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Lessons from COVID-19 for future disasters: an opinion paper

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Article history

Received: 16 June 2022; Accepted: 21 June 2022; Published: 27 June 2022

ABSTRACT

A "Pandemic/Disaster Law" is needed to condense and organize the current dispersed and multiple legislation. The State must exercise a single power and command appropriate to each situation, with national validity. The production of plans for the use of land and real estate as potential centers for health care, shelter or refuge is recommended. There should be specific disaster plans at least for Primary Health Care, Hospitals and Socio-sanitary Centers. The guarantee of the maintenance of communication and supply routes is essential, as well as the guarantee of the autochthonous production of basic goods. The pandemic has highlighted the need to redefine the training plans for physicians who, in their different specialties, have to undertake reforms that allow a more versatile and transversal training. National research must have plans to be able to respond quickly to questions posed by the various crises, using all the nation's resources and in particular, all the data and capabilities of the health sector. Contingency plans must consider ethical aspects, and meet the needs of patients and families with a humanized approach. In circumstances of catastrophe, conflicts increase and require a bioethical response that allows the best decisions to be made, with the utmost respect for people's values. Rapid, efficient and truthful communication systems must be contained in a special project

for this sector in critic circumstances. Finally, we believe that the creation of National Coordination Centers for major disasters and Public Health can contribute to better face the crises of the future.

Keywords: COVID-19, SARS-CoV2, catastrophes, pandemics, primary care, hospital care, socio-health centers, health organization, teaching in medicine, medical education, specialist training, research, communication, health industry, media, bioethics

Lecciones de la COVID-19 para futuras catástrofes: un documento de opinión

RESUMEN

Es necesaria una "Ley de Pandemias/catástrofes" que condense y ordene la dispersa y múltiple legislación actual. El Estado tiene que ejercer un poder y mando único adecuado a cada situación, con vigencia nacional. Se recomienda la confección de planes de utilización de suelo e inmuebles como centros potenciales de asistencia sanitaria, refugio o albergue. Deberán existir planes de catástrofes específicos al menos para la Atención Primaria, Atención Hospitalaria y Centros Socio-sanitarios. La garantía del mantenimiento de las vías de comunicación y abastecimiento es esencial, así como la garantía de producción autóctona de materias de primera necesidad. La pandemia ha puesto de manifiesto la necesidad de redefinir los planes de formación de los médicos que en sus distintas especialidades tienen que asumir reformas que permitan un entrenamiento más versátil y transversal. La investigación nacional debe tener planes para poder responder con rapidez a preguntas que planteen las distintas crisis, utilizando para ello,

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todos los recursos de la nación y en particular todos los datos y capacidades del sector sanitario. Los planes de contingencia deben considerar los aspectos éticos, y cubrir las necesidades de pacientes y familias con un enfoque humanizado. En circunstancias de catástrofe aumentan los conflictos que requieren una respuesta bioética que permita tomar las mejores decisiones, con el máximo respeto a los valores de las personas. La comunicación, rápida, eficiente y veraz debe estar contenida en un proyecto especial para este sector en circunstancias de crisis. Pensamos finalmente que la creación de un Centro coordinador nacional de grandes catástrofes y Salud Pública puede contribuir a enfrentarnos mejor a las crisis del futuro.

Palabras clave: COVID-19, SARS-CoV2, catástrofes, pandemias, atención primaria, atención hospitalaria, centros socio-sanitarios, organización sanitaria, docencia en medicina, educación médica, formación de especialistas, investigación, comunicación, industria sanitaria, medios de comunicación, bioética.

INTRODUCTION

The major concern of the society in general, and of the scientific society in particular, is to predict the future of the COVID-19 pandemic. It is necessary to try to anticipate whether there will be new waves of the disease, whether particularly virulent variants may appear, whether vaccines will evolve at a sufficient rate to cope with the situation and whether the pharmaceutical industry will be able to continue producing effective drugs against present and future coronaviruses.

In addition to the above, lessons need to be drawn from the situation suffered to deal with other potential catastrophes, not only of a viral or microbial nature, but of any other cause.

