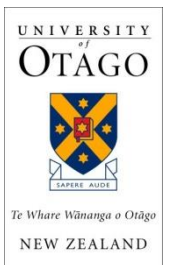
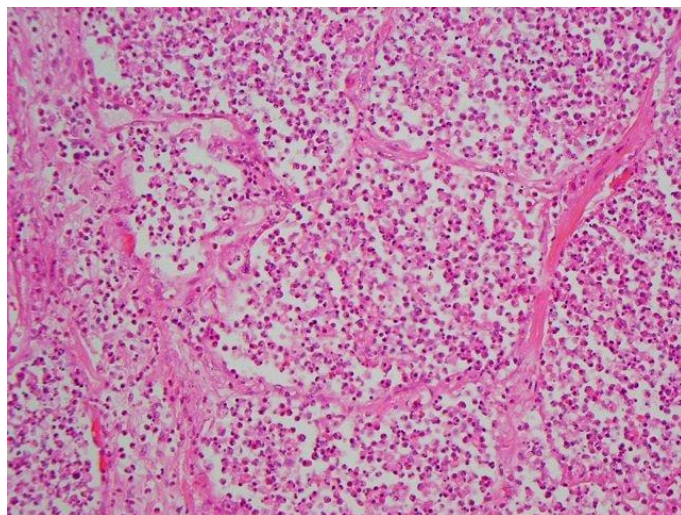
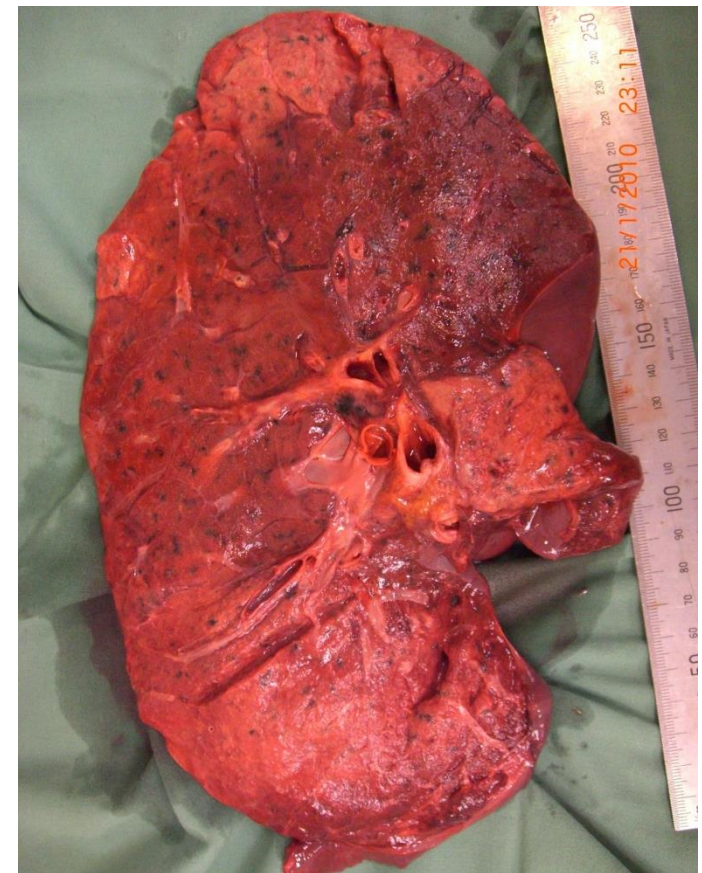




