATION

The participation of primary care is key in the development of this strategy, especially in the macro-elimination process. As it has been previously pointed out, this will focus on the systematic search of cases in primary care consultations, in the age group of 40 to 69. That is to say, it is an opportunistic screening, which will be carried out when the patient comes to the consultations of the doctor and/or the primary care nurse. According to our own data and those of the Health Department of the Government of Cantabria, more than 85 % of subjects over the age of 40 to 70 go, at least, once a year to visit the doctor and/or primary care nurse.

The macro-elimination program will be developed with a time horizon of three years, structuring the search for the population as follows (Fig. 2): a) year 2019: detection of patients between 50 to 59 years old; b) year 2020: detection of patients between 60 to 69 years old; and c) year 2021: detection of patients between 40 to 59 years old. This schedule has been made taking into account the prevalence of HCV infection in our region. Several studies have shown that population screening associated with treatment is cost-effective in different age ranges and in the general adult population (3,12,13). This has led several scientific societies in our country (Spanish Association for the Study of the Liver [AEEH] and Spanish Society of Gastroenterology [SEPD]) and the Alliance for Viral Hepatitis Elimination in Spain (AEHVE) to recommend the establishment of population screening strategies adjusted to the characteristics of the assisted population (14).

The Cantabria Health Service has designed a specific protocol for this healthcare process, which has been included within the personal plans in the electronic medical record of primary care for all patients whose age is among those indicated above. In addition, this protocol will be activated annually for some risk factors for which there is a specific code (alcohol use disorder, drug addiction, hemophilia, some sexually transmitted diseases, etc.).

Neither patients without risk factors with a negative determination made in the previous five years nor those with a previous diagnosis of hepatitis C need to carry out an anti-HCV determination.

MICRO-ELIMINATION AND DIFFERENTIAL CARE OF VULNERABLE AND/OR HIGH PREVALENCE POPULATIONS OF HCV INFECTION

The micro-elimination strategy has shown to be effective in other diseases such as HIV infection or, previously, polio. The micro-elimination focuses on the active search for cases in different primary focus with a high prevalence of hepatitis C in the adult population (over 18 years of age). These focuses include, among others, the following:

- History of blood transfusion or hemoderivatives prior to 1992.
- History of surgery, invasive procedures or dental interventions before the use of single-use material.
- People who have undergone procedures with different types of sharp material without adequate security.
- MSM and those with risk practices.
- Subjects with group sex and *chemsex* practices.
- Patients with alcohol use disorder.
- Homeless people (15).
- Immigrants from countries with a high prevalence of HCV infection.
- Pregnant women with risky practices or belonging to a primary focus (16-18).
- Patients coinfectd with HIV and/or HBV (hepatitis B virus).
- Patients with sexually transmitted infections.
- Acute or chronic hypertransaminasemia, provided that the antibodies against HCV had not been determined before.
- Patients with chronic hepatic disease, regardless of the primary etiology of the hepatic disease.
- Hemophilic patients.
- Patients in (active or previous) hemodialysis programs.
- Patients undergoing a solid organ (heart, liver, pancreas, lung, kidney) or a non-solid organ transplant.
- Patients with severe chronic mental illness, whether institutionalized or not.
- Subjects in harm reduction programs (substitution treatment with methadone or buprenorphine/naloxone).

- Injecting drug users (active or prior) and/or those who use inhaled drugs.
- Subjects sentenced to custodial and non-custodial penalties.
- People living with an HCV infected person and sexual partners of infected people (19).

In our community, there are some pioneering programs such as Jailfree (20) or Honest (21) that systematically test (and treat) HCV infection in prison inmates or in those subject to a non-custodial sentence. Similarly, and to facilitate diagnosis for elimination, several community initiatives are facilitating access to diagnosis (22), bringing diagnostic techniques closer to the patient, such as dry blood spot tests (DBST) or diagnostic methods at the point of patient care (23,24). This decentralized diagnosis is integrated into the usual circuits. All diagnoses of active infection by positive detection of viral RNA are included in a weekly electronic alert that is evaluated by the Hepatology Unit of the Digestive Diseases Department.

