

## COVID-19 revolution: a new challenge for the internist

Approach to complexity in the COVID-19 era:  
what are the internist's tools?Flavio Tangianu,<sup>1</sup> Fabio Capello<sup>2</sup><sup>1</sup>General Medicine 1, Medical Center, Ospedale di Circolo, ASST Sette Laghi, Varese; <sup>2</sup>Department of Primary Care, Azienda USL di Bologna, Italy

## ABSTRACT

As the main title '*COVID-19 revolution: a new challenge for the internist*' states, the global coronavirus infection disease 2019 (COVID-19) pandemic represented a new challenge for the internists. This paper is part of a series of articles written during the difficult period of the ongoing global pandemic and published all together in this fourth issue of the *Italian Journal of Medicine*, with the aim of sharing the direct experiences of those who were the first to face this severe emergency, expressing each point of view in the management of COVID-19 in relation to other diseases. Each article is therefore the result of many efforts and a joint collaboration between many colleagues from the Departments of Internal Medicine or Emergency Medicine of several Italian hospitals, engaged in the front line during the pandemic. These preliminary studies therefore cover diagnostic tools available to health care personnel, epidemiological reflections, possible new therapeutic approaches, discharge and reintegration procedures to daily life, the involvement of the disease not only in the lung, aspects related to various comorbidities, such as: coagulopathies, vasculitis, vitamin D deficiency, gender differences, *etc.*. The goal is to offer a perspective, as broad as possible, of everything that has been done to initially face the pandemic in its first phase and provide the tools for an increasingly better approach, in the hope of not arriving unprepared to a possible second wave.

This paper in particular deals with internist's tools useful for management of COVID-19 patient.

The coronavirus infection disease 2019 (COVID-19) pandemic revealed some of the flaws in the na-

tional health systems worldwide. Some countries had a prompt response to the crisis, whereas other faced serious issues, probably due to structural deficiencies in the territorial and hospital system.

For a novel disease, in fact, there are no *prêt-à-porter* solutions, nor international literature and therefore no ready-to-use guidelines, on which doctors, healthcare workers, and health policies-makers can count on. This new disease has proven challenging for everyone.

The guidelines on the possible organization in the course of a pandemic influenza that were present in the *drawers* of the ministry of health<sup>1</sup> clashed with the peculiarity of this new virus, the scarce information on its characteristics and the possibilities of its evolution, but above all on the contagiousness and the absence of a specific therapy. Therefore, we had to face a scenario that within a few days showed an escalation of events that was probably unique in recent history.

But what is the role of the internist doctor in this unknown reality?

To try to answer this uneasy question, we need to step back and consider what happened when COVID-19 stroke the world, focusing on the Italian scenario, being Italy the first non-Chinese country to face the devastating impact of an overwhelming number of serious cases of this mysterious disease.

Numbers say that some hospital has been forced

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to close all their wards and become a COVID-Hospital, namely a single-disease treating center. In the beginning, patients have been primarily admitted to Intensive Care Units (ICU), because the main symptom in these subjects was a rapidly evolving respiratory distress, similar to a clinical picture of acute respiratory distress syndrome (ARDS). In fact, back then it appeared reasonable to treat these patients with invasive mechanic ventilation.

However appropriate or not, this approach revealed a first deficiency in some health systems. If we consider the Italian case, the national health system could count on a number of intensive care beds that varied, before the COVID-19 emergency, from 11.99/100,000 (number of beds per hundred thousand inhabitants) in the Liguria region, to the 5.22/100,000 beds in the Trentino Alto-Adige region, with an average of 8.42/100,000.<sup>2</sup>

According to Chinese surveys, about 5% of patients needed ICU admission, although the 17% of patients had signs of ARDS.<sup>3</sup> As of the 3<sup>rd</sup> of March 2020, in Italy 8.8% of positive patients needed ICU admission due to respiratory failure.<sup>4</sup> Again, it appeared reasonable for the Italian health system to modify its organization in response to the crisis to face the sudden lack of ICU beds. The alternative would have been an implosion of the same system resulting in a serious biohazard for patients and healthcare workers. The prompt response produced multidisciplinary teams, mediated by the Internal Medicine Departments, that brought specialists from different areas together (anesthesiologists, pneumologists, infective diseases specialists among the other), organizing themselves in mega-structures that produced medical divisions that were a mix of internal medicine wards and a high-dependency sub-intensive care units.