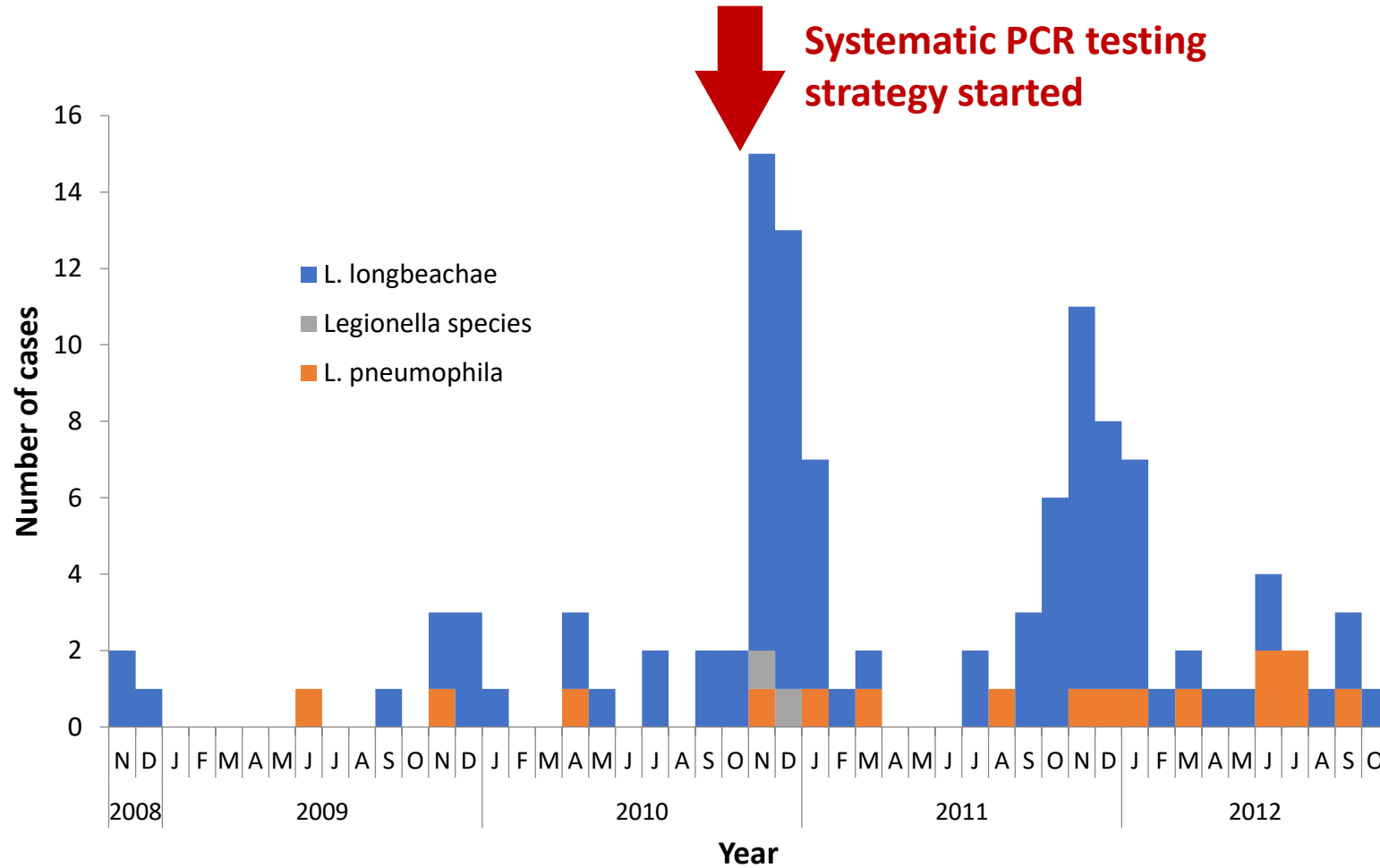
Legionnaires' Disease: *Are Gloves and Masks a help or a hazard?*

