

Research on Face Mask Efficacy

September 21, 2020

RE: Mandatory Mask Bylaw Update

Dear mayor and council colleagues,

Like you, I took an oath that said, "I will truly, faithfully and impartially exercise this office to the best of my knowledge and ability." As a chemical engineer and a science teacher I perceive a greater duty for me when it comes to topics involving science. Because of that I subscribed to science newsletters and have read hundreds of research abstracts and papers since taking office. Keeping up to date has earned me a reputation in the press for having bizarre views about science.

Since filters and particle sizes are a chemical engineering topic that intersects with our mask bylaw, I have done some research on that too. It is a popular belief that doctors wear masks during surgery because it cuts down on infection rates and that is mostly how we justify asking residents to do the same. Surprisingly, research does not show that surgical masks cut down on infection rates so I feel it is important to share with you cited randomized clinical trials and systematic reviews of scientific literature which draw that conclusion masks do not have a significant benefit.

For background, It was in the mid-70's and early-80's when the practice of wearing masks was first questioned. A surgical team led by Neil Orr stopped using masks for six months and observed that the infection rates went down substantially. Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2493952/pdf/annrcse01509-0009.pdf>

Randomized Clinical Trials

Postoperative wound infections and surgical face masks

In Tunevall's two-year study from 1991 study, a general surgical team performed 3088 surgeries wearing masks half the time. The wound infection rates were:

- 4.7% when masks were worn
- 3.5% when masks were not worn

They concluded that, "***the use of face masks might be reconsidered.***"³ Link: <https://europepmc.org/article/med/1853618>

Face masks worn by non-scrubbed staff

In 2010, Webster et al. sought further clarity on the issue by testing infection rates when non-scrubbed personnel did or didn't wear masks half the time. In their randomized controlled trial of 810 surgeries the Infection rates were:

- 11.5% when masks were worn
- 9% when masks were not worn

They reported that "***Surgical site infection rates did not increase when non-scrubbed operating room personnel did not wear a face mask.***"⁴ Link: <https://pubmed.ncbi.nlm.nih.gov/20575920/>

Masks in non-surgical settings

In a non-surgical setting, Figueiredo et al. compared bacterial infections in two groups of peritoneal dialysis patients when surgical masks were and were not worn by staff and found no difference.¹ Link: <https://pubmed.ncbi.nlm.nih.gov/10898061/>

In 2001, they followed it up with 5 years of not using masks at one centre and found infection rates no different than at other centres.² Link: <https://pubmed.ncbi.nlm.nih.gov/11510307/>

In both they concluded that "***routine use of face masks during CAPD bag exchanges may be unnecessary and could be discontinued.***"

Cloth masks versus medical masks for healthcare workers

In 2015 MacIntyre et al. published their cluster randomized trial of cloth masks compared with medical masks in healthcare workers (HCW). They noted that “**laboratory-confirmed virus were significantly higher in the cloth masks group compared with the medical masks group.** Penetration of cloth masks by particles was almost 97% and medical masks 44%.”¹⁰ Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4420971/>

Their conclusion was that, “**As a precautionary measure, cloth masks should not be recommended for HCWs, particularly in high-risk situations**”

Systematic Reviews

Disposable surgical masks and wound infection in clean surgery

After independently reviewing randomized controlled trials, Lipp, Edwards and then Vincent concluded that, “**it is unclear whether the wearing of surgical face masks by members of the surgical team has any impact on surgical wound infection rates for patients undergoing clean surgery.**” This was based on systematic reviews of:

- Two trials involving 1453 patients in 2005⁶ Link: <https://pubmed.ncbi.nlm.nih.gov/16295987/>
- Three trials involving 2113 participants in 2014⁷ Link: <https://pubmed.ncbi.nlm.nih.gov/24532167/>
- Three trials involving 2106 participants in 2016⁸ Link: <https://pubmed.ncbi.nlm.nih.gov/27115326/>

Does evidence based medicine support the use of surgical facemasks?

