

Paper-based record file of patients could be a fomite for SARS-CoV-2 transmission in Hospital Setting of Low and Middle Income Countries (LMICs)

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ABSTRACT

In the wake of the present COVID-19 pandemic, there has been a much needed increase in awareness among the general public of hand washing, social distancing, and observing cough and sneeze etiquette, and even disinfecting other fomites. We miss to focus on the paper documents, which has been the method and in some low and middle economy countries (LMICs), 'the only method' of patients' documentation. Worthy of note is that the virus can survive on paper and on cardboard for up to 3 to 24 hours. Most of the hospitals in LMICs are using paper to keep patient records, owing to poor funding and lack of proper databases. Each record file is exchanged many times between health care workers, patient's caretakers as well as various administrative people in the hospital; also it travels to different wards or rooms for various purposes along with patients during the course of medical check-up and treatment. The virus could be transmitted during this process. At present, very little is known regarding surface distribution of SARS-CoV-2 in hospitals of LMICs which rely on paper documentation of patient. This paper raises the question regarding the risk of using paper based record keeping inside hospitals during the COVID-19 pandemic.

Keywords: COVID-19, Pandemic, Transmission, Fomite, Paper, Health care

INTRODUCTION

Corona virus disease (COVID-19) is an infectious disease caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) (CDC, 2020). As at April 16th, 2020, the number of cases globally was 2,107,433 while in low middle income countries (LMICs) (according to Worldbank, 2020), the distribution of cases is presented in Figure 1. In total, there are 51,745 cases which contributed only about 2.45% of the total cases globally, far less than high income countries (contributing > 50 %). The low cases recorded are mainly due to their poor health care system, thus leading low number of testing. The highest LMIC case is in India (12,759) and least recorded is in Papua New Guinea (2). With the rapid spread around the world, the virus caused a devastating consequence on patients, healthcare workers, health systems and economies. The extremely fast transmission capability of SARS-CoV-2 has aroused concern about its various transmission routes. Symptomatic, pre-symptomatic and asymptomatic routes of transmission have been found in COVID-19 from the patient to the people (Zhang, 2020). In hospital settings, highest rate of viral particles were found on computer mouse, trash cans, sickbed handrails and doorknobs (Guo, 2020).

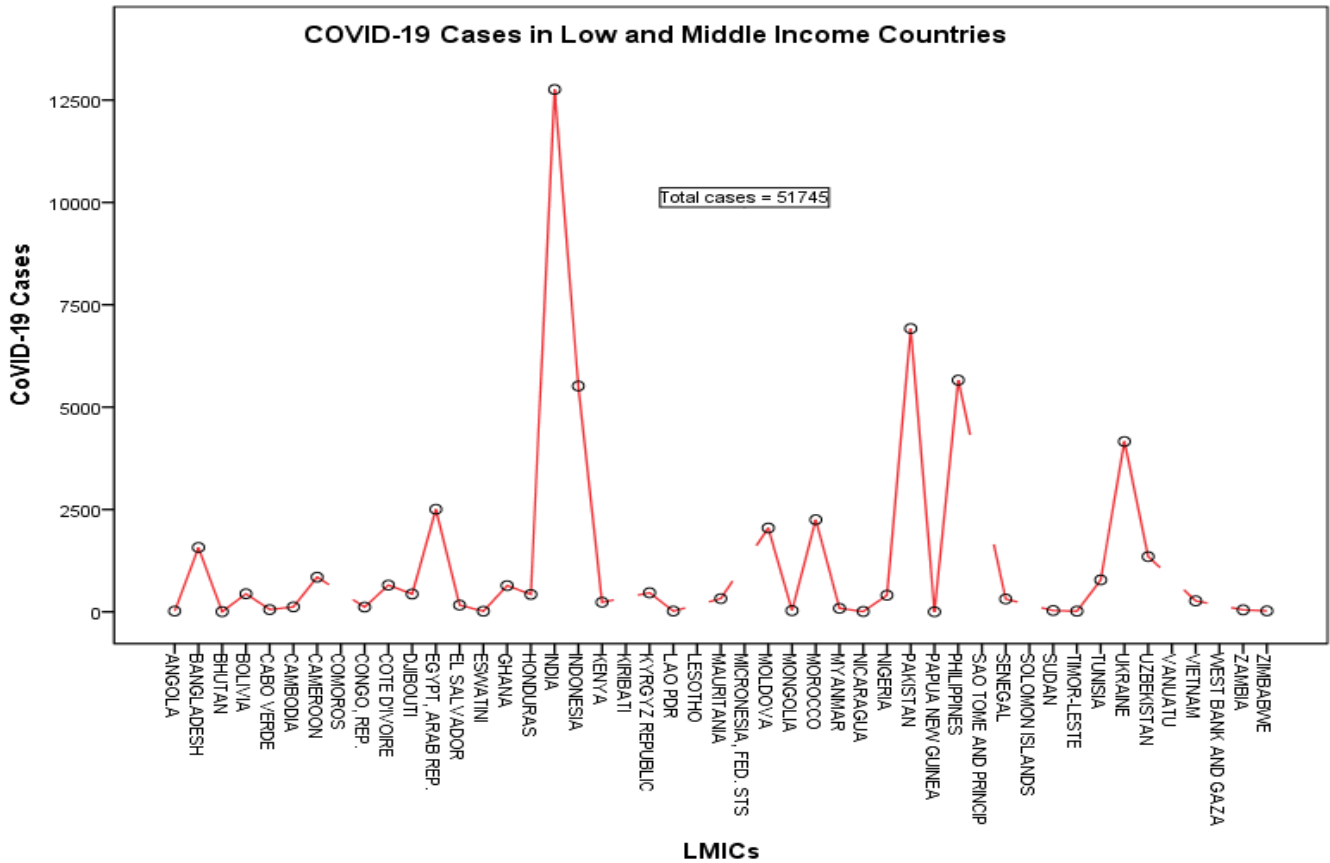
Since WHO declared SARS-CoV-2 as global pandemic, measures for protection and prevention against COVID-19 has been major concern. While the world has focused on physical protection equipment, cleaning hands, social distancing (Enyoh, 2020), even disinfecting other fomites, we miss to focus on the paper documents, which has been the method and in some low and middle