Data from a survey formulated by FADOI (Federation of Associations of Hospital Doctors on Internal Medicine - Lombardy section) on hospitals that have been at the forefront in the treatment of patients affected by COVID-19 (Cremona, Crema, Mantova, Niguarda, Varese, Garbagnate, Rho, Milano San Carlo Paolo, Sacco Fatebenefratelli, Policlinico di Pavia, Voghera, Vigevano, Melegnano, Magenta, Legnano, etc.) showed that the patients admitted to internal medicine were, at that time, 2489. In addition to that, the patients managed by Internal Medicine in lung ventilation helmet continuous positive airway pressure (CPAP) were 385, patients admitted to intensive care in pulmonary ventilation were 339. From these sampled and very representative numbers, it is clear that the majority of pneumonia from COVID-19 (over 70-80% of the more than 10,000 patients hospitalized in Lombardy) are followed and treated in Internal Medicine, and about 18% of these patients are in pul-

monary ventilation in Internal Medicine with the CPAP helmet.<sup>5</sup>

On the one hand, this emergency produced a collaboration, the necessary multidisciplinary approach needed to fight this disease, focusing on the patient. Treating this infection out of the context, namely treating the single patient seen as an individual, would have been tempting. Nonetheless that approach would have proved itself wrong: patients' profiles have changed abruptly during the crisis, becoming even more multifaceted, with a shift on the older ages and therefore on the elderly with a complex background.

The first cases, in fact, were young adults, otherwise healthy, where progressively invasive ventilatory procedures - from CPAP to early endotracheal intubation - made clinical sense. The medical decision, then, depended on some clinical, laboratory or instrumental findings that could lead toward a given ventilatory strategy. Besides, the overwhelming number of critical patients to be treated at the same time largely exceeded the capacity of the medical facilities involved, disrupting the normal organization of the hospitals.

This is when the medical skills of the internist doctor, the one normally in charge of the patients around the clock, went to the next level. These skills are the ones that medical doctors should show and develop during their clinical practice: the ability to evaluate patients considering the clinical signs that come as a response to the body to an injury, or a damage, or a stress. To name a few, the way a patient breaths, how he or she uses the respiratory muscles, and how the respiratory dynamics works; the heart frequency and the overall cardiovascular condition; the level of hydration or vascular stasis; the fine evaluation of the level of consciousness of the patient, and his or her ability to speak and interact with others and with his or her environment; and in addition to that all the non-objectively perceptions, based on all the sum of a doctor's past experiences, that a clinician uses to classify the single patient and therefore his or her general or peculiar health conditions.

If we consider this standpoint, the sole use of a single parameter, as the ventilation/perfusion ratio, would be misleading and trivial, useless to detect those patients where the invasive ventilation would have been necessary or could have made the difference. Besides, following these criteria, most of the patients already presented with a P/F <300 that according to the ARDS classification requires a mechanical invasive ventilation.<sup>6</sup>

Thus, the only possible way to establish the proper course of action was the face-to-face evaluation via a traditional medical encounter, to assess a patient's real conditions and to tailor the clinical response and the

treatment on the single individual, taking also into account the possible harms that the therapeutic strategy proposed could do on that specific patient.

Probably, the best technological support came from a relatively simple technique. Ultrasound scan provided an optimal solution: easy to move to a patient's bed, reliable, with no side effects, it represented the best weapon for doctors to fight their battle against the disease, giving valuable information on what step to do next.

The tragedy of this epidemic teaches us an inestimable lesson. We have discovered again what makes a physician: the ability to look, see, listen, touch, and then understand what is going on in a single patient. Then came the multidisciplinary help, where specialists worked together in symbiosis, collecting and providing information in order to find the better treatment strategy, tailored to the single case.

We probably did not look forward to an unprecedented international health crisis to find our way. Yet, this emergency forced us physicians, and particularly internist doctors, to face our main objective: the cooperation among different experts, aimed to achieve the best interest for our patients, promoting health, wellbeing, and quality of care.

No role is better than the others. It is true that most patients have been treated by internists, because most of COVID-19 patients were admitted to Internal Medicine wards. Yet, no war can be won alone, and there would be no successes to compliment to, without the work of all the specialists that have cooperated to reach the goal.

However, the internist should become aware that his or her role is critical when it comes to hospital care, as he or she is the one that is called to see the whole picture, directing the interventions and integrating the information that comes from the different specialists involved in the case.

The second wave of patients stressed this position even more. Because the patients admitted were mostly fragile people and elderly with different chronic comorbidities, a treatment strategy purely based on the collection of few vitals, or on acritical flowcharts, would have produced a number of invasive interventions that may have caused more harm than good. A clinical approach, on the contrary, helped to design specific treatments that produced favorable results also in critical cases.

It remains clear that in those areas more affected as the provinces of Bergamo, Brescia or Cremona the scenario was more complex than that, and that leads to unavoidable and unfavorable outcomes. But, as it often happens, especially in the medical practice, the most difficult challenges produced opportunities that ultimately led to the development of solutions that have been profitably used in that same affected areas

and in those that faced the same criticalities in a second moment.

From those doctors, nurses and healthcare workers come the expertise and the knowledge that helped us all to face both this novel disease and the cascade effects that hit our hospitals so hard lately.

