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Mini Review

Management of masks disposal in COVID-19 era

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ABSTRACT

Management of masks disposal in the COVID-19 era is a highly ignored segment in public health management and clinical care, which might be due to the unexpected emergence of pandemic and unpreparedness of the system. Meanwhile with over time newer information has evolved, now authorities should focus on adequate management of the masks wastes, especially at community levels. Some of the hurdles and suggestions are discussed here in this article.

1. Introduction

In the absence of any specific treatment for novel coronavirus (SARS-CoV-2), only three strategies have been found most effective including, Proper use of face masks, maintain a distance of 6 feet and frequent hand wash/sanitizer use. Avoid the 3Cs: spaces that are closed, crowded or involve close contact.[1] Among these the face masks emerged as the most important weapon in currant era. In the ongoing pandemic billions of peoples in India and globally are using masks every day, but safe disposal practices are not in place especially in the community, household use settings for home isolations in case of mild symptomatic patients and for prevention of spread in community.

1.1. Types of masks[1]

Two types of masks categories can be broadly classified as, biodegradable vs. Non-biodegradable, in perspective of their disposal.[1]

1.2. Biodegradable masks

Non-medical masks, also called fiber masks which are comely used in community level, for prevention of spread of infection, decrease infection to other. Fiber masks are washable, are mainly made of cotton fabrics, but other biodegradable materials can be used like- natural filers, plastic substitute, rice husk, natural rubber, bamboo etc.

1.3. Non-Biodegradable masks

These include surgical masks, N95 masks, KN 95 masks and other similar medical masks. They are made of plastics, mainly polypropylene, which are non-biodegradable, and takes >100 years to degrade and therefore important source of environmental pollution.

1.4. Effect on human and animal life of improper management of the mask disposal[2]

1.4.1. Humans

Improper disposal of the used masks , can put first line workers, like cleaners, garbage collector etc. at risk of COVID-19, infections, along with other infections

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due to soiled or infected masks from the patients or asymptomatic infected persons. Droplets can linger on the masks for longer period of time and saliva related spread of tuberculosis, hepatitis etc. can occur. Although advisory to keep mask in paper bag for 3 days then to discard as a general house waste, are in place but still on paper, but they are hardly implemented. Moreover these advisory of mask disposal as a general waste cannot be practice for plastic masks, used by infected patients at home isolation, due they are not biodegradable and needs different method of their sorting, segregation, storage and disposable.

1.4.2. Animal life

An improperly disposed plastic masks, puts all aspects biological life's in danger, directly or indirectly, earlier and remote effects as well. If plastic masks are improperly disposed of, then it can go to river, ponds, then untimely to ground water or ocean. Plastics changes to micro-particulate matter, then to Nano- particle and ultimately affects food chain, as they polymerizes on consumption into the plant life (plants, fruits, vegetables from the ground waters), larger surface animals like cattle's – consumes masks which are direct source of infection, intestinal obstruction, and malnutrition and food chain toxicity indirectly by incorporation into the tissues in animal flesh or meat, in marine life (polluted ocean due to masks, affects fish, turtles or other marine animals, can cause spread of infection directly, on consumption can cause intestinal obstruction, malnutrition due nonnutritive status of the masks, and toxic chemicals can be incorporated into the tissues over time, via indirect mechanisms.

1.5. How to properly handle and dispose of masks – while using and after use[3–6]

1. *Medical masks*- like N95-masks (filter non-oil based particles, NIOSH certified), surgical masks should be used by medical or health care professionals only, and not meant for public use. They are meant for single use and not reusable, but due to scarcity of masks, advisory to reuse after the sanitization or putting in air for few days, then reuse, are there, which are not ideal although.
2. *N95/KN95*- masks should be completely fitted to the face, without any air leak. Masks with filters are not recommended as they can cause spread infection to others, from an infected person, they provide protection to the person who is using it but not protect the community. One has to put an additional surgical mask if using filter mask.
3. *Surgical masks/ 3 layered mask* – consists of 3 layers, inner layer (soft filer), middle layer (melt blown – which is main filtering layer) and outer layer which is water resistant layer.
4. *Cloth masks*- Similarly Fiber mask or cloth mask which are recommended for general public use, are also 3 layered mask, therefore for homemade masks also three layers needed, this should be certified by local authorities. One can use HEPA filter in cloth masks as a middle layer. Sponge masks are not recommended. Cloth masks are washable and reusable, unless they are damaged or visibly soiled.
5. *Possible side effects of mask uses:*[7,8] Most common side effects is improper uses of masks and feels of false sense of security, putting other at risk. Don't forget the basics of good hygiene even after wearing the masks. Frequent manipulation of mask for adjusting, itching, etc. can cause self-contamination. Headache can occur with surgical/N95 masks, not with cloth masks, due to co2 accumulation. Breathability for a fiber/ cloth mask is 100 Pa and for surgical masks it's around 50 Pa. Communication is also disturbed with mask use. There are other minor multiple issues with mask uses, which can be easily rectified by the education leaflet provided with the mask or other simplified ways of health education.