economy countries, 'the only method' of patients documentation. Most of the hospitals in low and middle income countries are using paper to keep patient records, owing to poor funding and lack of proper databases. Each record file is exchanged many times between health care workers, patient's caretakers as well as various administrative people in the hospital; also it travels to different wards or rooms for various purposes along with patients during the course of medical check-up and treatment.

At present, very little is known regarding surface distribution of SARS-CoV-2 in hospitals of low and middle income countries. Most of the hospital surfaces are universally similar but they mostly vary on methods of record keeping. Most of the hospitals in LMICs mostly use paper based record keeping. Here we shed light on the possibility of transmitting SARS-CoV-2 through paper inside hospitals that is frequently assessed by medical staff, patient's caretaker. Worthy of note is that the virus can survive on paper for up to 3 hours.

This paper raises the question regarding the risk of using paper based record keeping inside hospitals during the COVID-19 pandemic. Similarly, it also put forward the necessity of conducting research immediately in LIMICs regarding the role of paper in transmitting SARS-CoV-2 among the health care providers as well as among caretakers. Health care provide those who are in direct contact with the positive cases are using PPE but rest of the medical staff and administrative staff don't use it neither do they have proper professional training.

Figure 1: COVID-19 cases in LMICs countries as at April 16th, 2020 (Data source: Worldometer, 2020).



METHODOLOGY

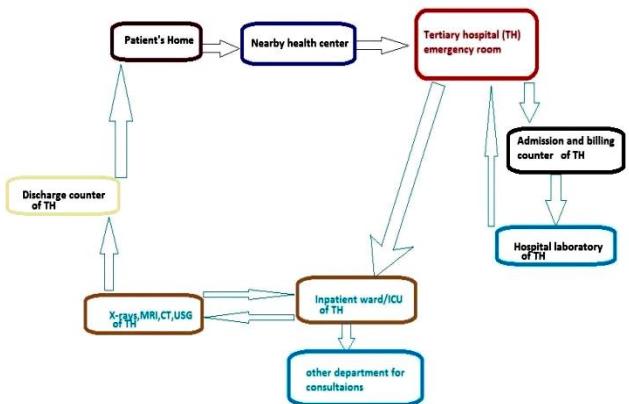
The major source of data and information were mainly from personal experience and also from the web while statistical bulletins, blogs, journals articles and conference/workshop/seminar papers that were published online were used for sourcing information. Web of Science, Pubmed and Google Scholar were three major scientific databases used to search for related articles.