The COVID Committee of the Illustrious College of Physicians of Madrid, whose mission is to deliberate on this and other aspects related to the pandemic and emerging pathogens, has formulated a series of questions that do not pretend neither to cover the universe of the problem nor to issue any dogma. We have simply intended to offer some reflections to our members, and to whom they may be useful, on lessons for the future learned from COVID-19. The questions have been formulated and discussed by the members of the Committee and the deliberations are set out below.

WHAT LINKS AND PLANS SHOULD BE IMPLEMENTED IN THE EVENT OF MAJOR DISASTERS?

In addition to natural biological threats, which are always latent [1], there are other types of threats, which are current and highly probable.

Spain and the rest of the states, have a response capacity, health and social, that translated into written rules, overwhelms in thousands of pages. But if they are to become real practices, it will be necessary to generate a more synthetic document with freer and more executive decisions, which will allow legally constituted institutions to act effectively among the autonomous,

national and constitutional legal tangle and the most elementary natural law [2]. In the early stages of the current pandemic, even with accredited health systems, as fortunately ours is, the response to basic demands (an oxygen supply, a medical visit...), were not always met, or arrived late. The delay, if it could be shortened, was due to the voluntarism, intuition and professionalism of healthcare workers and other social agents, rather than to the established institutional response.

This first line of action of security forces and social and health care, whose *raison d'être* is immediate intervention, should be strengthened by the State with human and technical resources. An example of what is needed should be plans for the use of land and real estate, which can be made available within hours, to be used as shelters or as areas for assistance or isolation.

Prevention, information and education for the health of the population are essential aspects. Educational programs should be established to promote compliance with hygiene standards and to raise awareness of the usefulness of vaccination and other preventive measures. It is also important to promote self-care and individual responsibility in health.

In major disaster situations, it is essential to secure communication routes, the transport network and the production of essential materials.

The use of social networks and other means of communication allows immediate interconnectivity, which can facilitate rapid and effective organization. Their good use can be decisive in the development of events [3-8].

The transport network is essential for the management of a major disaster and ensuring it will depend on the coordination of a single command, with the involvement, when necessary, of the so-called essential bodies. All available resources must be used, whether by land, sea or air, in order to supply food, equipment, transport of people, etc.

Another line of work that COVID-19 has reminded us of is the necessary and permanent connection of assistance with basic research and with the industrial and productive resources. The initial regulations during the pandemic, far from strengthening them, annulled them. The laboratories of universities and large research centers, which would have had great potential for diagnostic assistance and technological treatment, were preventively closed. International markets with high international demand were resorted to in a situation of low competitiveness, instead of activating and facilitating national production [9, 10]. In addition, in Spain, a national coordination center should be established to facilitate a single management in these circumstances. This has been hindered by the decentralization of healthcare competencies to the autonomous communities.

The national pharmaceutical industry, although with exemplary examples, should ensure sufficient production capacity for essential drugs, especially antimicrobials and vaccines.

A more centralized collaboration and organization in which equity is ensured is necessary. Our nation must not for-

get past experiences and must legislate a law on catastrophes and pandemics that will provide a legal framework for action and collaboration between the public and private sectors. If this is not done, a new opportunity will have been lost and the improvements that can be derived from past experience will not become evident.

In the following points of the document, more specific aspects of the healthcare response are raised that may be of great use in putting an end to this threat or facing the next one, which, as we well know, awaits us.

WHAT ESSENTIAL ELEMENTS SHOULD A MAJOR DISASTER PLAN ADDRESS IN PRIMARY CARE?

In order to face future health emergencies with greater guarantees, it is essential to strengthen Primary Care (PC). The proper functioning of PC guarantees a higher quality, safer, more equitable and efficient healthcare system. The strengthening of PC requires a substantial increase in its financing. Investment in PC should increase from 11% of the current health budget to the 25% recommended by the World Health Organization (WHO) [11]. Investment should cover both human and technological resources and the adequacy of infrastructures.

It is necessary to design in advance a specific contingency plan in PC for major disasters, with the active participation of PC physicians in its elaboration.