GENERAL MODEL OF INTERVENTION: DIAGNOSIS, TREATMENT AND FOLLOW-UP (Figs. 3 and 4)

After identifying the subjects that are the object of the program, their primary care physician in the macro-elimination program or both levels of care in micro-elimination will invite them to participate. Once informed, the subjects who agree to participate will undergo a one-step diagnosis of hepatitis C (25), that is to say, in those who are positive in serology, the Microbiology Laboratory will automatically perform the viral load determination by PCR, without the need of a new blood draw. The same process will apply in the few subjects with an indeterminate result in serology. Subjects with a negative result will be informed by the doctor who invited them to participate in the program. In the absence of risk factors, test repeat will not be required. In the event that the person persists with a situation that increases the risk of HCV infection, their doctor will explain the need for regular annual monitoring (6).

As previously mentioned, patients with active infection will be identified by the Hepatology Unit through an electronic alert. These patients will be automatically appointed (the patient does not need to visit the doctor who requested the new referral petition) with the Digestive Disease Department of his reference hospital,

where the study will be completed in a maximum period of three weeks. This short period of time is possible thanks to a one-step diagnosis (reflex test) and the implementation of an automated alert system that reports positive cases every week and largely prevents the loss of patients in the stream of care for these ones (26). In the first visit, the disease will be diagnosed in one-step. The disease will be characterized in terms of severity by carrying out a test in which a sample will be extracted for a potential phylogenetic analysis of the virus (to subsequently determine possible reinfections). In addition, a transition elastography to determine the degree of liver fibrosis and an abdominal ultrasound will be performed. At the end of the consultation, the corresponding treatment will be prescribed, which will be dispensed in the Pharmacy Service. During this first consultation, a report will be issued detailing all the relevant data on the patient's history, treatment and follow-up.

FOLLOW-UP AND DETECTING REINFECTIONS

Although the follow-up of the treated patients will be individualized, the program foresees a homogeneous follow-up after the start of the treatment that involves:

1. A test 12 weeks after the end of the treatment, in which the existence of a sustained virological response (SVR) is determined; this response will probably be obtained in more than 95 % of cases. This will be the only follow-up consultation for patients with non-advanced fibrosis who have SVR. Patients with advanced fibrosis and SVR will be followed in the Digestive Diseases Department to complete the observation programs for the development of esophageal varices and screening for hepatocellular carcinoma according to standard clinical practice.
2. Patients who do not present an SVR will be offered rescue treatment (after studying resistance if adherence has been correct) and a subsequent evaluation according to standard clinical practice.

DISSEMINATION, COMMUNICATION AND TRAINING

Before the effective start of the hepatitis C elimination plan in Cantabria, a dissemination, communication and training program was developed. It included all the doctors and nurses from the Cantabria Health Service.

1. Communication to professionals. After the approval of the final version of this elimination plan, it was disseminated to all the professionals involved. Furthermore, an informative scientific conference was held for all the professionals involved in which the program was exhibited and the different circuits and algorithms for action were presented.
2. Training of the professionals involved. During the months of April and May 2019, a training program was held for the professionals involved in conducting this program, which entailed one or more visits to health centers, in-hospital sessions, visits to holding facilities and others for special populations targeted by the program.
3. Public dissemination of the health problem. During the first half of March 2019, an institutional campaign to publicize hepatitis C as a health problem was carried out and the strategy for the elimination of hepatitis C was presented at a public event at the Hospital Universitario Marqués de Valdecilla.

PROGRAM EVALUATION

In order to evaluate results periodically, which in turn helps correct deficiencies, the following series of indicators have been defined for the program itself:

- Percentage of centers, services and health professionals and other professionals involved in the care of these patients who participate in the HCV elimination program.
- Target population of each program, detection rate, systematic detection and evaluation of the prevalence of HCV infection in the study population.
- Degree of compliance: a) diagnosis of the infection in a single step; b) diagnosis of the disease in a single step; c) treatment established in the first consultation; and e) time of diagnosis and establishment of treatment.
- Data regarding infection, disease and treatment: a) percentage of patients with previous known/unknown infection; b) percentage of patients with mild/advanced disease; c) existence or not of extrahepatic disease; d) coinfection or not with HIV and/or HBV; e) form of presentation of the disease: early or late; f) existence and type, where appropriate, of decompensations of the liver disease; g) development

or not of hepatocellular carcinoma; h) type of treatment; and i) reinfections.

This monitoring of the program operation and results is under continuous evaluation and will be adapted to the recommendations that are published (27) with the ultimate goal of being able to demonstrate the elimination of hepatitis C in our region.

