Myoko Model for Balancing Infectious Disease Control and Local Economy

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agenda

01 Challenges for tourism locations under COVID-19

02 COVID-19 infection model for tourism locations

03 Evaluation of infection control measures

01 - 01

Myoko Model for Balancing Infectious Disease Control and Local Economy

Challenges for tourism locations under COVID-19

Dilemma in tourism locations under COVID-19

- Tourism industry impacts far-reaching and is crucial to local economy.
- Tourists are risk of influx of infected people.

What are infectious disease control measures that are compatible with local economy?

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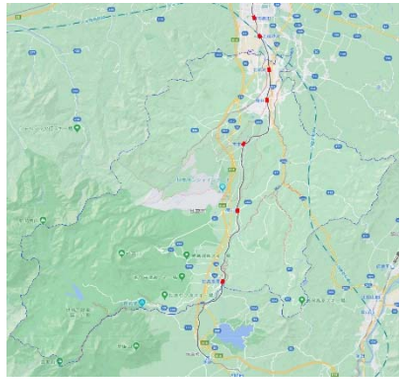
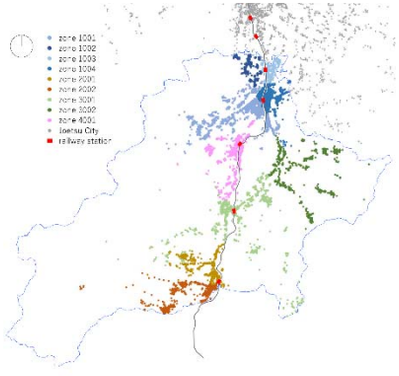
COVID-19 infection model for tourism locations

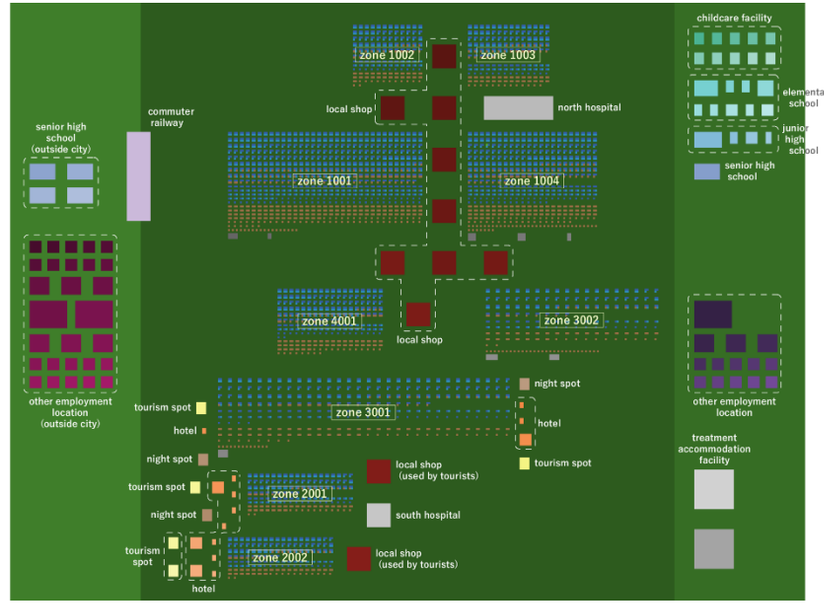
Tourism location model based on restored population data

- By reflecting demographic information, heterogeneous resident agents were generated in the model.
- It is possible to simulate diverse and complex infection routes.

Restored population data includes demographic information such as location of household and its members' gender, age, employment status, type of industry, scale of business.







