Cost-effectiveness analysis of nonpharmaceutical interventions combined with inactivated vaccination and oral medicine in China under COVID-19 pandemic

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Objective

• Various interventions were used to control the COVID-19 pandemic and protect population health. This study aims to examine the cost-effectiveness of combinations of vaccination, nonpharmaceutical interventions (NPIs) and oral medicine (Paxlovid) under the Delta and Omicron pandemic in China.

Methods

- A Markov model using Susceptible-Infected-Recovered-Infected (SIRI) structure with a one-week cycle length was developed to estimate the cost-effectiveness of different combinations of nonpharmaceutical interventions (NPIs, including social distancing, mask wearing, tracing-testing-isolation, mass testing, and lockdown), oral medicine (Paxlovid), and vaccination (including two-dose and three-dose vaccination) for combating the COVID-19 pandemic from societal perspective over one-year time horizon.
- Base case analysis was performed to examine the cost-effectiveness of different intervention combinations under the Delta strain pandemic for general population.
- Scenario analyses were performed to examine the cost-effectiveness of for 1) the general population group under the Omicron pandemic; 2) for the elderly aged 60–69, 70–79, and over 80 years old; 3) for the situation when cross-infection was occurred; 4) when 20% concentratedly quarantine was

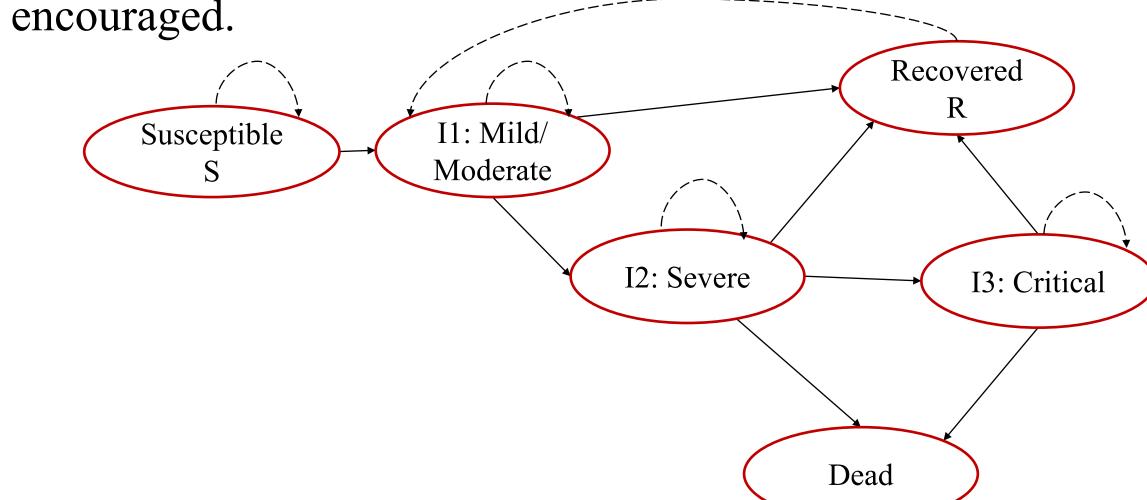


Figure 1:
Disease progression of COVID-19 patients with a modified susceptible-infected-recovered-reinfected process

- Under the Delta pandemic, the combination of social distancing, mask wearing, mass testing and three-dose vaccination was the optimal strategy, with cost at \$11165635.33 and utility of 94309.94 QALYs. Three-dose vaccination combinations were better than two-dose combinations.
- Under the Omicron pandemic, the combination of social distancing, mask wearing, mass testing and three-dose vaccination was still the optimal strategy.
- When cross-infection due to population gathering occurred, antigen testing combinations was better than nucleic testing.
- Adding Paxlovid or lockdown to the combined intervention strategies were not cost-effective for general population, but was cost-saving for those aged 70-79 and the octogenarian.
- Total societal cost declined sharply by encouraging test positive patients stay at home.

Conclusion

- Under the Omicron pandemic, universal three-dose vaccination and selfquarantine can save total cost and should be encouraged.
- Comparing with regular mass nucleic testing, antigen testing is better in saving cost and avoiding cross-infection.
- Oral medicine treatment and lockdown is not cost-effective among general population.