WORKING GROUP IN THE STRATEGY DESIGN FOR THE ELIMINATION OF HEPATITIS C IN CANTABRIA

María Eliecer Cano García, Fernando Andrés Mantecón, Ana Batlle López, Javier Cloux Blasco, Marta Cobo, Inés De Benito Población, Aroa Delgado Uría, Carmen Fariñas Álvarez, Susana Fernández Iglesias, Miguel García Ribes, Pablo González Astorqui, Aitziber Illaro Uranga, Beatriz Josa Fernández, Soledad Melgosa Moreno, Purificación Mellado Encinas, María del Mar Navarro Córdoba, Rosa Ortiz de Diego, Luis Miguel Otero García, Guillermo Pombo, Isabel Priede Díaz, Montserrat San Martín Aparicio, Carlos Armiñanzas, Jesús Artal, José Manuel Cifrián Martínez, Carmen Cobo Pelayo, José Enrique Gutiérrez Mora, María Yolanda Jubete Castañedo, Miguel Mateo, Enrique Ocio San Miguel, Daniel Pereda Beure, Juan Carlos Ruiz San, José Antonio Vallejo Correas and José Javier Zueco.

REFERENCES

1. Cooke GS, Andrieux-Meyer I, Applegate TL, et al. Accelerating the elimination of viral hepatitis: a Lancet Gastroenterology & Hepatology Commission. *Lancet Gastroenterol Hepatol* 2019;4:135-84. DOI: [https://doi.org/10.1016/S2468-1253\(18\)30270-X](https://doi.org/10.1016/S2468-1253(18)30270-X)
2. Chen Q, Ayer T, Bethea E, et al. Changes in hepatitis C burden and treatment trends in Europe during the era of direct-acting antivirals: a modelling study. *BMJ Open* 2019;9:e026726. DOI: 10.1136/bmjopen-2018-026726
3. Crespo J, Cuadrado A, Perello C, et al. Epidemiology of hepatitis C virus infection in a country with universal access to direct-acting antiviral agents: data for designing a cost-effective elimination policy in Spain. *J Viral Hepat* 2020;27(4):360-70. DOI: 10.1111/jvh.13238

4. Fernández-Bermejo M, Íñiguez R, Mata P, et al. Estudio de prevalencia de serología de hepatitis C en un área de salud con población rural. *Gastroenterol Hepatol* 2017;40(Espec Congr 1):95.
5. Ghany MG, Marks KM, Morgan TR, et al. Hepatitis C Guidance 2019 Update: AASLD-IDSA Recommendations for Testing, Managing, and Treating Hepatitis C Virus Infection. *Hepatology* 2020;71(2):686-721. DOI: 10.1002/hep.31060
6. European Association for the Study of the Liver. EASL Recommendations on Treatment of Hepatitis C 2018. *J Hepatol* 2018;69:461-511. DOI: 10.1016/j.jhep.2018.03.026
7. Calleja JL, Macias J, Forns X, et al. Guidelines on treatment of hepatitis C virus infection. Spanish Association for the Study of the Liver (AEEH). *Gastroenterol Hepatol* 2018;41:597-608. DOI: 10.1016/j.gastrohep.2018.07.010
8. WHO. Global health sector strategy on viral hepatitis 2016-2021. Accessed: May 13th, 2019. Available from: <https://apps.who.int/iris/bitstream/handle/10665/246177/WHO-HIV-2016.06-eng.pdf;jsessionid=A5BE2504F38F7A656B68AC7DE8421CFF?sequence=1>
9. Ministerio de Sanidad, Servicios Sociales e Igualdad. Plan Estratégico Nacional para el Abordaje de la Hepatitis C. Accessed: June 17th, 2015. Available from: https://www.mscbs.gob.es/ciudadanos/enfLesiones/enfTransmisibles/hepatitisC/PlanEstrategicoHEPATITISC/docs/PEAHC_eng.pdf
10. Ministerio de Sanidad, Servicios Sociales e Igualdad. Informe del Ministerio de Sanidad del Estudio de seroprevalencia de la hepatitis C en población general en España, 2017-2018. Available from: https://www.mscbs.gob.es/ciudadanos/enfLesiones/enfTransmisibles/sida/docs/INFO_RME_INFECCION_VHC_ESPANA2019.pdf
11. Hill AM, Khan A, Nath A, et al. "Diagnostic burn-out" for hepatitis C: when will countries run out of diagnosed people to treat with DAAs? *Hepatol* 2017;66:149-1185. DOI: 10.1002/hep.29501
12. Buti M, Domínguez-Hernández R, Casado MA, et al. Healthcare value of implementing hepatitis C screening in the adult general population in Spain. *PloS One* 2018;13:e0208036. DOI: 10.1371/journal.pone.0208036

