

## MORAL DILEMMAS IN PANDEMICS



How do I save the world?

I will not stop helping those I am sworn to help. It is what I do, central to how I exist in this world.

I want the people I care about in this world to live. I will admit freely that I will choose one person over another person based on my moral code. I will choose one animal over another person based on that same moral code. But I will not give in easily to these moral dilemmas and will fight that choice with vigor.

I think society needs to survive too, in ways that are less dramatic than “life and death”. Our happiness must survive. Our livelihoods must survive. Our health must survive. It IS complex and so grey as to be ominous!

I need to build on my creed of self-reliance; I have not seen good facts, rational analysis sufficient to direct my choices and actions. I am pointing my finger in the direction of some top public servants who did not abide their job descriptions, but that ain't gonna help me now.

These are statements of my thoughts today, 21 Mar 2020. Daily choices are not black and white for me right now. To gain control, I am scienceing-the-hell out of topics. And I am admitting what I am thinking, right onto paper (ok, computer); no unspoken elephants in my room.

Surgical masks were my moral dilemma that I attacked today. Below is my summary and my plan...for now.

Lara Marie Rasmussen, DVM, MS  
Diplomate, American College of Veterinary Surgeons  
Direct Veterinary Surgery, LLC  
[www.directvetsurg.com](http://www.directvetsurg.com)  
[directvetsurg@gmail.com](mailto:directvetsurg@gmail.com)



## FACE MASK USE: SUMMARY OF TWO ISSUES FOR VETERINARY PROFESSIONALS, CURRENT SCIENCE (21 MARCH 2020)

Shortage of face masks for personal protection of human health care personnel during this time of pandemic has raised the question of “inappropriate, immoral” use of these products by veterinary professionals (animal patient protection) and the general public (personal protection). To date, I have not seen a coherent, well elucidated rundown of current science to dictate our choices as veterinary professionals trying to provide animal care and human beings trying to protect ourselves and loved ones. So, I went reading... Below is my summary based on (and citing as much as designated time allowed) published data. This is by NO means a well cited, peer-reviewed thing.

Basic data regarding particle size:

Bacteria size, average 1  $\mu\text{m}$  (1000 nm)

Viral particle size, average 0.02-0.4  $\mu\text{m}$  (20-400 nm)

National Institute for Occupational Safety and Health (NIOSH) respirator certification test: median diameter particles 0.3  $\mu\text{m}$  (300nm)

SARS-causing coronavirus= 0.08–0.14  $\mu\text{m}$  (80-140nm) (Ksiazek *et al.* [N Engl J Med.](#) 2003 May 15;348(20):1953-66)

*Bacillus anthracis* = 0.81x1.5  $\mu\text{m}$  (800x1500nm)

### 1) Mask use to prevent veterinary personnel contamination of animals with bacteria

Current psychosocial/behavioral standard in most veterinary settings in the United States is “surgical masks prevent operator from contaminating patient during procedure/surgery”. This standard may be difficult to overcome by veterinary professionals raised on its message. Our moral obligation to our patients must be factored into decision-making as well.

“Surgical” masks are rated by American Society of Testing and Materials (ASTM) for Face Mask Performance Levels; testing specifies a droplet size of 3.0 microns containing Staph. Aureus (average size 0.6-0.8 microns). With respect to bacterial contamination of a surgical field by the operator’s mouth, products labeled as surgical or procedure masks all have greater than 95-98% bacterial filtration efficiency (BFE).

- Fluid Resistance: Mask resistance to penetration by synthetic blood under pressure (mmHg). Higher fluid resistance = Higher protection.
- Bacterial Filtration Efficiency (BFE): % of aerosol particles, 3 $\mu\text{m}$ , filtered.
- Submicron Particle Filtration Efficiency (PFE): % of submicron particles, 0.1 $\mu\text{m}$ , filtered.
- Differential Pressure (Delta P): Pressure drop across mask, or resistance to air flow in mmH<sub>2</sub>O/cm<sup>2</sup>. Greater resistance = better filtration but less breathability

There is no data to evaluate mask effectiveness being “reused” for this purpose. Given the high effectiveness as a new product, logic suggests it would take significant physical disruption of mask



integrity to reduce this effectiveness significantly. Personal hygiene is likely a stronger concern, with topical contamination and multiplication of organisms occurring absent purposeful and frequent topical disinfection and drying.