In addition to care for the victims of the catastrophic episode, it is essential to ensure access to PC for the rest of the population, particularly the most vulnerable (elderly, chronic, dependent, etc.) [12]. To this end, new alternative care models to the conventional ones should be promoted and consolidated, encompassed in the concept of telemedicine [13] with possibilities of active follow-up of patients with remote monitoring that can guarantee efficient care, control and prevention of chronic processes and multi-pathological patients.

The plan we suggest should promote home care from PC, especially by nurses, providing them with the capacity to provide resources related to the care and attention of complex chronic patients.

It would also increase efficiency and accessibility in PC, the elimination of all those activities that provide little care value and increase bureaucratization, such as the management of sick leave, favoring the digitization of administrative processes [14].

New care models should be implemented with multidisciplinary teams, less dependent on the figure of the family physician, and it is necessary to reorganize the responsibilities of all the professionals that make up PC based on different profiles that allow a more efficient response to demand. It is also necessary to promote the creation and adaptation of new professional profiles (psychologists, occupational therapists, community agents or managers, health promoters, clinical assistants).

Finally, we believe it is important to design and develop internal and external communication plans to ensure the dis-

semination among professionals of the clinical information generated by healthcare organizations.

HOW SHOULD MAJOR DISASTER PLANS BE ORGANIZED IN HOSPITALS?

It is essential that hospital disaster preparedness is well organized and incorporated into the routine operation of hospitals [15-21].

In the preparation and management of catastrophes, the concept of the maximum benefit of the greatest number of victims takes precedence over that of the individual, and the order of priority in intervention is not determined solely by the severity of the injuries, but by the possibility of survival [17, 18]. Some documents serve as examples of hospital organization in recent catastrophes such as the COVID-19 pandemic and the 11M terrorist attack in Madrid [19,20].

All hospitals should have organized a Commission responsible for preparing a Disaster Plan in advance, specific to each center and to the situations to which it may be exposed (natural disasters, pandemics, terrorism, chemical or biological weapons, accidents due to radioactive contamination, etc). The Commission will report directly to the hospital manager and may be subdivided into groups, with specific composition and responsibilities, mainly the Permanent Disaster Committee and the Disaster Commission.

The Standing Committee should be made up of the hospital's most responsible operational and organizational bodies: Manager, Medical Director, Director of Nursing, Director of Management (or whoever they delegate), Emergency Coordinator, Head of the IT Service, Communication Service or Office, and the President or Coordinator of the General Committee. It is essential to have permanent internal and external communication and coordination within and outside the hospital, with other hospitals, health care facilities that attend to patients (primary care, rescue services, out-of-hospital emergencies, etc.) and the relevant authorities.

The Disaster Plan is made up of those protocols, procedures and pre-established actions to be applied in the management of disasters, seeking the greatest efficiency of the available resources and the least impact on the hospital. The following areas will be represented: direct assistance areas, assistance support areas, General Services, Admission Service, Security Service, Communication Service and Press Office, Information Technology Service, Human Resources Services and Family Care Area.

With regard to organization and operation, it is important to work in advance on:

- 1.- Defining, forecasting and availability of additional resources needed in the first moments (care spaces, mobilization of human and material resources to the emergency and critical areas that receive the maximum influx of patients).
- 2.- Defining the essential active activity of the hospital during the disaster, as well as the temporarily delayable one.

- 3.- To prioritize the safety and support of the workers involved in the attention to the catastrophe.
- 4.- To ensure updated and truthful information on the evolution of the disaster.
- 5.- To anticipate and guarantee the management of new needs (protection measures, food, medicines, furniture, etc.).
- 6.- To establish the means of social and health support for patients and families.
- 7.- To develop training and support plans in the resolution and decision making of ethical problems [19, 21].
- 8.- To prepare psychological support groups for patients and workers, dependent on mental health services.
- 9.- To design stabilization and evacuation plans for pediatric patients in hospitals without a pediatric service.
- 10.- To have a plan for the reorganization and recovery of the hospital's previous activity, to be applied once the catastrophe is over.