13. Gómez-Escolar Viejo L, García Herola A, Sáez Lloret I, et al. Screening of hepatitis C virus infection in adult general population in Spain. *Eur J Gastroenterol Hepatol* 2018;30:1077-81. DOI: 10.1097/MEG.0000000000001190
14. Crespo J, Albillos A, Buti M, et al. Elimination of hepatitis C. Positioning document of the Spanish Association for the Study of the Liver (AEEH). *Rev Esp Enferm Dig* 2019;111:862-73. DOI: 10.17235/reed.2019.6700/2019
15. Aisyah DN, Shallcross L, Hayward A, et al. Hepatitis C among vulnerable populations: a seroprevalence study of homeless, people who inject drugs and prisoners in London. *J Viral Hepat* 2018;25:1260-9. DOI: 10.1111/jvh.12936
16. Saab S, Kullar R, Gounder P. The urgent need for hepatitis C screening in pregnant women: a call to action. *Obstet Gynecol* 2020;135:773-7. DOI: 10.1097/AOG.0000000000003704
17. Saab S, Kullar R, Amini C, et al. The next frontier: universal hepatitis C virus screening in pregnant women. *Am J Obstet Gynecol* 2020;S0002-9378(20)30133-2. DOI: 10.1016/j.ajog.2020.01.058
18. Rossi RM, Wolfe C, Brokamp R, et al. Reported prevalence of maternal hepatitis C virus infection in the United States. *Obstet Gynecol* 2020;135:387-95. DOI: 10.1097/AOG.0000000000003644
19. Terrault NA, Dodge JL, Murphy EL, et al. Sexual transmission of hepatitis C virus among monogamous heterosexual couples: the HCV partners study. *Hepatology* 2013;57:881-9. DOI: 10.1002/hep.26164
20. Cuadrado A, Llerena S, Cobo C, et al. Microenvironment eradication of hepatitis C: a novel treatment paradigm. *Am J Gastroenterol* 2018;113:1639-48. DOI: 10.1038/s41395-018-0157-x
21. Llerena S, Cabezas J, Mateo M, et al. Microeliminación más allá de los muros de la prisión: sujetos condenados a penas no privativas de libertad, cribado y tratamiento inmediato asistido por navegado y telemedicina. *Gastroenterol Hepatol* 2020;43.
22. Corma-Gómez A, Pineda JA. Hepatitis C virus infection in Spain: challenges in the track to elimination. *Enferm Infecc Microbiol Clin* 2019;37:219-21. DOI: 10.1016/j.eimc.2019.01.004

23. Saludes V, Antuori A, Folch C, et al. Utility of a one-step screening and diagnosis strategy for viremic HCV infection among people who inject drugs in Catalonia. *Int J Drug Policy* 2019;74:236-45. DOI: 10.1016/j.drugpo.2019.10.012
24. Saludes V, Folch C, Torres AA, et al. One-step diagnostic strategy of viremic hepatitis C virus infection from dried-blood spots: feasibility and usefulness in people who inject drugs. *J Hepatol* 2018;68:S178-9. DOI: 10.1016/S0168-8278(18)30569-5
25. Crespo J, Eiros-Bouza JM, Blasco-Bravo AJ, et al. The efficiency of several one-step testing strategies for the diagnosis of hepatitis C. *Rev Esp Enferm Dig* 2019;111(1):10-6. DOI: 10.17235/reed.2018.5810/2018
26. Assoumou SA, Tasillo A, Leff JA, et al. Cost-effectiveness of one-time hepatitis C screening strategies among adolescents and young adults in primary care settings. *Clin Infect Dis* 2018;66:376-84. DOI: 10.1093/cid/cix798
27. Safreed-Harmon K, Blach S, Aleman S, et al. The consensus hepatitis C cascade of care: standardized reporting to monitor progress toward elimination. *Clin Infect Dis* 2019;69:2218-27. DOI: 10.1093/cid/ciz714

