



Effectiveness of an 'outbreak dose' of MMR vaccine during a mumps outbreak in two First Nations communities in northern Ontario

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Acknowledgements

The two First Nations communities

Northwestern Health Unit

Sioux Lookout First Nations Health Authority

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Our colleagues at First Nations and Inuit Health – Ontario
Region



Presenter Disclosures

- Drs. Sarah Wilson and Jo Ann Majerovich have no affiliation (financial or otherwise) with a pharmaceutical, medical device or communications organization
- Sarah Wilson is employed by Public Health Ontario (Crown Corporation)
- Jo Ann Majerovich is employed by Indigenous Services Canada



Mumps outbreak context

- December 2017 to August 2018
- 2 First Nations communities in northern Ontario
 - Remote and isolated communities
 - Small population sizes
- Recent mumps outbreak activity in both MB and ON



Community engagement

- Community leadership played a key role
- Vaccination venues in community e.g., school, band office, Suboxone clinic, Northern Store
- Transportation available
- Fresh fruit, various prizes offered
- Multichannel communication strategy



Evaluation objectives

- Describe the outbreak
- Evaluate the effectiveness of the outbreak dose



MMR 'outbreak dose' eligibility

1. All individuals aged 8 to 48 years (born: 1970-2010)
2. No MMR in the last 28 days (patient self-report)
3. No medical contraindications

Rationale:

- Change in provincial immunization schedule in 2011 to move MMR from 18 months to 4-6 years
- Incorporates assumption of natural immunity for those born on/before 1970¹



Methods

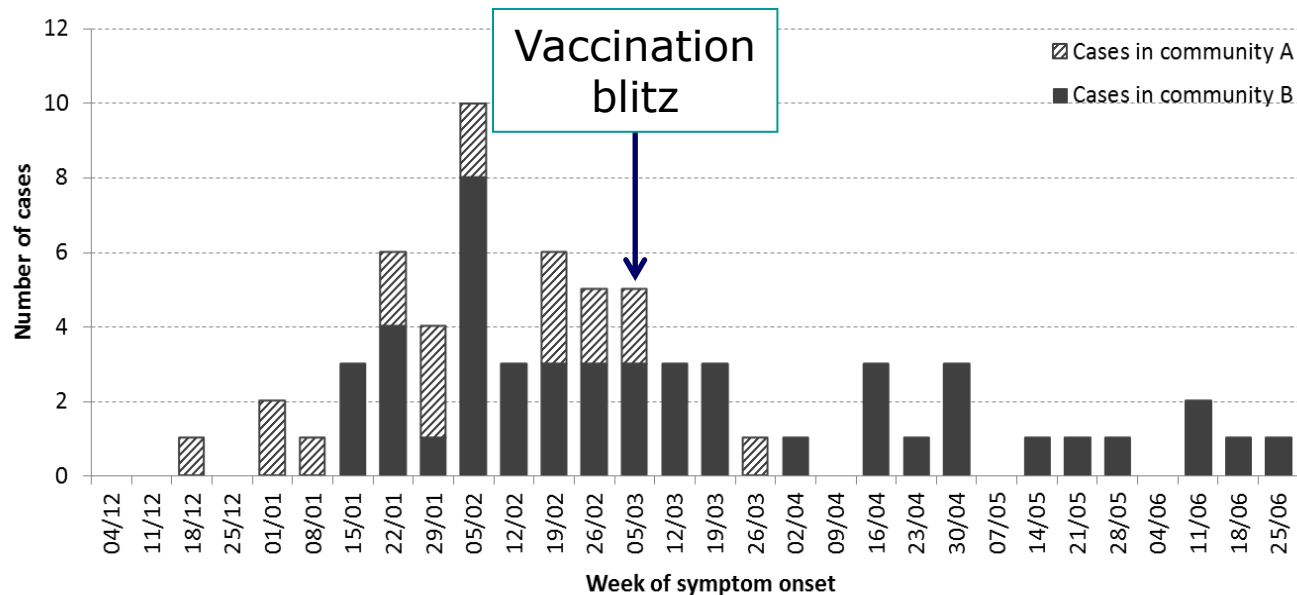
- Descriptive epidemiology of the outbreak included all community members
- Evaluation of the outbreak dose focused on eligible community members (aged 1-48)
- Population lists and vaccination records extracted from the communities' health information systems
- Developed outbreak case definitions
- Outbreak dose defined as any dose of mumps virus-containing vaccine received during the outbreak period
- Analysis of attack rates



Survival analysis

- Univariable and multivariable models
- **Primary variables:** Receipt of an outbreak dose, time since most recent MMR
- **Other covariables:** Gender, age, community, doses of MMR received
- Cox proportional-hazards models (penalized likelihood estimation)
- Receipt of outbreak dose as a time-varying covariate