Stephen Chambers
University of Otago, Christchurch
Christchurch, New Zealand





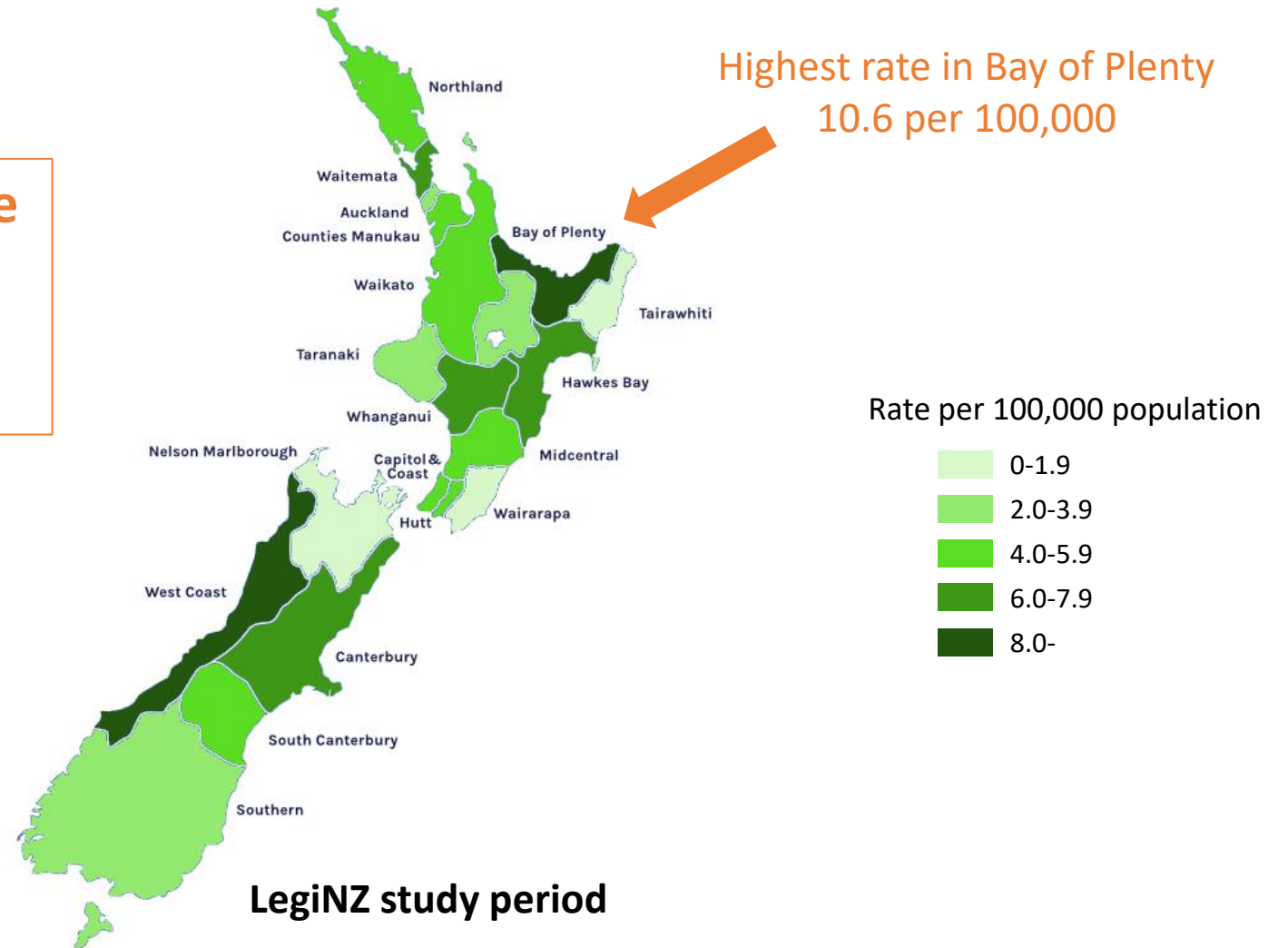
Legionnaires' Disease Cases Christchurch, New Zealand 2008-12



Incidence of Legionellosis in New Zealand by Region

Results of LegNZ study

Estimated national incidence rate
5.2 per 100,000 population
(twice the incidence reported over the
preceding 10 years)



How can we stop cases of *Legionella longbeachae* occurring?