Household and facility distribution in the model

02 - 02

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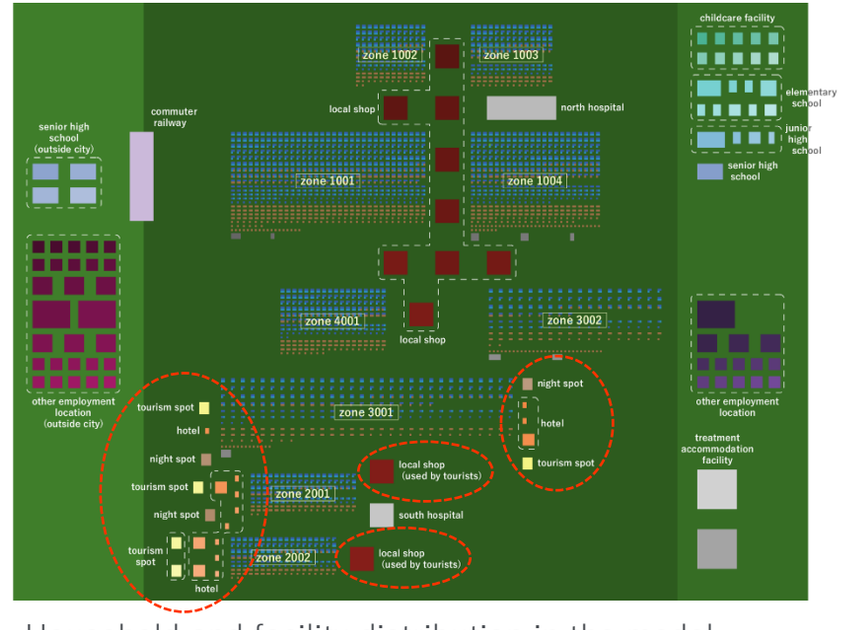
COVID-19 infection model for tourism locations

Residents' daily behavior in simulation model

- Resident agents repeated commuting and shopping, reflecting the actual data such as enrollment rate and employment rate.
- Employees in tourism industry (tourism spots, hotels, night spots , and grocery stores) contacted with tourists.

Tourism industry facilities were located in ski and hot spring resort areas at the foot of the mountains in the southeast and southwest. Tourists also visit the two local shops in the south. Employees of these facilities set as residents of nearby zones.



Household and facility distribution in the model

02 - 03

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COVID-19 infection model for tourism locations

Process of infection and symptom

- In each round of simulation, infection occurred probabilistically when resident agents spatially contact with each other on the model plane.
- Process of progress of symptoms was defined based on reports of detailed analyses.

- Infection
- Incubation
- Infectiousness
- Onset
- Exacerbation
- Recovery
- Death

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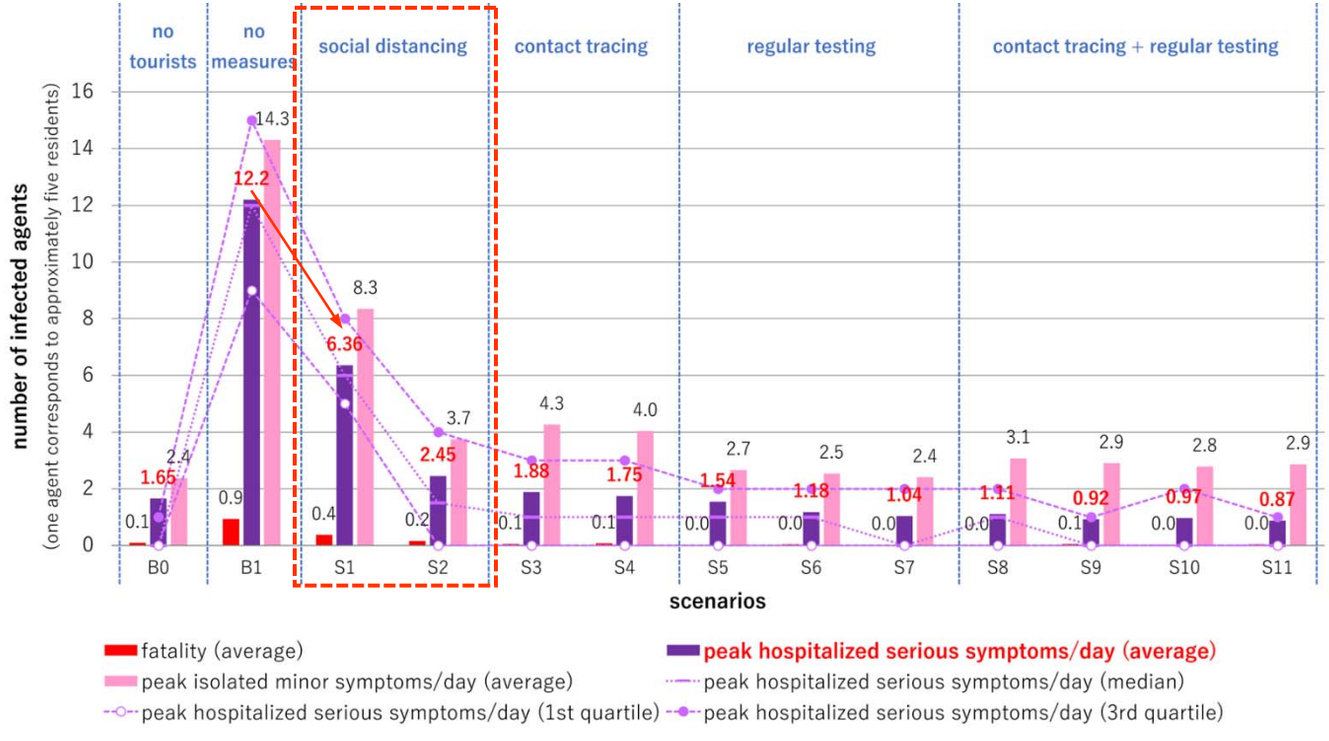
Evaluation of infection control measures