Bahli did a systematic literature review in 2009 and found “**no significant difference in the incidence of postoperative wound infection**” when operations were performed with or without masks.

He concluded that: “**it is still not clear that whether wearing surgical face masks harms or benefit the patients undergoing elective surgery**”.⁵ Link: <https://pubmed.ncbi.nlm.nih.gov/20524498/>

Effectiveness of hand hygiene and face masks during a pandemic

In 2017, Sandurs-Hastings et al. did a review of literature regarding the 2009 pandemic. Their meta-analyses suggested that against the 2009 pandemic influenza infection⁹ :

- regular hand hygiene provided a significant protective effect
- facemask use provided a non-significant protective effect

Link: <https://pubmed.ncbi.nlm.nih.gov/28487207/>

Conclusion

The main explanation for these results is that the particle size of viruses are smaller than the masks can filter out. Based on the non-effectiveness of masks I would conclude that mandatory face coverings are not warranted and that resources earmarked for enforcement would be better spent in ways that protect the vulnerable more directly.

Most of all, I want us to reject the false narrative that says, **If you don't wear a mask you are a horrible person placing others' lives at risk.** This divisive, unsupported supposition is responsible for fear, condemnation, name calling, physical assaults and the oppression of those with legitimate exemptions.

For my own sake, I want to point out that science has nothing to do with the use of ad hominem attacks to crush opponents of a pet or politically expedient theory. The scientific method involves impartially allowing the theories to rise or fall in the arena of demonstrable facts.

Yours,
Michael van Holst
Councillor Ward 1

Endnotes

- 1 Figueiredo AE, Poli de Figueiredo CE, d'Avila DO. Peritonitis prevention in CAPD: to mask or not?. *Perit Dial Int.* 2000;20(3):354-358.
- 2 Figueiredo AE, Poli de Figueiredo CE, d'Avila DO. Bag exchange in continuous ambulatory peritoneal dialysis without use of a face mask: experience of five years. *Adv Perit Dial.* 2001;17:98-100.
- 3 Tunevall TG. Postoperative wound infections and surgical face masks: a controlled study. *World Journal of Surgery.* 1991 May-Jun;15(3):383-7; discussion 387-8. DOI: 10.1007/bf01658736.
- 4 Webster J, Croger S, Lister C, Doidge M, Terry MJ, Jones I. Use of face masks by non-scrubbed operating room staff: a randomized controlled trial. *ANZ J Surg.* 2010;80(3):169-173. doi:10.1111/j.1445-2197.2009.05200.x
- 5 Bahli ZM. Does evidence based medicine support the effectiveness of surgical facemasks in preventing postoperative wound infections in elective surgery?. *J Ayub Med Coll Abbottabad.* 2009;21(2):166-170.
- 6 Lipp A, Edwards P. Disposable surgical face masks: a systematic review. *Can Oper Room Nurs J.* 2005;23(3):20-38.
- 7 Lipp A, Edwards P. Disposable surgical face masks for preventing surgical wound infection in clean surgery. *Cochrane Database Syst Rev.* 2014;(2):CD002929. Published 2014 Feb 17.
- 8 Vincent M, Edwards P. Disposable surgical face masks for preventing surgical wound infection in clean surgery. *Cochrane Database Syst Rev.* 2016;4(4):CD002929. Published 2016 Apr 26. doi:10.1002/14651858.CD002929.pub3
- 9 Saunders-Hastings P, Crispo JAG, Sikora L, Krewski D. Effectiveness of personal protective measures in reducing pandemic influenza transmission: A systematic review and meta-analysis. *Epidemics.* 2017;20:1-20. doi:10.1016/j.epidem.2017.04.003
- 10 MacIntyre CR, Seale H, Dung TC, et al. A cluster randomised trial of cloth masks compared with medical masks in healthcare workers. *BMJ Open.* 2015;5(4):e006577. Published 2015 Apr 22. doi:10.1136/bmjopen-2014-006577