RESULTS AND DISCUSSION

Paper and SARS-CoV-2: Recent reports have shown that SARS-CoV-2 can survive on the surface of paper for up to 3 hours and on cardboard type of paper up to 24 hours (Neeltje et. al., 2020). Neeltje et. al., (2020) in their study applied SARS-CoV-2 nCoV-WA1-2020 (MN985325.1) strain on paper based surface. Although the virus titer was greatly reduced with time, the virus was viable up to 24 hours. Therefore, paper fomite transmission of SARS-CoV-2 is plausible. However, the survival of this novel virus on plastic surface is controlled by environmental factors (Enyoh et. al., 2020; 2020a) e.g relative humidity, temperature etc. Half-life of SARS-CoV-2 is longer than SARS-CoV-1 on the cardboard. Difference in half life on of these two viruses were small on other surfaces except for cardboard (Van, 2020).

Transmission of paper-based record file: In order to illustrate the transmission mode, we take an example of a patient and try to map all the possible places he had to go for his treatment and along the course how his record files are maintained (Figure 2). This example will represent majority of the patients and the methods of the record keeping in the process of their treatment.

Figure 2: All possible places where the patient's record file or related paper documents travel (TH: Tertiary Hospital)



According to the patient whom we have considered to follow for an example, he had some health issues, for which he visited the local primary health center (PHC). He was attended by the health assistant and his history was taken on a sheet of paper. After doing the examinations and investigations available at the PHC, he was referred to tertiary center for further management. The refer note, a paper document, was carried by him to the tertiary center. He even told the papers were handled by the ambulance driver and his family attendants. After reaching the emergency room of the tertiary center, the medical officer (junior doctor) and the other medical staffs attended him. The history was again noted on a different paper. A file was made that had referral note from PHC, history sheet of the hospital and other relevant documents). The then paper circulated along the ER desk and bedside tables via nurses, HA and interns. Even the investigations and billing orders were noted on paper and attached to his file. Medicine slips, lab reports were handed to his care takers in the form of paper documentation. X-ray room, ultrasonography (USG) room and laboratories got access to his paper files.

After all the reports arrived, he was advised to get admitted to ICU. There the files containing papers from different sources travelled through a series of nurses, medical students, medical officers, residents and consultants. From the progress notes, vitals-charting, dietary-charting to drug cardex, every data were documented on papers which piled up every single day. After 5 days of ICU stay, he was shifted to the ward, accompanied by the ward boy with the files. Every day, the files circulated through a number of hands during rounds and medications. Consultation to other department was advised which invited inter- departmental infection exposure. Further investigations were sent, which circulated again to radiology rooms and laboratories. It travelled medical stores and sometimes some papers were even carried to the canteen by the attendants. After 3 days of ward stay, he was discharged from the tertiary center. He received a discharge note along with his old investigation reports and medication advice in the form of paper documentation. The same reached home, after visiting medical stores and vehicles on the way.

Implication of paper based record file as potential transmission route of SARS-CoV-2: Virus emitted from patients fall down on different surfaces. They reside there for variable period of time. The particles can be re-suspended in the air along with dust particles if the surfaces were not cleaned properly. Thus, putting others at risk for inhalation of particles (Vianello, 2019). Especially, paper-based record files were never decontaminated as compared to others surfaces. Paper documentation during the pandemic could be a pathway for transmission of SARS-CoV-2 in hospital setting of LMICs as the documents move from person to person. A paper document carrying the virus can be negligently passed through the process and an unknown person could come into contact with virus by collecting or holding the paper. Therefore, the virus could be transmitted between health workers and also to patient in the hospital. This pathway should be studied for clear understanding.

CONCLUSION

From this we can summarize that the whole journey of patient's included paper documentation, which can act as a fomite for transmission of SARS-CoV-2. It is always the little things that are missed, which eventually end up being major culprit for disease transmission. Especially in low and middle income countries, these play a major role. It has been found that SARS-CoV-2 survives up to 24 hours on cardboard, 2 to 3 days on plastic and stainless-steel surfaces (Van Doremalen et al., 2020). Paper based file are very difficult to disinfect compared to digital tools. Therefore, safety practice in hospitals should be reevaluated during dealing with COVID-19 pandemic. Maybe it's time to go paperless and adopt digital tools for record keeping inside hospitals as such tools can be easily disinfected and would eventually drop the incidence of disease transmission through fomite.

Conflicts of interests: No conflicts of interest

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