2. Discussion On How to Dispose the Masks,[9–11] Includes Short Term Actions along With long Term Plans as Follows:

2.1. Short term actions

1. (a) Keep records: Keep records of sale of masks at level of chemist shop or other places where masks are sold. Selling authorities should note the address of mask user, and inform the local authorities about the requirement of waste collection from that house or area, as a separated waste, in yellow bin, other than the house waste, for proper sorting / collection, segregation and ultimately separated storage then a household waste. Alternatively a separated yellow lidded bin, can be placed outside the chemist shop, so that on can dispose of used mask into that. If at all, this was not done at first step, then one can educate the waste handlers or waste collector at landfill area, to separate these waste, before final incineration or landfill.

   (b) 2S3 method, sorting (collection), segregation, and storage**:** Sorting, a proper collection is the first and most important step as discussed above. Then segregation and storage done. Biological wastes should be kept in an enclosed containment, not in open landfill and must be incinerated as per recommendations of biological waste management, to prevent air, land and water pollution. Sorting should be started from the site of generation of waste.

(c) Medical masks, including N95, triple layer masks, from Isolation Wards, Test Centres and Laboratories: Discard the used masks into separate 'yellow colour coded plastic bags' .They are then segregated by handing over to the waste collector engaged in the common biomedical waste treatment facility (CBWTF) at the site of generation of waste and should be storage in the contained environment and the safely incinerated as per guidelines of biological waste management.

(d) Fibre masks / cloth masks or other masks from Quarantined homes or other households: Keep the used masks in a paper bag for at least 72 hours prior to their disposal as general waste. This must be done as per Solid Waste Management Rules, 2016. As per the Union Ministry of Health and Family Welfare, disinfecting solutions like ordinary bleach solution (five per cent) or sodium hypo-chlorite solution (one per cent) can be used before keeping into paper bag to decrease immediate the risk of infection spread. This waste must be treated as domestic hazardous waste and should be incinerated by GCC and plastic masks/medical masks if used in home , should be separately discarded into yellow bin , as there methods of incineration is different from cloth masks.

(e) From containment zones / hotspots and sealed regions (i.e. red and orange zones): Used masks among others (gloves, aprons, head cover etc.) must be disposed and collected separately by the waste collectors and needs to be incinerated in enclosed environment or buried at a depth of at least 10 feet in order to prevent infection. Also, the sanitation staff have to be advised not to mix waste from these hotspots / containment and sealed zones with the household waste from other localities.

2.2. Long term actions

Education about the proper management of the used masks. To set the accountability at the population level and administrative level and impose fine of improper handling. Biomedical waste management rules are in place but hardly implemented. SW Rules 2016 & BMWM Rules 2016, 2018, 2019 are some examples of the rules in place. As per CPCB BMWM guidelines for COVID, 2020, Guidelines for management of waste generated during diagnostics and treatment of COVID-19 suspected/confirmed patients, are required to be followed by stakeholders in addition to existing practices under BMW Management Rules, 2016

3. Conclusion and Way Forward

3.1. Possible solutions of the proper mask disposal at community level

1. Waste collection should be expanded.
2. Recycling and incineration should be controlled, to avoid air, land and water pollution.
3. Global and local cooperation with NGO and government.
4. Making habit to purchase reusable masks.
5. Promote the biodegradable materials to make masks," vocal for local ", use- natural fibers, plastic substitutes, rice husk bamboo etc. as material for making masks.
6. N95 and surgical masks (plastic masks) should be restricted to health care uses, and therefore proper disposal.

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5. Conflict of Interest

None.

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