WHAT REFORMS ARE NEEDED IN HEALTH CARE INSTITUTIONS?

In Spain there are more than 400,000 residential places in these socio-health centers for all population groups, with the elderly being the most notable [22]. Residents have pluripathology, need for polypharmacy and have high levels of physical and mental dependence that determine important family and psychosocial conditioning [23].

This situation is reflected in the figures produced by the pandemic with an 80% mortality rate due to COVID-19 in the over-70 age group, reaching up to 47% of deaths in nursing homes [24], figures that could be even higher [25].

The Pandemic has revealed, among others, the following deficits in the socio-health environment, which a future disaster plan should try to solve:

- Significant lack of health personnel assigned from primary care or hospital referral. Doctors and nurses in these centers do not always have the necessary training in family and community medicine or geriatric medicine. In addition, they tend to have a very rapid turnover.

There are usually no plans for catastrophes or pandemics in the social and health centers, nor a plan of audits to guarantee their implementation.

- There are usually no coordinated information systems that facilitate access to residents' medical records for healthcare professionals in order to provide coordinated and speed care.

In view of the above, there is a need to redesign and consolidate a social and health care structure that responds to the needs of these people and these centers, which should include the following:

- 1- The figure of a liaison Geriatrician in each hospital.

- 2.- The creation of Residential Care Units by means of multidisciplinary teams of doctors, nurses and pharmacists, depending on primary care, directly coordinated with Hospital Geriatrics and Public Health.

The need for a new regulatory and financing system for the creation of a new model of comprehensive care centered on the person, reducing the fragmentation between social and health care, equalizing the qualifications required as well as the economic compensation [26] (Table 1).

Table 1	Measures to be contemplated in contingency plans for residential health and social care centers [26]
1. In relation to the Organization of the residential center itself:	
- Location of all residential centers in the area.	
- Adjustment of visits according to the incidence of the pandemic.	
- Continuous training of all personnel in the different teams.	
- Adequate hygiene measures	
- Necessary protective equipment	
- Isolation capacity in: red zone (infected patients), orange zone (suspected patients) and green zone (not infected and infection overtaken).	
2. In relation to the Sociosanitary Coordination:	
- Well-established consultation circuits with hospital referents.	
- Health and social resources (both human and material) according to the needs of each center and type of patient (degree of dependence).	
- Adequate communication with Hospital-PHC-Public Health-SUMMA teams.	
- Capacity for diagnostic tests according to indications.	

HOW SHOULD THE KNOWLEDGE AND TRAINING OF HEALTHCARE WORKERS BE IMPLEMENTED IN DISASTER PLANS?

The SARS-CoV-2 pandemic has highlighted the main value of the healthcare system, which is its professionals. Especially in the first wave of the pandemic, the need to provide care to an unusual number of COVID 19 patients, which saturated healthcare resources, and the drastic reduction in care for other pathologies, led to substantial changes in the organization of work and healthcare teams [27].

Many healthcare professionals with specialized training had to support teams with high care loads such as the emergency department, hospital wards and critical care areas [28]. Teamwork, motivation and professionalism managed to provide an exceptional response to care, teaching and research needs, even innovating and incorporating technology and digitization in healthcare systems. But it has also had negative consequences not only physically but also emotionally on professionals and sometimes even on care outcomes, by reducing the quality of care in highly specialized environments.

One of the lessons learned from this pandemic leads us to reflect on how the new training models for these healthcare professions should be approached.

The first consideration would be related to the need for competency-based training. Specialized medical training has followed the classic model of programs based on experience acquired in programmed rotations in different care areas with the participation of expert clinical professionals acting as teachers. The evaluation of the results is carried out through the certification of these stays by means of subjective observation and supervised practice, generally without a final exam, which presupposes the benefits of this training model. This model does not ensure homogeneity of results and does not always meet the expectations of professionals. Competency-based training is currently an alternative to these classical training models. They are based on the definition of a series of observable and measurable competencies (knowledge, skills, behaviors and attitudes) that a professional must have in order to meet the needs of patients and solve the problems they pose. The training is based on reflective learning, places the physician in training at the center of the system, incorporates innovative teaching tools such as clinical simulation for the acquisition of competencies, requires the training of teachers as facilitators of this learning, emphasizes periodic and structured formative evaluation with objective and validated instruments through the recording of achievements and sometimes incorporates or facilitates a summative evaluation through certifications that reliably ensure the effectiveness of the training process [29]. All this favors an objective, structured, transparent and effective training process that, promotes autonomous professional development and reduces learning variability [30].