Readily available option for surface treating surgical/procedure masks to reduce local contamination of the user’s face, consider either:

- 1000ppm or 1/3cup to 1gallon dilution of 5.25% sodium hypochlorite (household bleach; solution prepared weekly and stored out of light) followed by thorough air-drying (Clinical Microbiology Reviews Oct. 1997, p. 597–610)
- Isopropyl alcohol spray followed by thorough airdrying  
[https://www.ajicjournal.org/article/S0196-6553\(08\)00758-X/abstract](https://www.ajicjournal.org/article/S0196-6553(08)00758-X/abstract) (abstract only)

With regard to the necessity of mask use to minimize postoperative infections, a 2016 Cochran Review states, “Overall, we found very few studies and identified no new trials for this latest update. We analyzed a total of 2106 participants from the three studies we found. All three studies showed that wearing a face mask during surgery neither increases nor decreases the number of wound infections occurring after surgery. We conclude that there is no clear evidence that wearing disposable face masks affects the likelihood of wound infections developing after surgery.”

<https://www.cochranlibrary.com/cdsr/doi/10.1002/14651858.CD002929.pub3/full>

Very little data is available for homemade face masks for this purpose. The table below suggests a fairly high degree of filtration efficacy in a scientific in vitro setting using homemade masks patterned after traditional surgical masks. Particle sizes ranged from 1 um to 20nm, so well within the size consideration for bacterial contamination of a surgical/procedure field.

[https://www.researchgate.net/publication/258525804\\_Testing\\_the\\_Efficacy\\_of\\_Homemade\\_Masks\\_Would\\_They\\_Protect\\_in\\_an\\_Influenza\\_Pandemic](https://www.researchgate.net/publication/258525804_Testing_the_Efficacy_of_Homemade_Masks_Would_They_Protect_in_an_Influenza_Pandemic)

Filtration Efficiency and Pressure Drop Across Materials Tested with Aerosols of <i>Bacillus atrophaeus</i> and Bacteriophage MS2 (30 L/min) <sup>a</sup>						
Material	<i>B atrophaeus</i>		Bacteriophage MS2		Pressure Drop Across Fabric	
	Mean % Filtration Efficiency	SD	Mean % Filtration Efficiency	SD	Mean	SD
100% cotton T-shirt	69.42 (70.66)	10.53 (6.83)	50.85	16.81	4.29 (5.13)	0.07 (0.57)
Scarf	62.30	4.44	48.87	19.77	4.36	0.19
Tea towel	83.24 (96.71)	7.81 (8.73)	72.46	22.60	7.23 (12.10)	0.96 (0.17)
Pillowcase	61.28 (62.38)	4.91 (8.73)	57.13	10.55	3.88 (5.50)	0.03 (0.26)
Antimicrobial Pillowcase	65.62	7.64	68.90	7.44	6.11	0.35
Surgical mask	96.35	0.68	89.52	2.65	5.23	0.15
Vacuum cleaner bag	94.35	0.74	85.95	1.55	10.18	0.32
Cotton mix	74.60	11.17	70.24	0.08	6.18	0.48
Linen	60.00	11.18	61.67	2.41	4.50	0.19
Silk	58.00	2.75	54.32	29.49	4.57	0.31

<sup>a</sup> Numbers in parentheses refer to the results from 2 layers of fabric.

Taking into account all of these factors, the use of disposable surgical/procedure masks is neutral or beneficial. Rationing of these products substantially for multiday or multiweek use is **one solution** to the moral dilemma faced by veterinary professionals in the current pandemic. **Another solution** is to



self-manufactured/sewn masks with readily available materials outside of the health care supply chain.

## 2) Mask use to prevent human exposure to environmental contaminants (specifically virus)

The science to inform the decision about face mask use to prevent the user from being infected by a virus is broad and to some degree undecided. The overall message is that it will help to some, as yet poorly defined degree; nothing is a guarantee or even close to that.

