Ideas and the origin of evidence during the COVID-19 pandemic

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COVID-19 has exposed the limits of evidence-based medicine. We are faced with a new emergency, for which no evidence exists to guide us. So then how do we deal with the pressing need for new information?

This question highlights the three types of research (and researchers) that are urgently needed. The first is the inventor and innovator: these researchers are the ‘Heston Blumenthals’ of emergency medicine. They generate new ideas. They create a new concept or an idea that can solve a particular problem. They are responsible for paradigm shifts and new ways of thinking. The second researcher is the applied scientist. These researchers take an idea and improve it or make it more practical. The applied scientist may synthesise two ideas and create a new model or idea. The final researcher is the sceptic. The sceptic researchers are the critics who see the problems in the new ideas or models. They may attempt to test the novel ideas and ensure that they are better than previously used methodologies. In order for medical science to advance there needs to be a balance between these three types of research. If there are no new ideas, there can be no advancement. If there is no optimisation of ideas, advancement is too slow. If there is too much scepticism, something that appears to be an advancement may lead to patient harm. On the other hand, too much scepticism and not enough new thinking leads to stagnation and ultimately, also to patient harm.

Therefore, we need to ‘act swiftly but carefully, with caution and reason’. We need a rapid cycling of ideas, testing, critical review of these ideas then further optimisation. The novel concepts and ideas of the inventors need to be widely distributed so that the applied scientists can improve them, so that appropriate research can be performed, so that the sceptics can carefully and positively impact the next cycle of progression. We need the imagination, innovative, knowledge-generating researchers, the optimisers and the careful validators to expertly craft appropriate, well-designed and adequately powered studies to rapidly—and carefully—advance our knowledge.

The COVID-19 pandemic has also revealed the strengths and limitations of the rapid dissemination of information in the era of social media and rapid online publication by journals. Mere ideas, no matter how attractive and compelling they appear, cannot and should not be adopted without appropriate investigation and research as well as sufficient scepticism. These ideas, when tested objectively in the real world, may actually result in patient harm because of factors not immediately evident (hydroxyethyl starch is a good example). These factors may be related to the user or the patient. There is therefore still the need to search for evidence-based medicine. We must be ready to abandon ideas or innovations instantly even if they appeared to be exceptional ideas. A telling example of this is the prolonged and inappropriate utilisation of cricoid pressure. This demonstrates how a practice can be adopted with an insufficient degree of supporting evidence. Never again should we allow something to become a standard of care without sufficient evidence (some aspects of stroke care would fall into this category as well).

In this edition of the journal, there are two studies reporting modifications of innovative methods to reduce the risk of harm to healthcare workers during aerosolising procedures in patients with COVID-19. The articles by Jazuli and Hsu describe these devices or techniques. These new ones need to be tested in appropriate studies to confirm that they are helpful and not harmful. Publishing these articles increases the potential pool of researchers that can work on these studies. It is important to maintain the mindset that, until the use of these methodologies has been proved to be beneficial, we should be ready to abandon them. We should also not become too comfortable with ideas, such as these, until we have positive evidence supporting their use.

There are some limitations to these studies that need to be discussed. First, do we know if the aerosol boxes that are described are safe for patients? While no data have been presented in these papers, there is some preliminary data from other studies showing that aerosol boxes make intubation slower and more difficult. In an already-compromised patient this could potentially be the difference between a good and a poor outcome. Additional unknown factors include whether the devices could be used equally by doctors of different heights and strengths. The benefits of the devices would need to substantially outweigh the risks in order to justify their use in clinical practice. This is certainly something that requires urgent further investigation in critically ill patients with COVID-19, before committing unthinkingly to new devices and procedures. In addition, other factors such as difficulties in cleaning the devices and any potential risks of transmitting infection to the patients and users would need to be investigated. There may also be additional safety concerns that emerge with further evaluation.

Second, are these devices effective? What do they accomplish that appropriate personal protective equipment (PPE) does not? In other words, are they actually required if we have the correct PPE? None of these questions were addressed in the papers and remain unanswered. It is clear that the devices change the distribution or enhance the clearance of aerosols while in place (vaping aerosols do have an overlap in particle size with bioaerosols so this is probably a valid surrogate). However, any potential benefit of the additional protection over and above standard or enhanced PPE is not known, whether through reduction of droplet contamination or aerosolised particles.

So does the benefit of using such devices outweigh the risk to the patient? This has not been answered in any way and significant concerns exist about the validity of these systems. Nonetheless, they remain an important starting point to rapidly generate new ideas and starting points for further studies. Ideas that are of uncertain value may spawn further ideas of unquestionable value. In the interim, given our mandate to ‘first do no harm’, these devices should not be widely adopted without further critical review and validating research with clinically meaningful endpoints.

In the end, whenever there is great need, the response needs to be greater. A coordinated, cooperative wide-scale increase in research is needed in which we never lose sight of the epitome of evidence-based medicine.

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Commentary

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