The second, is the need to define what should be the basic competencies for any healthcare professional, regardless of the function he or she performs on a regular basis outside crisis situations. A common and transversal training, beyond the specialization of each program, favors the response in this context. The management of life-threatening emergency situations, the initial response to disasters and especially the acquisition of basic skills such as teamwork and effective communication are essential. Disaster medicine is not incorporated in practically any body of doctrine or in the curricula of the different specialties, although there are clearly defined competencies. During the pandemic, initiatives have been developed that have allowed basic training in critical patient care for many professionals from other areas [31]. This requires innovative teaching methodologies such as clinical simulation to increase the learning curve. There are training programs such as TeamSTEPPS® [32] or crisis management training (CRM) [33] aimed at training leadership, effective communication, supportive behavior, emotional intelligence and other competencies that favor teamwork and flexibility of professionals in situations of uncertainty.

Interdisciplinary training favors collaborative practice, training teams to work together, and has been shown to improve care outcomes. All this requires profound changes in undergraduate and specialized training programs that respond

to these needs and ensure the maintenance of competencies through continuing education [34]. Knowing the institutional contingency plans, and their periodic training through drills, is one of the basic pillars to act effectively and safely in these contexts [35].

Other competencies, such as digital competencies and competencies in the use of technology should be considered in the training programs of healthcare professions [36,37].

The best prepared organizations will be the ones that have those professionals with excellence in the specialized technical part but also have the flexibility to adapt to a changing context such as the one we have faced during this pandemic.

WHAT CHANGES IN THE ORGANIZATION OF HEALTHCARE MANAGEMENT ARE MOST NEEDED TO DEVELOP AND ACTIVATE SUCH PLANS?

The COVID-19 pandemic has led to multiple changes and adaptations in health system care and management. Some of these changes could be maintained in the future to improve health care and improve response to emerging situations and are as follows:

1.- There is a need to redesign hospitals to allow for the expansion of critical areas in an agile manner and the isolation of infectious-contagious patients. Hospital contingency plans should foresee where these critical areas should grow, the material needed to equip them and the human resources that should be employed.

2.- Work in coordination between the three levels of care (primary care, out-of-hospital emergencies and specialized hospital medicine) to be able to carry out common preventive medicine. The management of at least the most frequent processes between the different levels of care should be promoted by means of agreed and common protocols and clinical pathways. The use of information systems as tools to help the professional and not only as a way of recording and storing clinical and administrative information on the patient is fundamental to their success.

3.- To increase the coordination of the different national territories, so that solutions to common problems are shared, patients' healthcare information is available when they are treated outside their Autonomous Community and to ensure the greatest possible equity in healthcare, regardless of where it is provided.

4.- The crisis situation led to the need to urgently hire multiple health care workers and even to incorporate medical personnel who were not yet specialized or who had already retired. The organizational staffs of health centers should be adequately equipped to respond to crisis emergencies and would make it possible to avoid or mitigate the suspension of surgical, diagnostic or chronic patient care activity in the event of any emergency, as has occurred in the current crisis.

5.- The multidisciplinary work carried out in the COVID-19 care has highlighted the value of this type of strategy, which

provides the knowledge of various specialists in the care of the same care process. Previous experience in this regard already existed, but the organization of the system according to processes with multidisciplinary groups should be encouraged, especially in prevalent processes affecting the elderly population with comorbidities, where optimal clinical management should be integrated and not patched according to the specialist who is evaluating the patient at a given moment.

6.- Teleconsultation has been greatly enhanced during the pandemic. The key to its success, however, does not lie in generalizing it, but in choosing appropriately the patients who can benefit from it, avoiding unnecessary trips to the health center if it is not going to add value to the care provided. The first contact with the health system when faced with a health problem should always be face-to-face, so that the physician can carry out an adequate anamnesis and physical examination, which is imperative at the first moment.