- No difference contracting influenza when 400 nurses wearing a surgical mask vs. wearing a N95-rated mask were working in a setting with low level exposure (i.e. not working directly with infected patient and aerosolized virus or contaminated droplets from talking/cough)  
<https://jamanetwork.com/journals/jama/fullarticle/184819>
- “Protection Factor (PF)” (OSHA rating) was higher for N95 than surgical masks  
<https://academic.oup.com/annweh/article/52/3/177/312528>
- Public mask use reduced influenza transmission in closed households.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2662657/>
- FFP2/N95 mask vs. surgical mask vs. homemade cloth masks had reducing levels of protection but protection was present.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2440799/>
- Meta-analysis identifies difficult data interpretation, but suggests surgical masks have benefit, and N95 masks are better against smaller particles.  
[https://journals.lww.com/ccmjournal/Abstract/2010/02000/Protecting\\_healthcare\\_workers\\_from\\_pandemic.40.aspx](https://journals.lww.com/ccmjournal/Abstract/2010/02000/Protecting_healthcare_workers_from_pandemic.40.aspx)
- A review acknowledging sparse data on community transmission with mask usage, but small pockets of data suggesting reduced close-quarters/home spread with mask and hand hygiene.  
<https://www.cambridge.org/core/journals/epidemiology-and-infection/article/face-masks-to-prevent-transmission-of-influenza-virus-a-systematic-review/64D368496EBDE0AFCC6639CCC9D8BC05/core-reader>

It is clearly important in a pandemic that human health care personnel have appropriate protection such that they may continue their work helping the rest of human society and not suffer disproportionately for their efforts. Given the paucity of strong data supporting routine public mask use to prevent user-infection, the supply chain directed toward human health care personnel should remain intact.

If a novel supply chain can be created and maintained outside the above critical one, it seems absolutely reasonable to pursue that AND **support those who wish to use novel masks** to protect themselves. Rationing of surgical/procedure masks substantially for multiday or multiweek use is **one solution** to the moral dilemma faced by veterinary professionals in the current pandemic. **Another solution** is to self-manufacture/sewn masks with readily available materials outside of the health care supply chain. Both solutions allow individuals to elect to wear masks while in public and workspaces to reduce their potential exposure to virus.



TWO LESS OBVIOUS ASPECTS OF FULL-TIME PUBLIC MASK use in the veterinary professional setting (and the outside world), **specifically psychosocial**, need addressing. As a person who wears a mask almost full-time while working, I have experienced significant fear and avoidance from dog and cat patients. I can extrapolate this to children, I think, and adult strangers. If you choose to wear a mask, factor in accommodations to your behavior or appearance of a mask to minimize this effect.

And secondly, for the individual wearing the mask in the US culture (as compared to multiple Asian cultures), there is likely to be a stigma that may result in harassment or isolation/avoidance. Planning for these effects will help the individual emotionally and behaviorally prepare.

AND A **BRIEF NOTE on social distancing science**: Depending on particle size (range 0-200 $\mu$ m), horizontal distance traveled by particle peaks at 2-2.5 meters. "From these studies, it is noted that the size of droplet nuclei because of sneezing, coughing, and talking is likely to be a function of the generation process and the environmental conditions. Sneezing can generate approximately a million droplets of up to 100 $\mu$ m in diameter, plus several thousand larger particles formed predominantly from saliva in the frontal part of the mouth. While most people think that only coughs or sneezes can generate the infectious droplets, studies have shown that talking for 5min can generate the same number of droplet nuclei as a cough, i.e., some 3000 droplet nuclei. The actual size distribution of droplets is also dependent on parameters such as the exhaled air velocity, the viscosity of the fluid, and the flow path (i.e. through the nose, the mouth, or both). There is also a great individual variability." <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1600-0668.2007.00469.x>

And improving **environmental humidity**: A recent study provides evidence on the infectivity of single airborne virions as it showed that aerosol transmission of influenza virus was improved under low relative humidity (20%). This was associated with two possible factors: small size of airborne viral particles due to quick evaporation of water and the stability of airborne infectious virions at low humidity. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2034399/>

*If you have read this far, I'll tell you what I am going to do based on my digest of my reading today (and Google was NOT involved in my day, FYI).*

- *I have given 90% of my stock of surgical masks to my local emergency medical service for distribution as they see fit.*
- *I have adopted a marked mask rationing Standard Operating Procedure for my business, until such time as I need to begin using hand-sewn product made from 2-layer muslin with vacuum bag "paper" inner filter.*
- *I will continue my practice of veterinary surgery with the goal of providing treatment for conditions that will worsen with time or prolong significant discomfort or disability.*
- *I will wear a rationed/repurposed mask or hand-sewn mask when I am required to interact within 10 feet of another human being in my conduct of professional and personal business.*

**Prepared by: Lara Rasmussen, DVM, MS**  
DIPLOMATE, AMERICAN COLLEGE OF VETERINARY SURGERY