- Engage with industry and gardeners to improve practice
- Identify low risk components of potting mix
- Increase our understanding of where the organisms are in the environment and how they multiply
- Make sure protective measures work

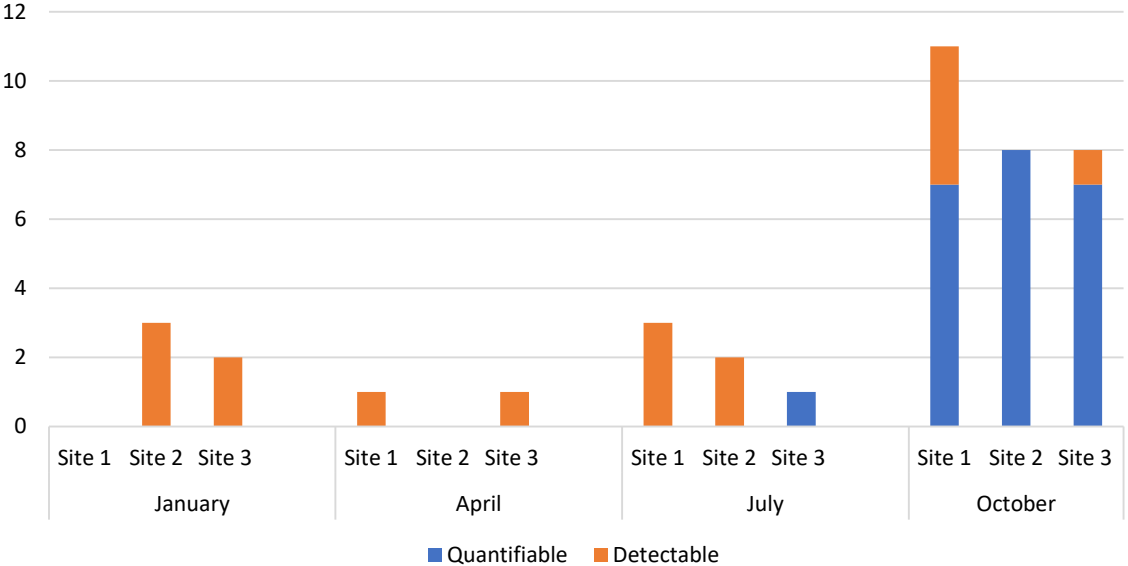
DNA testing for *L. longbeachae* at potting mix manufacture sites



Sample type	Number of samples	qPCR positive
Bark	360	27(8%)
Sawdust	185	14(8%)
Peat	205	0
Green waste	130	0
Pumice	20	0
Mixing area	73	1
Pre-bagged or bagged product	200	12(6%)
Total	1173	54(4%)

Tree testing: Bark samples taken at chest height for qPCR testing

Number of trees with detectable *L. longbeachae* DNA over 12 months



Site 1 N= 22 Site 2 N=12 Site 3 N= 16 Total 50

Survey of tree species bark samples in early summer

Non-*P. radiata* pine species 22/28 (79%) positive
 Adjacent mixed species 6/37 (16%) positive
 (p<0.001)



Instore
Special
Large envelope
Planter
was \$599
NOW
\$475

Table 5. Multivariable analyses of the direct and intermediate effects of types of compost use on *Legionella longbeachae* Legionnaires' disease, New Zealand, October 1–March 31, 2013–2014 and 2014–2015*

Compost use risk factor	OR (95% CI)
Use of compost in previous 3 weeks	0.97 (0.16–5.9)
Tip or trowel compost	6.1 (1.3–29.4)
Hand to face before handwashing	2.3 (0.88–6.1)

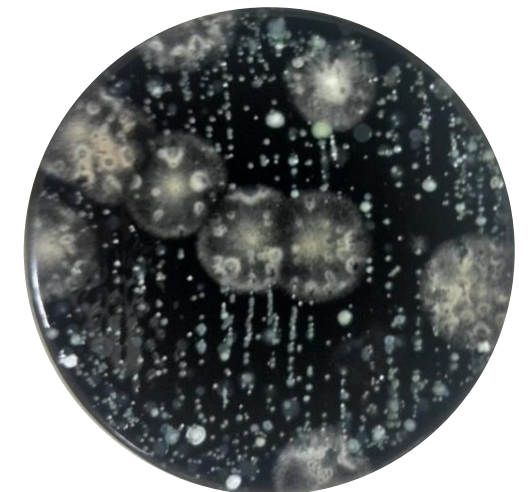
*OR, odds ratio.