7.- A double care circuit should be maintained in emergency departments for the location of patients with communicable respiratory diseases to avoid secondary contagion with other patients and ensure adequate protection of healthcare personnel. This measure can be useful in other common respiratory viruses such as influenza or RSV pandemics, in addition to the coronavirus pandemic.

8.- Health education and patient empowerment from the initial stages of education is essential to prevent the general population from consulting for minor problems that distort the care of patients who do require such care.

WHAT ERRORS IN THE COMMUNICATION POLICY SHOULD BE CHANGED IN THE FUTURE?

The analysis of the information received by the population during the SARS-CoV-2 pandemic reflects three fundamental problems: the excess of information in general, the confusion caused by the diversity of official sources, and the enormous amount of biased or false information that has been disseminated. At the very least, these three problems should be corrected in future disaster plans.

Information overload, without going into its quality, has led to the coining of the term infoxication [38], and can have negative consequences on prevention behaviors [39]. It can also be the cause of neuropsychiatric disorders (gathered in the information overload syndrome) with diverse presentations, almost all related to anxiety pictures, loss of concentration and even social isolation responses [40]. In an environment of press freedom, with multiple sources of information and the added participation of social networks, it is difficult to propose measures to correct this overload. Health education of the population and the leadership of the health authorities could allow sufficient and contrasted information, avoiding the need to resort to multiple sources.

The diversity of official national and international sources has generated information that is not only excessive, but sometimes confusing, contradictory or openly erroneous.

Without falling into the ridicule of the declarations of the presidents of some nations, examples include those relating to the use of masks at the beginning of the pandemic, the appropriate meters to maintain social distance or the number of people who could gather in each territory or period [41]. The dispersion of measures of the European Union states and the Spanish autonomous communities has multiplied the dissemination of heterogeneous information, which has overloaded the population and undermined their confidence. It seems essential that, for the future, there should be real leadership by the World Health Organization (WHO) and adequate coordination of the health and information policies of the European Union and Spain, using single, homogeneous channels.

Beyond the excess, there has been an enormous amount of biased or false information that the WHO has called "infodemic" [42]. The United Nations (UN) has described it as something as worrying as the pandemic itself, as it can generate dangerous health behaviors, distrust towards the media and health authorities, social or racial discrimination and even violence.

Given the fundamental role of social networks in the dispersion of false and biased news [43], solutions have been proposed such as public health organizations taking a leading role in the networks, both disseminating truthful information and combating hoaxes [44]. The social networks themselves have taken measures to reduce disinformation [45], and the activity of many groups of journalists to safeguard the veracity of information should be highlighted. An example of this is Web Newsguard (<https://www.newsguardtech.com>). It has even proposed the use of artificial intelligence systems to detect and stop hoaxes and rumors at an early stage [46].

Although the right to freedom of expression and information must always be taken into account, the right to health and the obligation to provide truthful and verifiable information must also be considered. In addition to internal control measures by social networks and control by information professionals, a large part of the solution to this problem involves training society in the critical use of information technologies [41,43,44] and paying attention to the doubts and fears of the population, in order to provide them with appropriate answers [42].

IS THERE A NEED FOR NATIONAL RESEARCH COORDINATION TO ADDRESS THE QUESTIONS THAT NEW DISEASES OR NEW SITUATIONS MAY PRESENT?

Although the impact experienced during the first wave has given rise to pessimistic reflections on the real potential of our national health system research, the fact is that it has also highlighted the organizational capacity and care efforts of the professionals and their research efforts. Spain occupies the 7th place in the ranking of research publications related to COVID, which is undoubtedly a good ranking [47].

In Spain, public research in biomedicine is mainly car-

ried out in hospitals and universities, on numerous occasions through research institutes that enable collaboration between the two. The Instituto de Salud Carlos III (ISCIII), is the ultimate responsible for public biomedical research in Spain, with a dual functional dependence on the Ministry of Science and Innovation and the Ministry of Health [48,49]. The structure of the ISCIII for the promotion and development of Research is well established through its own or linked national research centers (CNI), in addition to other networks and consortium centers (CIBERs, RETICs, Platforms).

