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Focus on the predictive management of COVID-19 risk in educational institutions in Morocco

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Abstract
The corona virus pandemic at the international and national levels constitutes a real problem for health, economy, trade and certainly education. In Morocco, general confinement, since March 20, 2020, is an obligation to limit the spread of this virus. The Ministry of National Education decided to close education and training institutions on March 16, 2020. It adopted, in parallel, several proactive and preventive measures to deal with this pandemic on several levels, including distance education.

Certainly these measures taken in the field of education are highly important, but require reinforcement for a continuous improvement of the safety and health of learners and the professional body. Continuous prevention measures are proposed in this study, acting on legal, human resources and educational content aspects, as well as on the preventive aspect on which we offer simplified methods and tools for the effective management of COVID-19 risk. In particular, we propose a checklist, adapted to the school context, used to carry out periodic internal audits for regular control and monitoring of the health situation in the school institution and the implementation of corrective and preventive actions.

1. Background
Morocco announced the registration of the first case of the new corona virus in March 02, 2020. The number of cases increased significantly thereafter. To cope with this pandemic, and under the high instructions of King Mohammed VI, the authorities have up a series of preventive measures limiting the spread of the virus and progressive containment measures according to the evolution of the pandemic, until the declaration of a general containment since March 20, 2020.

Indeed, the current situation of the spread of the COVID-19 pandemic at the international and national levels is a heavy burden on health care systems, and is damaging economies, tourism, trade and education. This pandemic is highly contagious, with people with COVID-19 being able to spread infection before the onset of symptoms, during the course of symptoms, and during the clinical recovery period [1]. Similarly, transmission of the virus through contaminated objects or surfaces (copper, cardboard, stainless steel, plastic, etc.) is important, as the virus can remain viable and infectious for hours or even days [2].

This has led to policies of social (physical) distancing all over the world. In particular, many countries have decided to close schools as part of a policy of physical distancing to curb the transmission of the virus and to ease the burden on health systems. The United Nations Educational, Scientific and Cultural Organization estimates that several countries have implemented regional or local closures. These school closures affect the education of 80% of the world’s children [3].

The benefit of closing schools during an epidemic is to reduce transmission and new cases. A 2008 study in France on the spread of H5N1 influenza estimated that prolonged school closures could have reduced cases by 13–17% (although in practice, some schools may remain open to provide childcare services, reducing this estimate) [4]. Another study showed that schools are likely locations of
transmission based on contact patterns of influenza-like pathogens in U.S. children during H1N1 2009. However, this study also showed that voluntary behavioral changes, without mandatory stopping, appeared to reduce cases of this flu by 10–13% [5]. Nevertheless, school closures can produce significant difficulties during pandemics: For example, the fact that schools are closed for a long period of time could increase mortality from COVID-19 due to a reduction in health care staff, in the absence of alternative childcare options [6], could have difficult social and health consequences for children living in poverty, and would likely exacerbate existing inequalities. These children are likely to find it difficult to take online courses. Beyond the educational challenges, the current health crisis is expected to lead to a severe economic downturn for low-income families [3]. As a result, the potential benefits of school closures should be balanced with their costs. Several studies have analyzed the economic impacts of school closures during health crises and have shown that schooling is one of the most important investments [7–9].

However, containment is seen as the only possible response [10] to this epidemic today. This choice has opened up another priority area on which everyone is working at the moment: that of establishing emergency plans to avoid disrupting the educational process.

In Morocco, the strategic orientations of the Moroccan education system emphasize the safety and health of students and the protection of their rights to safe educational conditions. Likewise, particular attention is paid to the occupational health safety of its administrative and teaching staff. It has, therefore, opted for the closure of educational institutions since March 16, 2020 until the end of the school year. In fact, the solution was to adopt the largest e-learning initiative in Morocco. This means moving towards distance learning or e-learning with media campaigns (on TV, radio and social media) [11,12], using digital and audio-visual resources via specialized Internet platforms. This shift towards distance learning is certainly seen as a direct and pragmatic response to the containment imposed by the risk of the uncontrolled spread of COVID-19 [13]. Indeed, this growing awareness of the seriousness of the risk of COVID-19 for the health of students and the administrative and pedagogical staff of the national education in Morocco has pushed the officials to adopt a preventive and corrective forward planning management. These measures make it possible to reduce exposure to risks within acceptable limits and improve the quality of educational services by including elements relating to occupational safety and health. As a result, the national education system has programmed significant proactive precautionary and health promotion measures for the school year in September 2020. Indeed, the Ministry of National Education has launched a consultation inviting student tutors to choose between face-to-face education or virtual education, pending the hoped-for improvement in the epidemiological situation. He insisted on the need for positive discrimination in favor of the rural world and vulnerable students from families in precarious situations. He also specified that distance education will be relayed by television channels and platforms approved by the ministry, with the possibility of creating virtual classes.