Survey of Gardeners

- 77 of 102 who agreed completed the survey Christchurch, December 2018
- 67% women

Hours gardening each week	Number
0-2	31 (40%)
3 to 5	39(49%)
> 5 hours	8(10%)

- Gloves 76 gardeners
- DNA testing for *L. longbeachae* on gardening gloves
 - DNA positive 11 (17%) gloves
- Culture did not give useful results



A

Table 1 Results of a questionnaire of gardeners who submitted gardening gloves for testing for *Legionella longbeachae* DNA by qPCR

	qPCR positive	qPCR negative	Total	<i>P</i> value
Number	11	65	76	
Potting mix use				
Yes	11 (100%)	61 (94%)	72 (95%)	1
No	0 (0%)	2 (3%)	2 (3%)	
Unknown	0 (0%)	2 (3%)	2 (3%)	
Glove material				
Cotton	1 (9%)	3 (5%)	4 (5%)	0.07
Leather	3 (27%)	5 (8%)	8 (11%)	
Coated cotton	7 (64%)	57 (88%)	64 (84%)	
Wash gloves				
At least weekly	2 (18%)	12 (18%)	14 (18%)	1
Sometimes	3 (27%)	18 (28%)	21 (28%)	
No	6 (55%)	33 (51%)	39 (51%)	
Unknown	0 (0%)	2 (3%)	2 (3%)	
Dried gloves				
Yes	4 (36%)	24 (37%)	28 (37%)	0.8
Sometimes	3 (27%)	13 (20%)	16 (21%)	
No	4 (36%)	26 (40%)	30 (39%)	
Unknown	0 (0%)	2 (3%)	2 (3%)	
Storage				
Garage/laundry/car boot	5 (45%)	32 (49%)	37 (49%)	0.87
Garden shed or greenhouse	6 (55%)	27 (42%)	33 (43%)	
Other	0 (0%)	4 (6%)	4 (5%)	
Unknown	0 (0%)	2 (3%)	2 (3%)	
Damp following storage				
Yes	0 (0%)	0 (0%)	0 (0%)	0.74
Sometimes	3 (27%)	22 (34%)	25 (33%)	
No	8 (73%)	41 (63%)	49 (64%)	
Unknown	0 (0%)	2 (3%)	2 (3%)	
Replace gloves				
>1/year	5 (45%)	26 (40%)	31 (41%)	0.38
1/year	4 (36%)	14 (22%)	18 (24%)	
<1/year	2 (18%)	23 (35%)	25 (33%)	
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Fisher's exact test				

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Culture of inoculated gloves and masks with *L. longbeachae*