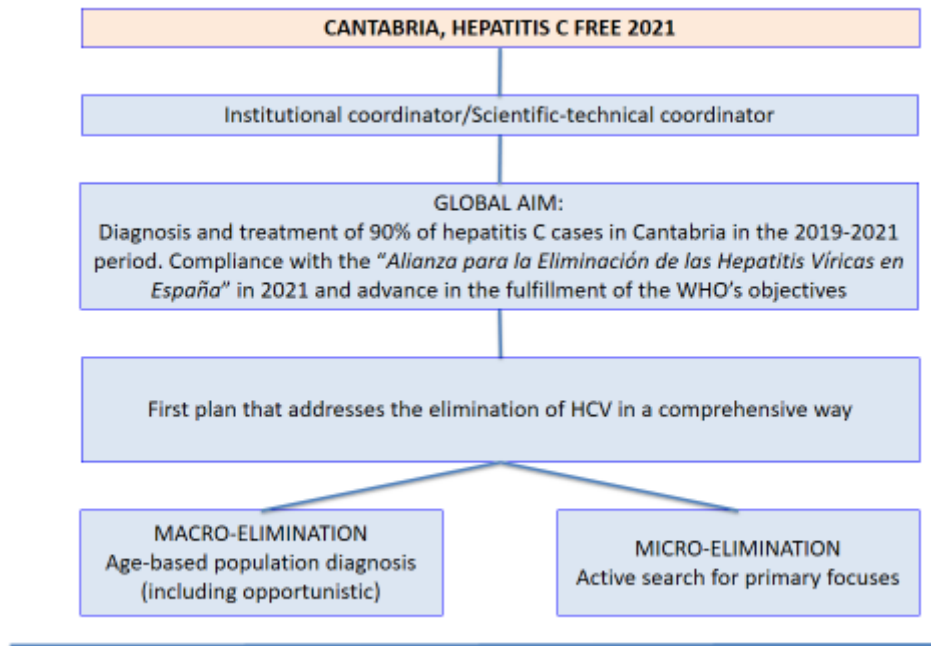


Fig. 1. General design of the strategy for the elimination of hepatitis C in Cantabria. The program is based on two pillars: age-directed macro-elimination for the general population and micro-elimination for populations with differential characteristics with a high prevalence of hepatitis C.

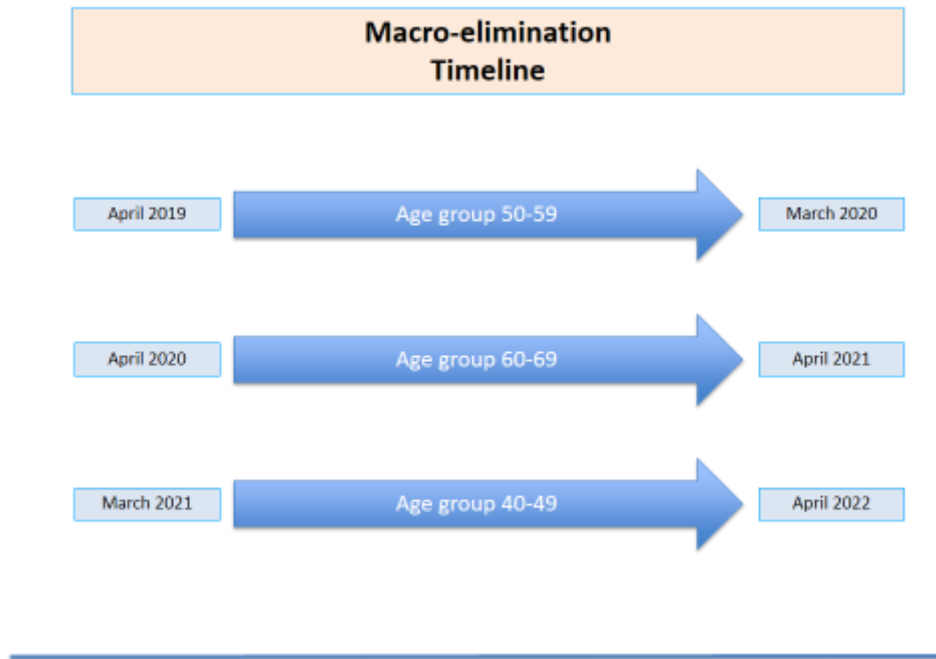


Fig. 2. Macro-elimination pillar. The implementation of this part of the strategy will be carried out gradually by age group.