Face-to-face teaching is based on several preventive measures, citing for example: Physical distancing and the use of hydro-alcoholic gel as well as the disinfection of teaching rooms and school transport vehicles which must not exceed 50% of their capacity. Inside vehicles, the mask is compulsory for all pupils, whatever their age; a temperature measurement is taken before getting into the vehicle. Likewise, wearing a mask is compulsory from the fifth year of primary school [12]. It is a question of doing better with constant means or even with fewer people [14].

It should be noted that the adoption of more accentuated and specific self-monitoring and prevention measures, at the level of the educational system, particularly in schools, is an absolute necessity for good quality education and a risk-free environment. This would help ensure the health safety of students and educational staff, and thus the safety of the Moroccan population. Accordingly, distinctive measures for continuous improvement, quality of service, and health safety assurance related to pandemics, particularly COVID-19 should be taken at several levels in the education system.

2. Current situation and proposal for ongoing prevention measures

The openness of education and training institutions is closely linked to the ability to up and implement adequate health measures. To deal with the coronavirus pandemic, the Moroccan education system is called upon to reinforce the preventive measures already in place by other, more precise solutions that protect against this risk. To support all the efforts made by the Ministry of National Education, we propose, as a non-exhaustive list, to focus on three main aspects. These are the legal aspect, the aspect related to the development of skills and pedagogical content, and the preventive aspect by proposing precautionary measures and internal audit tools based on a checklist adapted to the educational context. This tool would enable the field verification of compliance with health safety instructions in educational and training institutions, as well as the identification and evaluation of non-compliance, which would have to be corrected on site according to a corrective action plan, thus allowing continuous improvement in prevention against the virus.

2.1. Legal aspect

In Morocco, as in other countries, occupational health and safety includes occupational health and safety rules provided for in the Dahir of July 2, 1947 regulating labor, in the Decree of November 4, 1952 enacting a large number of general and safety measures applicable to all institutions in which commercial, industrial or liberal activities are carried out, or in various other decrees providing for special measures specific to certain professions.

In the civil service, there are legislative texts governing the health and safety of civil servants, mentioning as an example, chapter 45 of Dahir No. 1.58.008 of 4 Shaaban 1377 (February 24, 1958) concerning the general status of public employment, as amended and supplemented. According to law, the civil servant receives his/her salary during the period of his/her work stoppage until he/she is able to resume work or until his/her incapacity to work is finally recognized and he/she is referred for retirement. Also, the injured civil servant has the right to recover from the administration to which he/she belongs the replacement medical costs and expenses directly related to the accident, when claims for cost recovery are submitted with detailed invoices and fully revised in accordance with the requirements of Article 14 of Decree No. 2.99.1219 of 6 Safar 1421 (May 10, 2000) [15].

In the general status of the civil service, social progress has led the public authorities to try to ensure that public servants are protected against accidents on duty, and to set up a special “social security” regime, which is manifested by the institution of mutual insurance companies [15]. In addition, Mohammed VI Foundation for the Promotion of Social Works in Education and Training provides significant social support for the health of education officials [12].

In the same way, the health security of pupils and students is an interesting part of the health policy of the Ministry of National Education, which involves regular monitoring of their health profiles and the programming of health promotion actions at the level
of schools and educational institutions, as well as the reimbursement of school accidents, as stipulated by the Dahir bearing the reimbursement of school accidents of pupils in public schools of 16 Shaoul 1361 (October 26, 1942) as elaborated and amended, and the Convention (School Insurance) between the this Ministry and a private insurance company. Similarly, other actions aimed at promoting school health are taken by the Moroccan education system [12].

2.1.1. Measures for improvement

Updating and strengthening labor laws in Morocco’s civil service is highly important, particularly because the government has not taken a comprehensive approach to protecting civil servants from all occupational hazards [occupational accidents and diseases] and because occupational health and safety regulations are geared primarily toward the private sector.

For a modernized public administration based on a strategy to mobilize human resources, especially with this COVID-19 crisis, it is essential to pay sustained attention to working conditions and life in services, including education. Indeed, the search for performance in education and training remains conditioned by the improvement of the environment and ergonomic conditions of civil servants and the protection of occupational hazards. This is also required for the promotion of the health and safety of learners in the face of pandemics and health risks in schools.

2.2. Skills development aspect

The strengthening of teaching professions and the development of the skills of educational staff and Moroccan students in terms of health security and prevention of the risk of pandemics, a case of coronavirus today is an absolute necessity. It is, then, a matter of adopting key improvement measures.