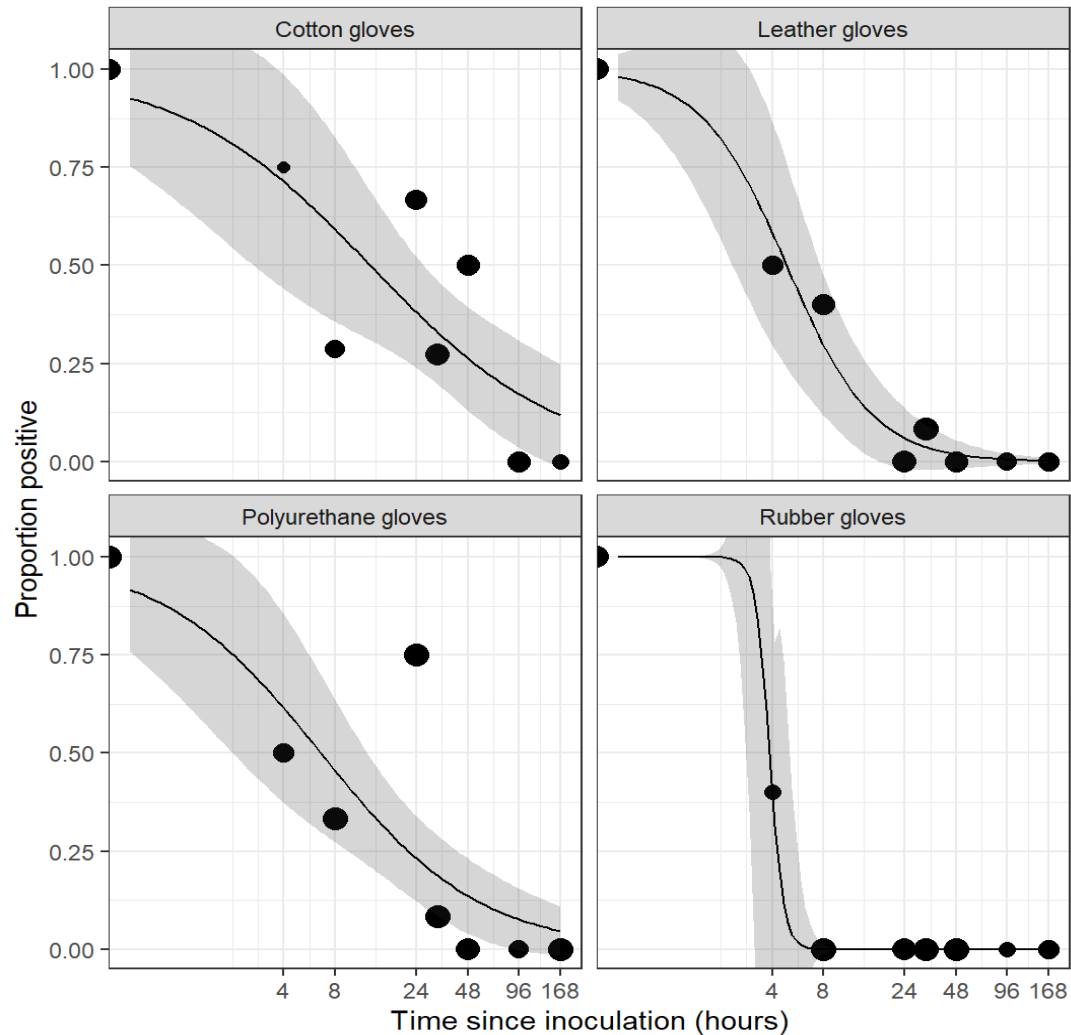


Table 2 Estimates of T_{50} (time 50% of samples reached endpoint) and slope of decay curve of *Legionella longbeachae* inoculated onto various types of gardening gloves and masks. The endpoint was when *L. longbeachae* was undetectable on subcultures onto selective media

Material	T_{50} (hours) Estimate (95% CI)	Slope Estimate (95% CI)
Gloves		
Cotton	16.1 (3.6, 29.6)	0.71 (0.27, 1.16)
Rubber	3.9 (2.1, 5.7)	17.4 (-314, 348)
Leather	5.3 (2.8, 7.9)	1.90 (0.88, 2.92)
Polyurethane	8.0 (2.9, 13.0)	1.07 (0.54, 1.59)