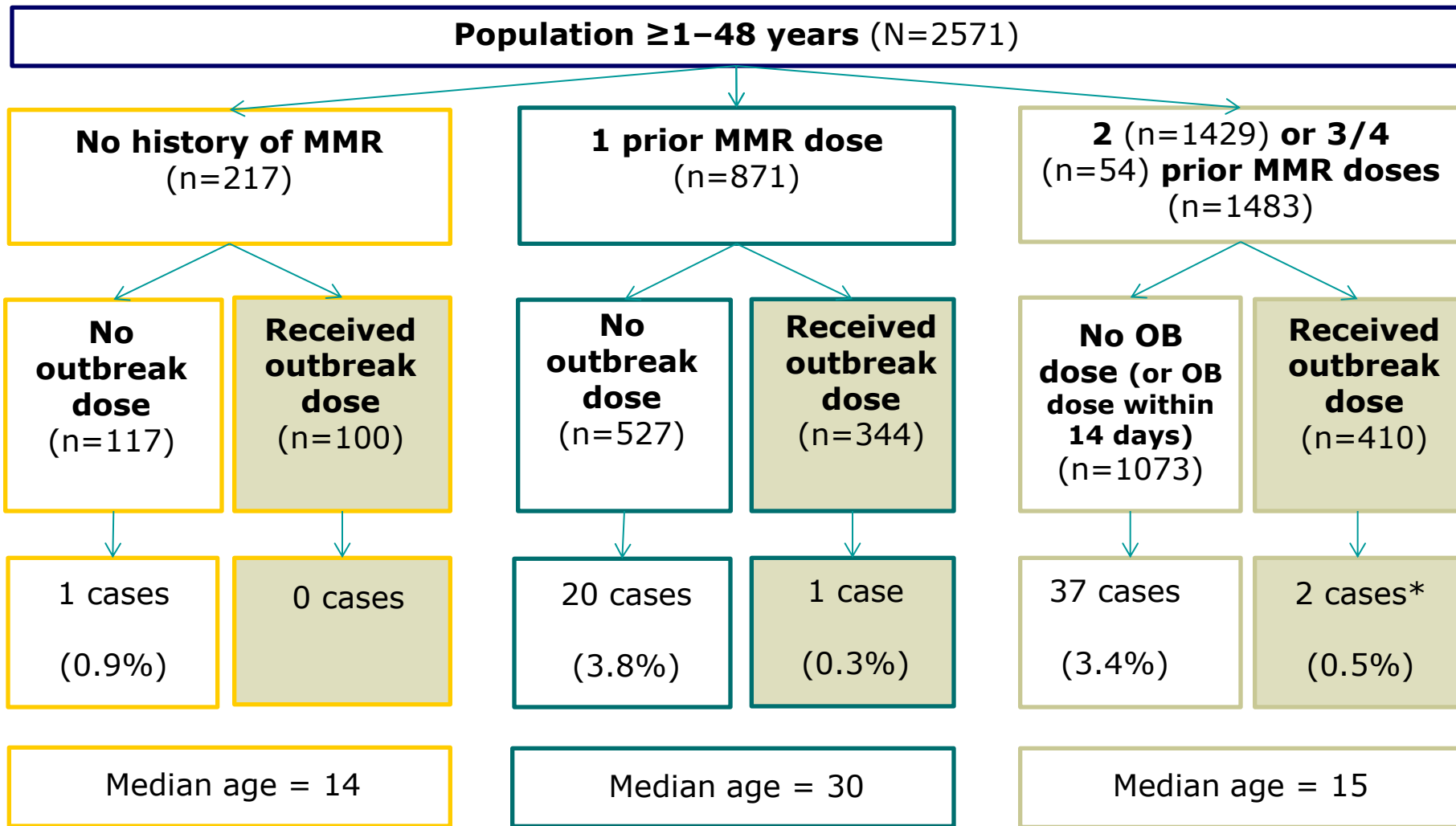
Descriptive Epidemiology



- 71 cases (52 confirmed, 19 probable)
- 67% male
- Median age: 24 years (range: 10 months to 65 years)



Results



* OB doses received 25 days and 120 days before symptom onset



Unadjusted attack rates I

Individuals 1 to 48 years of age

	Cases	Population	Attack rate (per 1000 persons)
Overall	61	2571	23.7
By age group			
1 to <5 years	1	327	3.1
≥5 to <19 years	25	938	26.6
≥19 to 48 years	35	1306	26.8



Unadjusted attack rates II

Individuals 1 to 48 years of age

	Cases	Population	Attack rate (per 1000 persons)
MMR doses prior to outbreak			
0	1	217	4.6
1	21	871	25.7
2	39	1429	27.3
3/4	0	54	0
Years since last MMR dose prior to outbreak			
0 to <3	2	183	10.9
3 to <10	8	529	15.1
10 to <20	16	603	26.5
≥20	34	1039	32.7



Survival analysis – unadjusted (select variables)

Individuals 1 to 48 years of age

	Hazard Ratio	Confidence Interval	P-value
No outbreak dose vs outbreak dose (time-varying)	2.0	(0.7–7.6)	.20
Male vs female	2.2	(1.3–3.9)	.004
Age (in years)	1 to <5	(0.02–0.6)	.005
	≥5 to <19	(0.5–1.6)	.77
	≥19 to 48	REF	-



Survival analysis - adjusted

Individuals 1 to 48 years of age

Variable		Hazard Ratio	Confidence Interval	P-value
Received an outbreak dose (time-varying)		REF	-	-
No outbreak dose received	Prior dose <3 years ago	1.0	(0.2–4.6)	1.0
	≥3 years to <10 years	1.5	(0.4–6.4)	.55
	≥10 years to <20 years	2.3	(0.8–9.3)	.13
	≥ 20 years	3.1	(1.1–12.2)	.04
	No prior dose received	0.7	(0.1–4.2)	.67
Gender	Female	REF	-	-
	Male	2.1	(1.2–3.8)	.005



Conclusions

- Individuals who received an outbreak dose of MMR had a lower risk of mumps, but this did not reach statistical significance
- Individuals who received their most recent dose of MMR more distantly before the outbreak were at increased risk of mumps



Thank you!

Questions?