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New strategies proposed by clinical pharmacists in the management of the COVID-19 pandemic in a developing country

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Summary
The current exceptional pandemic situation requires that health professionals reorganize and adapt their practices to face the crisis. The clinical pharmacy department of the Rabat Ibn Sina hospital has proposed a series of actions that aim to standardize practices, train teams and raise their awareness on environmental hygiene and personal protective equipment. The objective of the current article is to highlight the role of clinical pharmacists as well as the strategies and means implemented to reinforce protection measures and infection control within hospitals in the context of the SARS-CoV2 pandemic. When the pandemic broke out, working strategy was declined in 7 steps. First of all, it became necessary to set up an expert made up of clinical pharmacists and their collaborators. The work started by collecting all the documents containing relevant data relating to the coronavirus. The next step was to draft and validate bio-cleaning protocols and the equipment information sheets. Training and simulations were organized with the different care units. During this health crisis, the clinical pharmacy department effectively adapted to the new situation and reinvented itself by putting personal protection and environmental hygiene as absolute priorities in addition to its routine missions.

Résumé
Nouvelles stratégies proposées par les pharmaciens hospitaliers dans la gestion de la pandémie de Covid-19 dans un pays en développement

La situation pandémique exceptionnelle actuelle nécessite de la part des professionnels de santé une réorganisation et une adaptation des pratiques. Le service de pharmacie clinique de l'hôpital Ibn Sina de Rabat a proposé une série d'actions qui visent à standardiser les pratiques, former les équipes et les sensibiliser à l'hygiène du milieu et aux équipements de protection individuelle.
L’objectif du présent article est de mettre en évidence le rôle des pharmaciens cliniciens ainsi que les stratégies et moyens mis en œuvre pour renforcer les mesures de protection et la lutte contre les infections dans les hôpitaux dans le contexte de la pandémie du SARS-COV2. Le travail a commencé par la collecte de tous les documents contenant des données pertinentes relatives au coronavirus. L’étape suivante a consisté à rédiger et à valider les protocoles de bio-nettoyage et les fiches d’information sur les équipements. Des formations et des simulations ont été organisées avec les différentes unités de soins. Le service de pharmacie clinique s’est réinventé durant cette crise sanitaire et s’est adapté efficacement à la nouvelle donne en faisant de la protection individuelle et de l’hygiène du milieu une priorité absolue en plus de ses missions habituelles.

Introduction
The current exceptional pandemic situation requires mobilizing all energies and resources to care patients suffering from the SARS-CoV2 virus within hospital services as well as the protection of the medical staff. In addition to the National Watch and Response Plan for the Coronavirus 2019-nCoV infection issued by the Moroccan Ministry of Health [1], this situation requires that health professionals reorganize and adapt their practices to face the crisis.

Reminder of the missions of clinical pharmacists in routine and "in normal times"
In Morocco, clinical pharmacy was introduced in 2017 through the full-time assignment of internal and resident pharmacists to different healthcare units including Emergency department and Intensive Care [2]. As part of the healthcare team, pharmacists have access to medical information relating to the patients and to the service. Clinical pharmacists main missions include the optimization of therapeutic strategies, the fight against iatrogenia, information and training on health products and development of protocols on healthcare practices. Clinical pharmacists also stand as contact persons between the central pharmacy and hospital services.

When faced with a new infectious respiratory disease, as is currently the case with the COVID-19 pandemic, it is essential that healthcare professionals, or anyone who comes into contact with a suspected or infected patient, comply with WHO guidelines on infection prevention and control (PCI) [3]. Infection spread control within hospitals requires a rational and correct use of protective means while respecting their proper use, but also a strict bio-cleaning system. Such strategies take time and are difficult to implement in the current emergency context [4].

When the pandemic broke out, five hospital services were turned into dedicated COVID-19 care units and healthcare staff needed to have precise guidelines on the use of personal protective equipment (PPE).

The clinical pharmacy department of the Rabat Ibn Sina hospital has proposed a series of actions which aim to standardize practices, train teams and raise their awareness on environmental hygiene and PPE.

The objective of the current article is to highlight the role of clinical pharmacists as well as the strategies and means implemented to reinforce protection measures and infection control within hospitals in the context of the SARS-COV2 pandemic.

Method
Step 1
Quick set up of a group of experts (permanent team) made up of one senior emergency doctor responsible of a COVID-19 hospitalization unit, one senior clinical pharmacist, one junior clinical pharmacist and one resident pharmacist. Set up of a second team, called upon if necessary, for bibliographic research made up of two resident pharmacists working remotely. Depending on the specificity of the action, other professionals were consulted: members of the Infection Control Committees (ICC), radiologists, nurses and hygiene technicians.

Step 2
Collecting the experience of other pharmaceutical teams from different countries during the COVID-19 pandemic, consultation of all documents containing relevant data published by the Moroccan Ministry of Health, public health agencies (Canada, France, United Kingdom) World Health Organization (WHO), the French Society of Hospital Hygiene, databases (MEDLINE, PUBMED, Cochrane, Google Scholar).

Step 3
Definition and prioritization of the actions to be carried out on the basis of the problems observed; these actions concerned two areas: PPE and bio-cleaning.

Step 4
Constitution of two working groups: one group worked on the bio-cleaning protocols and the other group worked on the elaboration of PPE information sheets.
Step 5
Drafting and validation of bio-cleaning protocols and PPE information sheets.

Step 6
Training and simulations with the different teams of the "COVID-19" care units.