Culture of masks inoculated with *L. longbeachae*

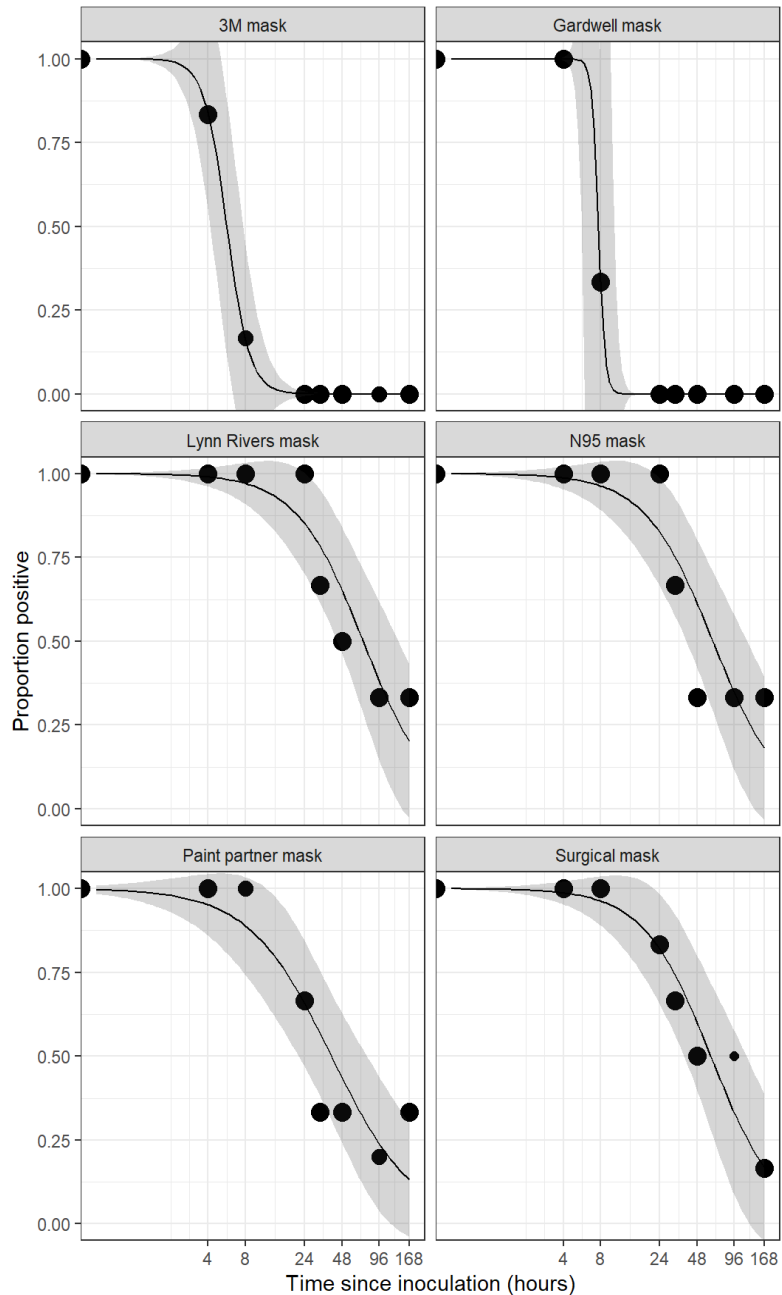


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Material	T_{50} (hours) Estimate (95% CI)	Slope Estimate (95% CI)
Masks		
Type 1 dust mask	7.7 (3.3, 12.0)	16.0 (-190, 222)
Type 2 dust mask	5.6 (3.8, 7.5)	4.71 (0.50, 8.92)
Type 3 dust mask	39.5 (16.6, 62.4)	1.30 (0.47, 2.14)
N95	64.2 (30.3, 98.2)	1.58 (0.56, 2.59)
Respirator	71.2 (33.1, 109)	1.61 (0.56, 2.65)
Surgical	61.8 (27.9, 95.7)	1.60 (0.55, 2.65)

Conclusions



- Infectious dose of *L. longbeachae* is not known.
- Aerosolization of particles carrying *L. longbeachae* is the primary means of exposure but facial contamination also a risk.
- Masks seem an obvious protective measure but can become a hazard if not disposed of carefully immediately after use.
- Gloves may harbour *L. longbeachae* for up to a week. Rubber or polyurethane probably the safest but do not bang them and breath deeply when you take them off.
- The garden is not an operating theatre !!!
- A safer products seems the best option for control.

The Christchurch team

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Ros Podmore
Esther
Anja Werno
John Clemens
David Murdoch
Pippa Scott
Steve Chambers



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THE INFECTION GROUP

