

Novel disinfecting spittoons during COVID-19

Mubarak Muhamed Khan , Sapna Ramkrishna Parab 

Ear Nose Throat, Sushrut ENT Hospital and Dr Khan's Research Centre, Talegaon Dabhade, Pune, Maharashtra, India

Correspondence to

Dr Sapna Ramkrishna Parab, Ear Nose Throat, Sushrut ENT Hospital and Dr Khan's Research Centre, Talegaon Dabhade, Pune 410507, Maharashtra, India; drsapnaparab@gmail.com

Received 8 July 2020
Accepted 28 December 2020

BACKGROUND

Spittoons were developed centuries ago as receptacles for spitting, similar to ashtrays for saliva. They were meant for men to dispose their chewing tobacco and the abundant phlegm that accompanied the habit. Convenience turned to concern in the late 19th century when a global tuberculosis (TB) epidemic took hold and scientists realised that spittoons might actually spread diseases. After one exchange at the 1905 International Tuberculosis Congress in Paris, the head doctor of the city's postal system ordered all spittoons removed from city post offices. In the USA, public health departments launched antisputting campaigns to stop the spread of TB—and in some states made spitting illegal, as it still is. By the mid-20th century, spittoons were gone from most public spaces in the USA.¹

Similarly, kidney trays have been used in hospitals for collection of coughed sputum of admitted patients. However, these do not disinfect the collected sputum and naso-oral secretions which may be potential sources of infections during handling by healthcare workers.

INTRODUCTION

There are a total of 267 million tobacco users in India.² Chewing and spitting have been a tradition in India and in South East Asian low-income countries. In India, it is a tradition to offer fennel seeds and sugar crystals to chew after a meal, which act as mouth fresheners and also help digestion. On the other hand, chewing smokeless tobacco products, *paan masala* and *areca nut (supari)*, increases the production of saliva followed by a very strong urge to spit. Spitting in public places is now a greater health menace as it could enhance the spread of the COVID-19 virus. However, for many people, this habit of spitting in public places does not go off so easily. Despite knowing that SARS CoV-2 could spread through the droplets and aerosols of

sputum and saliva, many people are still seen spitting in public places without caring about health and safety of others.

WHAT IS THE INNOVATION?

The novel spittoon concept is based on traditional spittoons which are used for spitting into, but these are not disinfecting the sputum and hence has been considered as a potential source of infection. Sodium hypochlorite^{3–9} is a well-known disinfectant and sand and brick have been used for removal of pollutants in yellow water.¹⁰ Based on the previous applications and studies, our disinfecting spittoon is a simple form of a bucket containing red bricks at the base and sand, and then soaked with ample amount of 1% sodium hypochlorite so as to keep the sand moist. Sodium hypochlorite achieves disinfection, whereas red bricks and sand help in sedimenting the sputum and secretions, as well as preventing the decay of sodium hypochlorite (NaOCl), which gets soaked into the sodium hypochlorite. In the absence of sand and brick, the disinfection with sodium hypochlorite would be equally effective but would have given rise to splashing of the contents on introduction of every spitting contents. It is provided with a lid which opens and closes with foot press and release, respectively. Such a spittoon will disinfect the sputum (from symptomatic patients as well as asymptomatic carriers and patients with COVID-19) and hence will not be a potential source of infection to the health workers dealing with the waste. There is no need to process it as it gets disinfected simultaneously.

METHOD OF PREPARATION OF SPITTOON

We have a simple yet effective solution for disinfecting the sputum (figures 1 and 2):



© Author(s) (or their employer(s)) 2021. No commercial re-use. See rights and permissions. Published by BMJ.

To cite: Khan MM, Parab SR. *BMJ Innov* Epub ahead of print: [please include Day Month Year]. doi:10.1136/bmjinnov-2020-000513



Figure 1 Three-dimensional image of simple bucket with foot pad.

1. Take a 10L bucket with a foot pad opening half the lid of the bucket on foot press (must not have a leak).
2. Fill half of it with crushed red bricks.
3. Over this layer, put a one-fourth bucket of good quality coarse sand.
4. Now pour an adequate amount of 1% sodium hypochlorite solution (NaOCl) (depending on the size of the bucket, the quantity of NaOCl will vary. It must just make sand moist.)
5. Similarly, such small 1 L or 500 mL plastic bowls can be created for bedside spitting for bedridden patients (instead of kidney trays)
6. Keep such buckets or bowls in toilets and write in big letters: 'All must spit in this bowl only'.
7. Create such disinfecting spittoons/buckets and keep in hospitals. All hospital and laboratory owners can get rid of the infected sputum by using this technique.

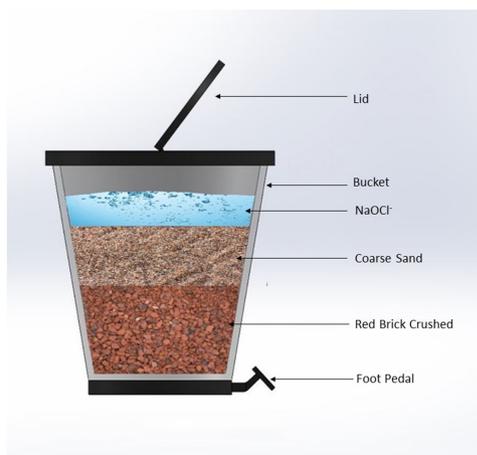


Figure 2 Design and concept of disinfecting spittoon.