2.2.1. Improvement Measures

- Integration of Quality, Health, Safety and Environment [QHSE] specialists in the educational system:

  The Strategic Vision of the 2015–2030 Reform of the Moroccan education system has insisted, among other things, on the renovation of teaching, training and management professions as a first prerequisite for improving quality. The aim is to redefine the functions and roles of these professions and the standards related to them in harmony with the new requirements of society and school and with current developments at the national and international levels. The vision also insists on the adequacy of training with the economic needs of the country and the new and future-oriented professions, as well as with the various requirements of socio-cultural integration and good economic integration [16].

  The major change imposed by the COVID-19 pandemic is in line with the orientations of the 2015–2030 strategic vision, which calls for an update of the jobs in the education system and the integration of new jobs according to needs. The Ministry of National Education has the jobs ensuring the improvement of safety and health in the administration and in schools. At the central level, there is a person in charge of monitoring health action and national prevention programs, the implementation of national guidelines and their follow-up in terms of health prevention in the school environment. At the regional level, a doctor is in charge of school health promotion, including the management and follow-up of school accident files. At the provincial level, the service in charge of school life ensures the organization and monitoring of health prevention in educational institutions and students’ families [12]. It also includes a range of preventive, educational and curative activities [consultation, vaccination, awareness raising, etc.] undertaken in educational institutions, and these activities are devoted to the school health team of the Ministry of Health, which works in collaboration with the relevant teams of the Ministry of National Education in a partnership framework.

  While these activities and jobs are very important, they require the strengthening of the capacities and skills of health security officials and the creation of specific risk management jobs in government and educational institutions. This would include, for example, the creation of the position of manager specializing in quality, health, safety and the environment. This manager can, absolutely, play a key role in the face of this pandemic and in the continuous improvement of health and safety in educational institutions, as well as the quality of work, learning and the environment. This person is trained in the analysis of risks of all kinds and in the management of crises and complicated situations with regard to the safety of people, property and the environment. In addition, he or she has an overall understanding of quality, health, safety and environmental regulations, enabling him or her to recommend more appropriate measures to be adopted by management [17]. This change is valid today, since the Moroccan Ministry of Education is already in the process of updating the Employment and Skills Reference System for the teaching and administrative staff. It is therefore a question of adapting the skills profile to the changing challenges of teaching, in order to ensure optimal resource utilization. The first author is responsible for updating the REC.

- Information and sensitization of the staff:

  The shift in activity to pandemic mode has become a reality for many organizations and institutions. Specific awareness-raising and information actions should be carried out to reinforce the actions already taken and ensure their continuity. The new organizational measures adopted should be transmitted to the staff concerned, such as changes in cleaning instructions for work premises or waste management. To do this, the QHSE manager could use a variety of internal communication tools, such as posters displaying the principles of prevention at the workstations, and an information campaign organized within the educational institution, using audiovisual means, etc. This would enable the administrative and teaching staff, as well as students, to fully adhere to the prevention measures.

- Basic and continuing education:

  Given the current situation, the training must be adjusted to the sanitary and/or epidemiological reality of the institution, province, region and country, to the working conditions concerned by such a risk and take into account the health problems likely to be encountered there. It is essential to accompany this reopening with an update of safety training, adapted to the post-pandemic context. Modified safety training should be provided to existing staff as well as to new arrivals [17]. Similarly, it is necessary to update the curricula and pedagogical content in educational institutions. The curricula and syllabi should be updated to reflect new health developments. Also, modules and continuing education sessions on quality and health risk analysis [risk assessment, risk management and communication, coronavirus risk analysis] should be incorporated into the training programs for trainee teachers and educational administrators in training, as well as for the supervisory and control staff. A module on institutional evaluation for student administrators has already been developed on quality and risk management in educational institutions, and the first author is a member of the module evaluation team. Similarly, managers of national education have benefited from a continuous training on risk management in the educational system through quality tools, from January to May 2019, as part of the EDUC II program, with the technical and financial support of the European Union (EU) [12].
The first author is a member of the technical team of the project and is an internal trainer in quality management and risk analysis in the school environment. Though these experiences are very interesting and pragmatic, they still need strengthening and generalization at all levels and continuous improvement, as well as the encouragement of scientific research to fight against the risks of pandemics, such as COVID-19. Indeed, many scientific bodies (including learned societies and publishers) are currently providing articles and research on Covid-19 that are available for free. A non-exhaustive list of these international organizations as well as an update on the various research carried out in this context are presented and discussed by Touzani. R. et al [18].