In March 2020, at the beginning of the pandemic, and immediately after the declaration of the state of alarm, the ISCIII opened a research fund of 24 million euros and, in fact, in that year 129 projects were approved, of which only 17 corresponded to initiatives of CIBERs or national Centers and Platforms. These projects have already been the subject of some publications [50,51], as have been published the results of the ENE study, directly developed by the ISCIII, [52] or the COMBIVAC study, also directly funded by the ISCIII and with the participation of its researchers [53].

Applied research is crucial in pandemic situations. With the very high number of cases available, the informatic tools and the current research structures, an adequate national research strategy would allow, without adding new organisms, to have viral biology data or, where appropriate, the pathogen involved in the pandemic that, together with the epidemiological data, could be applied to prevention policies, generate knowledge quickly applicable to the detection of vulnerable populations and to research in therapeutic responses supporting care recommendations. This without forgetting basic research for the development of vaccines and new pharmacological molecules.

Without detriment to the research initiatives of the different groups, in an eventual National Pandemic Plan, biomedical research should be included and centralized under the direction of the ISCIII with an action plan that could very well follow these lines.

- Appoint an independent Scientific Advisory Board, made up of professionals with recognized knowledge and experience in the areas related to the problem generating the crisis.
- Establish the National Centers, Networks and Platforms that should work in a coordinated manner in the planning of research projects.
- Identify priority research areas according to needs and feasibility.
- Allocate available resources on a preferential basis for the development of national projects that have been established.
- Establish alliances with "bigdata" technology companies that can streamline the processing of clinical records.
- Establish research alliances with the pharmaceutical and medical technology industry.

WHAT ASPECTS OF HUMANIZATION AND ETHICS NEED TO BE IMPROVED IN THE FACE OF A POTENTIAL CATASTROPHE IN THE FUTURE?

Many and varied are the ethical conflicts that have arisen during the pandemic and have been addressed according to its evolution. Suffice it to mention the different reports of the Spanish Bioethics Committee [54-56], etc. that have helped to deal with the complex situations experienced in the different waves. Learning from this pandemic must be used to safely face new scenarios.

In the future, it will be necessary to bring bioethics closer to daily clinical practice, relying on bioethicists and the different bioethics advisory bodies at all levels (institutional, hospital care, etc.). During the pandemic, many scientific societies, faced with the new challenges, drew up recommendations on ethical aspects that were of great help in decision-making. Local initiatives should be avoided, trying to unify ethical principles and their implementation in an agile and continuous way in order "...not to leave ethics aside, but rather, in a crisis situation, it is even more important to articulate ethical guidelines for extraordinary circumstances that help decision-makers under pressure...". [57].

It is necessary to establish consensual criteria for prioritizing the allocation of resources in situations where there is an imbalance between the demand for care and the available resources. In these cases, decision-making is highly complex and requires appropriate management of resources without undermining the rights and dignity of citizens.

The different ethical reports [54-59] establish that triage (admission to ICU, transfer to hospital from residential centers, etc.) requires the maximum expansion of resources, and must be guided by clinical criteria that, objectively, although in the context of uncertainty, help in decision making. [60]. Protocols should include flexible criteria and be adapted to each particular situation. To this end, the best recommended strategy is the creation of care teams that update these protocols and that, in crisis situations, are responsible for the daily assessment of incoming and outgoing patient flows. In this regard, a basic element is to encourage society to plan care in advance on the basis of its values and preferences, especially in the most vulnerable population.

Once the above is well defined, it will be possible to determine the criteria for resource allocation in a critical disaster situation, recommending mixed model criteria that include utility, equity, and protection from vulnerability. However, it will not always be possible to fully achieve both utility and equity and there will be no single right way to solve the problems. But what is important is that the decisions that are made are made in a transparent process that takes into account local circumstances along with those of the rest of the autonomous communities and the country [60].