8. Instruct the staff to just fill sodium hypochlorite solution (NaOCl) into the bucket every 8 hours, just sufficient to make sand wet.

WHAT ARE THE KEY ADVANTAGES OVER THE EXISTING ONES?

1. Collects the sputum.
2. Disinfects the collected sputum.
3. Has a lid with a foot press for opening and closing, which minimises the droplet exposure.
4. Easy to prepare.
5. Safe to dispose as no longer health hazard.
6. Extremely economical.
7. When used in the ICU wards of hospitals, it will help to take care of the disinfection of the potentially infected sputum.

HOW WILL IT AFFECT HEALTHCARE?

Such disinfecting spittoons should be placed in all shopping malls, hotels, restaurants, cinema halls, parks, toilets, shops and other public places. In hospitals, it should be placed in the ICU, postoperative wards, respiratory wards, TB wards and Outpatient Department. Such disinfecting spittoons, when placed at multiple sites in public places, will ensure that there is less spread of infections and will also ensure the safety of healthcare workers and the community as a whole. During the COVID-19 pandemic, spitting in public places may in fact accelerate the spread of the infection.

IS THERE EVIDENCE SUPPORTING THIS?

Sodium hypochlorite is a known disinfectant with action against various micro-organisms, including viruses and mycobacteria.³ They have a broad spectrum of antimicrobial activity (ie, bactericidal, virucidal, fungicidal, mycobactericidal and sporicidal); do not leave toxic residues; are unaffected by water hardness; are inexpensive and fast-acting⁴⁻⁶; remove dried or fixed organisms and biofilms from surfaces⁷; and have a low incidence of serious toxicity.

WHAT ARE THE BARRIERS IN IMPLEMENTING?

It requires a general consensus of the government office bearers to make law enforcing rules and placement of such in public places. On a smaller but significant scale, it can be implemented by all hospitals and ICUs where the COVID-19 and respiratory status of the patients is not known.

IN WHAT TIME FRAME CAN THIS INNOVATION BE APPLIED ROUTINELY?

It is easy to prepare and is not time-consuming. It can be done with immediate effect.

LIMITATIONS

It does not tackle airborne spread, which is the major transmission route.

Twitter Mubarak Muhamed Khan @twitter.com/drmubarakkhan

Acknowledgements We express our gratitude to Mr Shubhankar Gouraj, Fifth-year Bioengineering student of MIT School of Bioengineering Sciences & Research, Rajbaug, Loni Kalbhor, Pune, for digital conversion of the Concept Sketch of Novel Disinfecting Spittoon. We also acknowledge Dr Shirin M. Khan for her contribution in proof reading of the manuscript and for the technical support.

Contributors MMK: idea, concept and design of the study, and drafting of the manuscript; SRP: concept and drafting of the manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

This article is made freely available for use in accordance with BMJ's website terms and conditions for the duration of the covid-19 pandemic or until otherwise determined by BMJ. You may use, download and print the article for any lawful, non-commercial purpose (including text and data mining) provided that all copyright notices and trade marks are retained.

ORCID iDs

Mubarak Muhamed Khan <http://orcid.org/0000-0002-8405-4406>
Sapna Ramkrishna Parab <http://orcid.org/0000-0002-8058-7117>

REFERENCES

- 1 From the obscure to the everyday, these objects tell the story. Available: <https://www.globalhealthnow.org/object/spittoon>

- 2 Asma S, Mackay J, Song SY, *et al.* *The GATS atlas*. 2015. Atlanta, GA: CDC Foundation, 2018.
- 3 Chemical Disinfectants. Guideline for disinfection and sterilization in healthcare facilities (2008). Available: <https://www.cdc.gov/infectioncontrol/guidelines/disinfection/disinfection-methods/chemical.html#Chlorine>
- 4 Cavalli A, Marinaro M, Desario C, *et al.* In vitro virucidal activity of sodium hypochlorite against canine parvovirus type 2. *Epidemiol Infect* 2018;146:2010–3.
- 5 Rutala WA, Peacock JE, Gergen MF, *et al.* Efficacy of hospital germicides against adenovirus 8, a common cause of epidemic keratoconjunctivitis in health care facilities. *Antimicrob Agents Chemother* 2006;50:1419–24.
- 6 Rutala WA, Weber DJ. Uses of inorganic hypochlorite (bleach) in health-care facilities. *Clin Microbiol Rev* 1997;10:597–610.
- 7 Rutala WA, Weber DJ. Disinfection and sterilization in health care facilities: an overview and current issues. *Infect Dis Clin North Am* 2016;30:609–37.
- 8 Merritt K, Hitchins VM, Brown SA. Safety and cleaning of medical materials and devices. *J Biomed Mater Res* 2000;53:131–6.
- 9 Khan MM, Parab SR. Safety Guidelines for Sterility of Face Shields During COVID 19 Pandemic. *Indian J Otolaryngol Head Neck Surg*.
- 10 Pradeep E, Premachandra B, Kumara W. Study on the efficiency of removing some environmental pollutants in yellow water by using sand and brick powder, 2012. Available: <http://dl.lib.mrt.ac.lk/handle/123/9059>