2.3. Preventive aspect

In this regard, the Ministry of National Education has adopted several preventive measures aimed at protecting the health of its staff and learners during this pandemic. It has also programmed preventive actions for the school year; these actions mainly concern potential exposure situations, through work organization, information and training measures for staff.

2.3.1. Improvement measures

For a good prevention of the risk of corona virus, certain preventive measures must be set up and adapted to the professional activity concerned. These measures will first be technical and collective, giving priority to individual protection measures, and should be linked to work organization, training and information on the risk of VID19 and the application of hygiene measures. Other measures of great importance are those related to health, such as ensuring medical surveillance of officials and students exposed to the risk and providing for their vaccination.

In the same way, the evaluation and prevention of biological risks [bacteria, viruses, etc.] must be integrated into an overall prevention approach. It specifies the existing preventive measures and the actions still to be taken to prevent the risks identified [19]. It makes it possible to draw up a specific prevention action plan for the educational institution and to ensure that risks are fully managed. The evaluation of the effectiveness of protective measures should combine biological, environmental and medical monitoring [20] of students and the administrative and teaching staff. Therefore, to support the preventive aspect of corona virus risk, it is worth adopting simplified and quantitative risk analysis tools and methods.

- Quantitative evaluations (metrology and bio metrology):

These methods, in particular, are based on the interpretation of quantitative results. Most often, they are based on the results of atmospheric samples (metrology) taking into account only the res-
piratory route and excluding risks related to skin contact and ingestion, which are likely to be significant. Hence the need to supplement them, where possible, with specific bio-metrology examinations, taking into account other routes of penetration.

- Simplified methods:

  In the absence of quantitative assessment tools, QHSE managers can rely on simplified methods to identify and assess biohazard in the school and administration. As examples, we can refer to the following methods:

- BAOBAB [Observation Base for Biological Agents] [21]: this database, proposed by the French National Institute for Research and Safety [INRS], is an aid to biological risk assessment. It contains summary sheets intended for a wide public. The database includes all the infectious biological agents classified by French regulations, providing regulatory and epidemiological information for each one. This approach leads to the identification of situations of potential exposure to a biological risk. This enables an action plan to be drawn up defining the appropriate prevention measures for the risks identified.

- Continuous monitoring of the preventive measures adopted by the educational institution through internal audits. This allows regular monitoring of the preventive actions taken and updating of the prevention program according to epidemiological, regulatory and technological developments related to COVID-19 in Morocco. It also allows an update of epidemiological data in the institution and in the region.

To conduct these audits, we propose, below, a checklist (See following table) adapted to the specificities of educational and training institutions. It refers to the recommendations of the Moroccan authorities for the fight against the virus, those of the Ministry of Economy, Finance and Administrative Reform [22] and those of the Ministry of National Education, Vocational Training, Higher Education and Scientific Research [12]. Moreover, checklists recently proposed to the Moroccan industrial community by the General Confederation of Enterprises [23] have also served as a model for the elaboration of this guide. It allows us to assess the state of preventive measures to fight against the risk of contamination and spread of the virus. Therefore, this guide, which is intended for schools, describes the approach to auditing the health plan to be carried out before and during the resumption of school activities. It specifies all the topics to be addressed through a series of audits to be completed in order to draw up summary and associated recommendations. This audit should be periodic, daily if necessary, and depending on the health and epidemiological status. It can be carried out by a person in charge trained in this area; this can be the school director, teachers, general supervisor, etc., and/or the QHSE manager, if necessary, who could lead this process efficiently and steer it at the provincial level. Prior to the application of this audit guide, preparatory measures must be implemented such as awareness-raising actions via electronic means. Brochures with explicit illustrations on COVID-19 and hygiene means should be distributed to students and educational staff upon their arrival at school for the first time after confinement.

Finally, this checklist would initially allow a primary assessment of the state of hygiene and the application of the requirements in force, but it is subsequently intended to be a tool for monitoring and ensuring control of the conditions of protection against COVID-19 via a rating. This rating would allow managers to implement corrective actions and continuous improvement of protection measures against the virus (See following Table 1).

3. Conclusion

The analysis of the health risk related to COVID-19 in educational and training institutions in Morocco was based on a proactive and preventive strategy to deal with this pandemic. It is imperative to adopt additional measures for a good control of the risk. Within this framework, we have proposed measures for continuous improvement and prevention in three areas: updating the legal context, developing human resource skills and educational content in health security, and improving collective and individual prevention actions. To combat the risk of COVID-19 in educational and training institutions, we have also proposed the adoption of a simple, pragmatic and well-targeted checklist for regular and effective monitoring of the health and preventive status in these institutions.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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