In conclusion, COVID-19 exposed how fragile the knowledge we have on nature is, and how complex it is the interaction of the human body with the environment we live in. What we know about this new virus and the disease is still too little, and we understood that we cannot necessarily rely on whatever knowledge we have on viruses and on other diseases, no matter how similar to this, because we are exploring a completely new territory, where things may differ from what they apparently look like. The same behavior of the virus in individuals, in clusters of patients, or in a population is still unknown, as well as the physiopathology of the disease. Besides, we have too little information to build robust guidelines, and an evidence-based approach that do not take into account the individualities and the peculiarities of each patient and of each scenario may lead to wrong clinical and public health decisions.

Considering this perspective, the internist can evaluate the problem from a privileged vantage point that allows him or her to consider the patient as a whole, addressing complexity and finding tailored solutions. Italian internists in the past months had to face an overwhelming number of cases, making decisions that were not based on ready-to-use protocols or algorithms, but on the complex interaction between their knowledge, their medical experience, and the capacity developed in problem-solving. Those aspects are based on the deep theoretical knowledge and the open-mindedness that characterize the Italian education and the Italian medical school. Thus, internists have been able to approach any new problem evaluating the complexity of the situation they had to deal with and creating reproducible solutions that have been eventually proven useful to face and overcome the crisis. This is consistent with the flexibility that is typical of any internal medicine doctor, that allowed - using the little information available from international literature - effective flows management, an accurate diagnostic verification and confirmation, adequate patient management that, even in more serious cases, improved the outcomes of non-invasive ventilation, and a continuous search for optimal treatment options that ultimately helped health professionals to achieve valuable results.

Additionally, COVID-19 has helped us understand how unprepared we are in dealing with pandemics and new diseases, and has given us some lessons that, no matter how costly, we will treasure for the future (Table 1). However, in the fight against

the virus, we might find again the same motivations and spirit that allow internal doctors in the past to pioneer a medicine that still needed to be invented, developing those solutions that today save the lives of many worldwide.

Therefore, this experience probably will offer the ability to consider the real needs of our patients, with

or without COVID-19, and to understand what are the abilities, the skills, and the capacities that every doctor and in particular every internist doctor should develop in his or her career. So that no trouble may come unforeseen, with people ready to work out any future challenge nature will present to the humankind.

**Table 1. Lesson learnt from the coronavirus infection disease 2019 pandemic. Most of the errors made by health professionals and decision makers were due to the lack of information, secondary to the fact that everything about the disease was new, and there obviously were too little evidences in the scientific literature on what was useful or what was dangerous to do to face the infection and the spreading of the disease in the population. Because of the lack of available data on severe acute respiratory syndrome coronavirus disease 2, and the poor quality of the publication produced at the beginning of the epidemic, and because most of the long-term effect on the disease on people and on the population will be unknown for months or years, some decisions were performed inaccurate. However the table summarizes some of the mistakes that should be avoided in the future, to achieve better outcomes and to better manage the disease in single patients and in the community.**

Type	Error made	Lesson learnt
Risk assessment and evaluation	Considering unpredictable or improbable the event of a pandemic	Pandemics can happen without notice
Risk assessment and evaluation	Considering unpredictable or improbable the event of a novel or serious infection presenting to an emergency department in any given time	Necessity of a plan, with health professionals aware that improbable events can happen at any time
Public health management	Lack of national guidelines for the management of a novel pandemic	Necessity of a plan
Disaster medicine management	Lack of national guidelines for the management of an international crisis and a national health emergency	Necessity of a plan
Communication	Poor communication among the different actors involved in the crisis management	Necessity of a plan
Risk communication	Messages shared on mass or social media by health professionals or experts, non-professional, public figures, decision-makers or politicians, based on personal opinions or inaccurate facts, and/or delivered in the wrong way	Necessity of a shared risk communication strategy
Risk communication	Professionals offering - because of their role and not of their actual knowledge - their solicited or unsolicited opinion on the media, offering explanations or solutions based on personal ideas and not on scientific-based evidences	Necessity of a shared risk communication strategy Necessity to involve mass media and supervisory authority in the production of such a strategy
Health policies	Residences for the elderlies without the minimal standards required to face and contrast the spreading of the infection	Accreditation protocols must consider disease control capacity of the facilities intended for elderlies
Disease control and disaster medicine management	Shared access to the emergency departments without dedicated triage areas for patients with infectious disease	Need for a plan, with clear and shared procedures for the allocation of triage areas, the pathways for the internal transport of infected patients from the access point to the isolation area, and the measures needed to avoid the spreading of the disease
Disease control	Infected patients admitted to wards or area without the minimal standards to contain an infection	Necessity of a plan, avoiding easy or political solutions that do not have the minimal standards to guarantee the safety of the patients, of the healthcare workers or the population in general
Disease management and disaster medicine management	Transferring severe patients to intensive care units that were already working beyond their capacities without considering alternative options	Consider Internal medicine wards as a possible and valid alternative for sub-intensive care or high-dependency care
Health policies	Not considering internal medicine wards as a possible resource and ignoring internists capacity to deal with the epidemic	Enhance the role and figure of the internist doctor

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