Step 7
Communication with printing and posting of PPE information sheets at the entrance to all departments hosting COVID-19 patients and at the hospital pharmacy.

Results and discussion
Personal Protective Equipment (PPE) information sheets
Given the data available at the present time on the SARS-COV2 virus, contact precautions are recommended regarding respiratory droplets for routine healthcare of patients whose infection with COVID-19 is either suspected or confirmed [5]. The protection of individuals is one of the key elements of this pandemic, which implies the proper use of PPE as well as a strict compliance with the indications to avoid a risk of shortage. The practical PPE information sheets elaborated are as follows:
1. Principle of wearing masks intra-hospital in the context of the coronavirus pandemic: appropriate conditions of use of FFP2 masks and surgical masks.
2. Principle of wearing masks intra-hospital in the context of the coronavirus pandemic: How to wear your FFP2 mask?
3. Principle of wearing masks intra-hospital in the context of the coronavirus pandemic: How to wear your surgical mask?
4. Composition and indication of gown kits and suits in COVID-19 services: When to wear the gown kit and when to wear the suit?
5. Dressing/undressing procedure.
The elaboration of these sheets was inspired by WHO [6]. However, the protection level has been increased while taking into account the stocks available.
A training intended for the healthcare staff was carried out on the correct use of masks, the objective was to raise their awareness to the interest to wear a mask, to list the difference between a surgical mask and a FFP2 mask, to show how to wear the mask and when to change it. The training was also an opportunity to remind the healthcare staff of the importance of hand washing.

Bio-cleaning protocols
According to a study published in the NEJM [7] on March 11, 2020, the COVID-19 can continue to live in the air for several hours and on certain surfaces for two or three days it also reveals that plastic and stainless steel offer greater stability to the virus. This same study shows that SARS-CoV-2 remains viable and infectious in aerosols for up to 3 hours.

Another recent article by Ong et al. [8] evaluated viral dispersion intra-hospital by taking samples of air and surfaces in the room of hospitalized patients, before routine cleaning, SARS-CoV-2 was identified on 61% of the samples of surface in a patient's room.
As SARS-COV-2 is an enveloped virus, the guide from the European Centre for Disease Prevention and Control (ECDC) indicates that the standard EN 14476 for detergents/disinfectants is recommended for enveloped viruses and would by analogy inactivate SARS-CoV-2 [9,10].
As all this data highlights the spread and persistence of the virus in the environment, it was essential for the team to take environmental and technical measures.
New protocols have been developed on the basis of former ICC protocols by incorporating data related to SARS-COV2:
1. Linen change in the hospital room during COVID-19 patient hospitalization;
2. Bio-cleaning of the hospital room during COVID-19 patient hospitalization;
3. Linen change and bio cleaning of the hospital room equipment after discharge or death of the patient COVID-19;
4. Protocol for disinfecting the laundry trolley;
5. Composition of the cleaning trolley;
6. Bio-cleaning of the hospital room after a COVID-19 patient discharge or death;
7. Disinfection of protective glasses after leaving a COVID-19 zone;
8. COVID-19 Patient Bed Electrocardiogram Protocol: precautions and bio-cleaning;
9. COVID-19 Patient Bed Thoracic X-ray Protocol: precautions and bio-cleaning;
10. COVID-19 Ultrasound Protocol: Use and bio-cleaning;
11. COVID-19 Scanner Protocol: Reception of suspected or confirmed patients and bio-cleaning;
12. COVID-19 Thoracic X-ray Protocol at the radiology department: precautions and bio-cleaning.
The players of each protocol followed a training program consisting of:
• Theoretical training;
• Simulation training;
• Practical case in the presence of a suspected or confirmed patient.
The theoretical training was organized in a large amphitheatre respecting social distancing measures. The training was intended for all cleaning and support agents assigned to COVID-19 units. In order to guarantee a good disinfection of the environment and an effective virucidy, emphasis was put on the concentration and the contact time of the cleaning product, the respect of a minimum time between the removal of the linen and the bio-cleaning of the ground and other surfaces. Emphasis was also put on the Dressing/Undressing Procedure and the proper use of Personal Protective Equipment.
This training was followed by real-life situations in which each agent simulated a bio-cleaning in order to ensure the proper understanding of the protocol.

Training continued in the field and was taken over by the Hygiene Team (members of the Infection Control Committees) with a daily schedule for monitoring the implementation of the protocols in the “COVID-19” care units. A weekly meeting has been scheduled between the EOH and the working group of experts to ensure a proper operation and compliance with the schedule.

The elaboration and implementation of protocols by clinical pharmacists enabled to reach specific objectives within a short time:

• The standardization of practices within the five dedicated “COVID-19” care units on the proper use of PPE equipment and bio-cleaning methods.
• A better protection of the healthcare staff and intra-hospital pandemic spread control.
• The easing of pressure on the healthcare staff and on equipment stocks through the training of the healthcare staff on the proper use of PPE equipment.

Furthermore, an email gathering all these files and protocols was sent to the heads of departments of the “COVID-19” units for dissemination of the information. A document containing all the PPE information sheets and bio-cleaning protocols was also handed over to each service for the healthcare staff. All of these documents were also sent by email to pharmacists and doctors in other hospitals.

**Conclusion**

During this health crisis, the clinical pharmacy department effectively adapted to the new situation and reinvented itself by putting personal protection and environmental hygiene as absolute priorities in addition to its routine missions. Other pharmaceutical teams, especially in developing countries, could implement the strategies developed in this article in order to reinforce intra-hospital safety measures and improve working conditions for their healthcare staff.

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