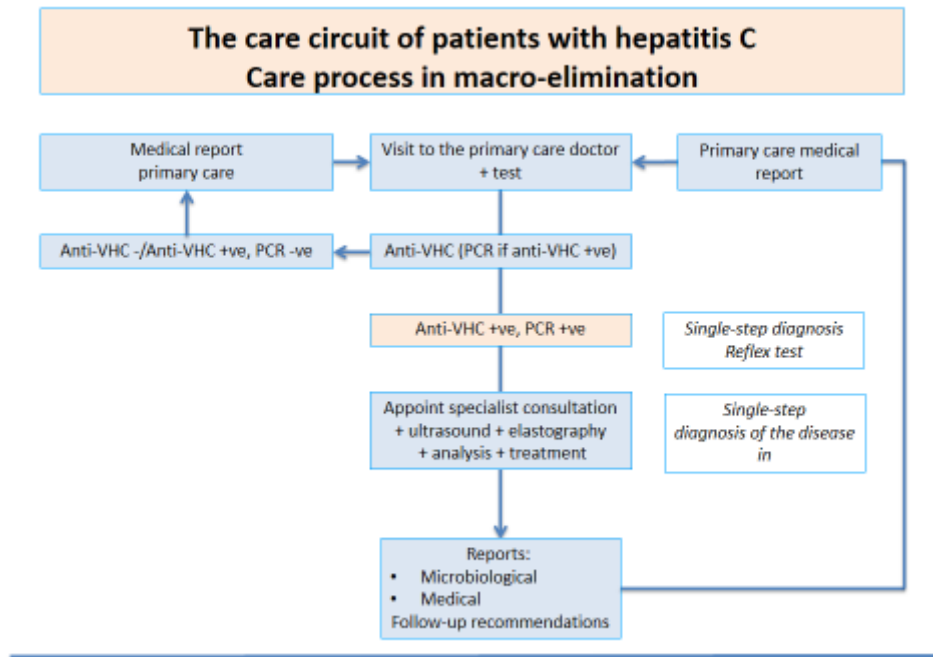


Fig. 3. Macro-elimination healthcare circuit. Workflow for the population screening from the initial test, evaluation of the disease, prescription of treatment and follow-up recommendations.

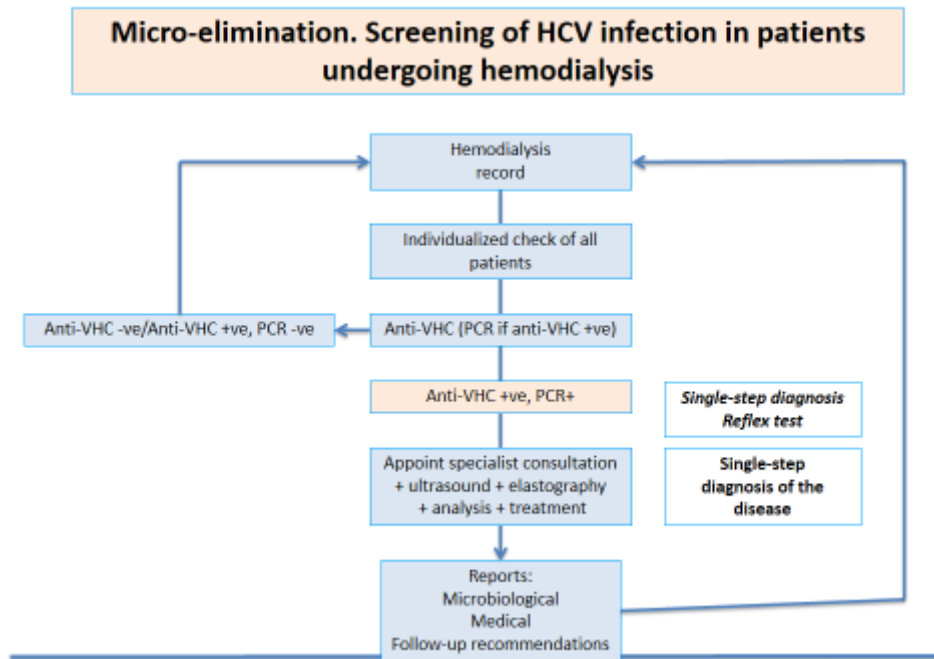


Fig. 4. Micro-elimination healthcare circuit. Screening is adapted to the specific needs of each population. In the example, hemodialysis patients, we started from a registry that reviewed the available serologies. In patients who were identified without evaluation, this was requested and after a single-step diagnosis, those with active infection were evaluated for liver disease in one visit. Treatment was prescribed and appropriate follow-up was established.