It is also necessary to consider the needs of humanization in the assistance and aspects related to the families. The compulsory isolation of infected persons adds to the seri-

ousness of the disease, an affective deprivation, both in the family and in health, never experienced before. The need for a "more compassionate environment" has been learned. [60, 61], with a fundamental rule: no person should die alone without having his or her physical, psychological, emotional, and spiritual needs effectively met. Therefore, in the face of any catastrophe, in the 21st century, it will always be necessary to articulate and guarantee the necessary measures so that all patients have the opportunity to live their end of life accompanied and cared for by the healthcare team in their palliative needs. Along these lines, particularly fragile patients such as children, the disabled, the mentally ill, the elderly in need of help with activities of daily living, etc. must always be able to be accompanied. With today's means (video-calls, telematic connections, etc.), situations of isolation such as those that have been experienced are no longer understandable, and all hospital units should provide the means for face-to-face contact (limited in time) and telematic contact (the time required by the patient). All these measures, as well as triage, should be taken by multidisciplinary teams at middle management level that can guarantee these measures of "compassionate environment as a superior act of hospital humanization" to the different ward teams on a daily basis [61]. Finally, communication with families at this point should be considered a priority and should be as frequent as possible, communicating in an empathetic and sensitive way to the adequacy of care according to the changing clinical situation.

A legal framework according to the clinical-ethical situations in disaster situations will be necessary. Usually after the pandemic subsides, claims and lawsuits begin. In a pandemic, professionals face a different praxis scenario than usual, acting in a way that is conditioned by limited resources. In this pandemic, initiatives have been taken by legal associations expressing the possibility of expressly excluding healthcare professionals from their claims, without excluding the viability of claims against those responsible for the hypothetical damage caused in their case. Therefore, as demanded by numerous national and international scientific societies, with what has been learned in the COVID, it is necessary the existence of legal systems that protect professionals from legal liability taking into account the context in which the care activity is developed in a disaster situation.

IS THERE A NEED FOR A NEW NATIONAL COORDINATION CENTER FOR MAJOR DISASTERS?

The response to large-scale disasters is usually coordinated from the Office of the President of the Government, to facilitate the participation of the different Ministerial Departments. This has been the case in the current COVID-19 pandemic. However, for the preparation and response to new pandemics, there is a certain social agreement on the need to strengthen public health structures. Without prejudice to the fact that this includes especially the public health services of the Autonomous Communities, since they have the main competences in this field, there is a broad parliamentary consensus

on the need to strengthen public health structures. [62] and major public health societies [63], that this can be achieved through the creation of a State Center for Public Health, already contemplated in the General Public Health Law 33/2011. For this reason, the Ministry of Health has budgeted for the development of this center, which would become operational during the current legislature. The creation of this State Public Health Institution is described in component 18 of the Government of Spain's 2021 Recovery, Transformation and Resilience Plan. [64], which indicates that it should be configured as a center of excellence that performs functions in two main areas: public health surveillance, risk assessments and analysis of the health situation of the Spanish population; and, preparation and coordination of the health system in the face of public health threats, mainly of an epidemic nature, but also other health crises resulting from, for example, climate change (increased temperatures, floods, etc.). It should also monitor and evaluate the Public Health Strategy, and contribute technical and scientific capabilities to the design and evaluation of health policies and to the improvement of public health services and their actions [63,64].

Probably, the best legal form for the new institution, in accordance with the legal context and the functions envisaged, is that of an "agency", since it can exercise administrative powers and is characterized by autonomy, agility and flexibility in management, transparency, accountability and evaluation by results. In particular, a State Agency for Public Health (AESP) attached to the Ministry of Health, through the Secretariat of State for Health, can assume direct management powers [63].

We are awaiting the regulatory development of this institution and its creation and development. The adequate provision of material and human resources, the use of appropriate working procedures, and its relative independence from political power are necessary conditions for it to be an effective instrument for improving Spain's response to new public health challenges in the coming years. Experience will tell if all this is possible.

FUNDING

None to declare

CONFLICTS OF INTEREST

The authors declare no conflicts of interest

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