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Results

Table 1: Cost-effectiveness analysis of different strategies and combinations under the Omicron pandemic of general population

Strategy	Coat		Incremental comparisons		
	Cost (\$)	QALY	Cost (\$)	QALY	ICER (\$/QALY)
1+2+8	31690522.08	92325.3	_	_	_
1+2+4+8	13955403.02	93853.82	-17735119.06	1528.52	-11602.80
1+2+4+7	17123659.44	93573.17	-14566862.64	1247.87	-11673.38
1+2+7	38208134.2	91698.56	6517612.12	-626.74	-10399.23
1+2+4+5+8	45386312.48	94029.07	13695790.40	1703.77	8038.52
1+2+4	45932538.04	93357.9	14242015.96	1032.60	13792.38
1+2+4+5+7	47821428.14	93808.01	16130906.06	1482.71	10879.34
8	49079193.15	90116.47	17388671.07	-2208.83	-7872.34
7	55414641.05	89584.34	23724118.97	-2740.96	-8655.41
1+2+6+8	59814711.53	92325.59	28124189.45	0.29	96979963.62
1+2+4+5	70393346.05	93636.25	38702823.97	1310.95	29522.73
1+2+6+7	71920390.63	91699.16	40229868.55	-626.14	-64250.60
1+2	103347586.2	91274.45	71657064.12	-1050.85	-68189.62

①Social distancing, ②Mask wearing, ③Tracing-testing-isolation (TTI), ④Mass nucleic testing, ⑥Paxlovid, ⑦Two-dose vaccination, ⑧Three-dose vaccination

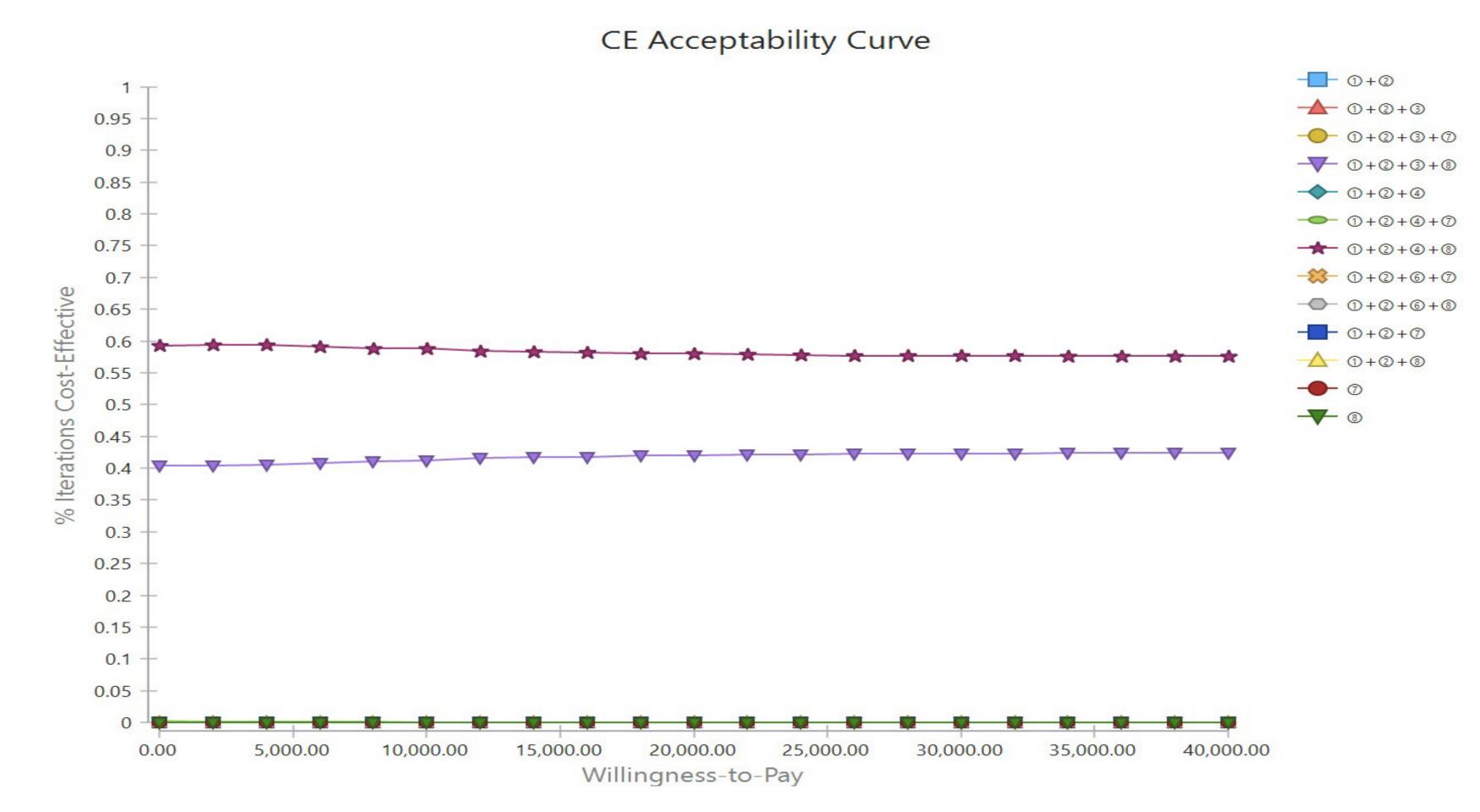


Figure 2: Cost-effectiveness acceptability curve

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