Effects of voluntary infection control measures

Compared to no measure (B1), in peak number of serious symptoms:

- 52% with reduction in residents' visit to local shops (S1)
- 20% with reduction in contact between employees and tourists (S2)



03 - 02

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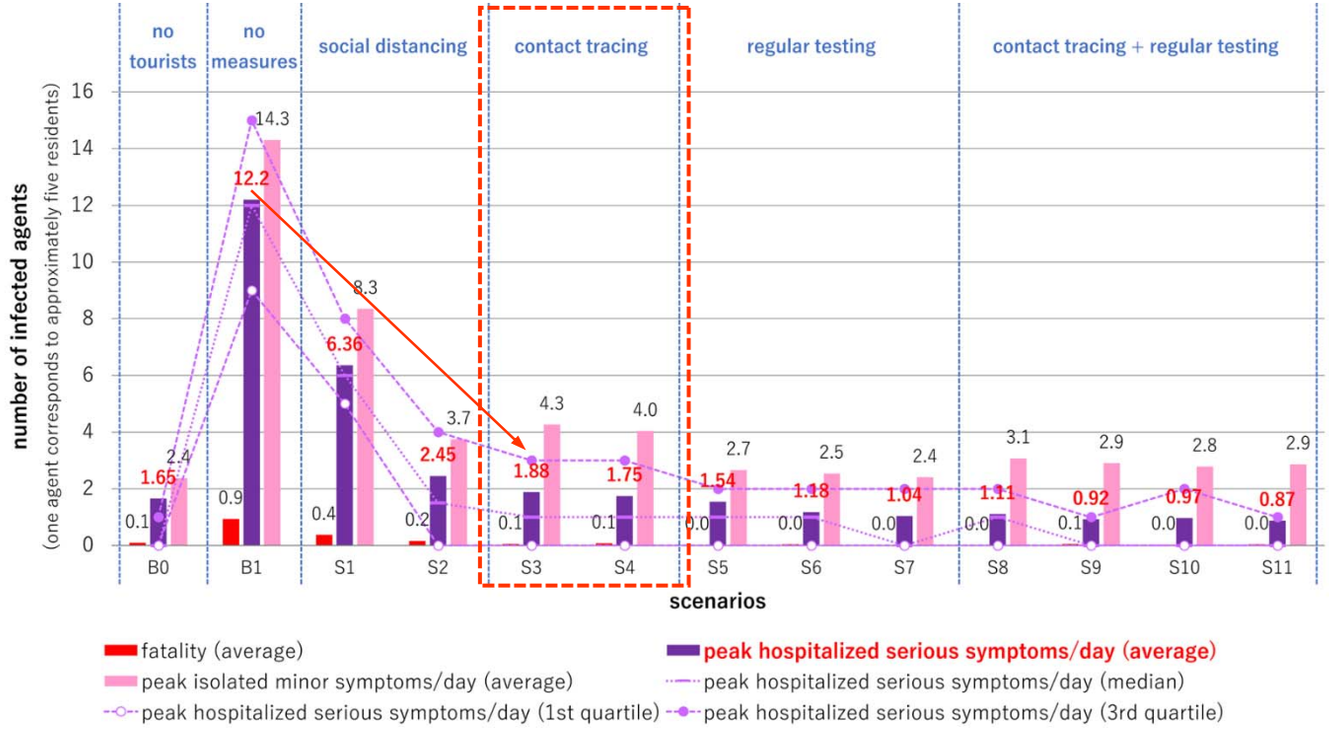
Evaluation of infection control measures

Tracking tests for persons in contact & isolation

Compared to no measure (B1), in peak number of serious symptoms:

- 15% with a forward one-time tracking ratio of 50% (S3)
- 14% with a forward one-time tracking ratio of 80% (S4)



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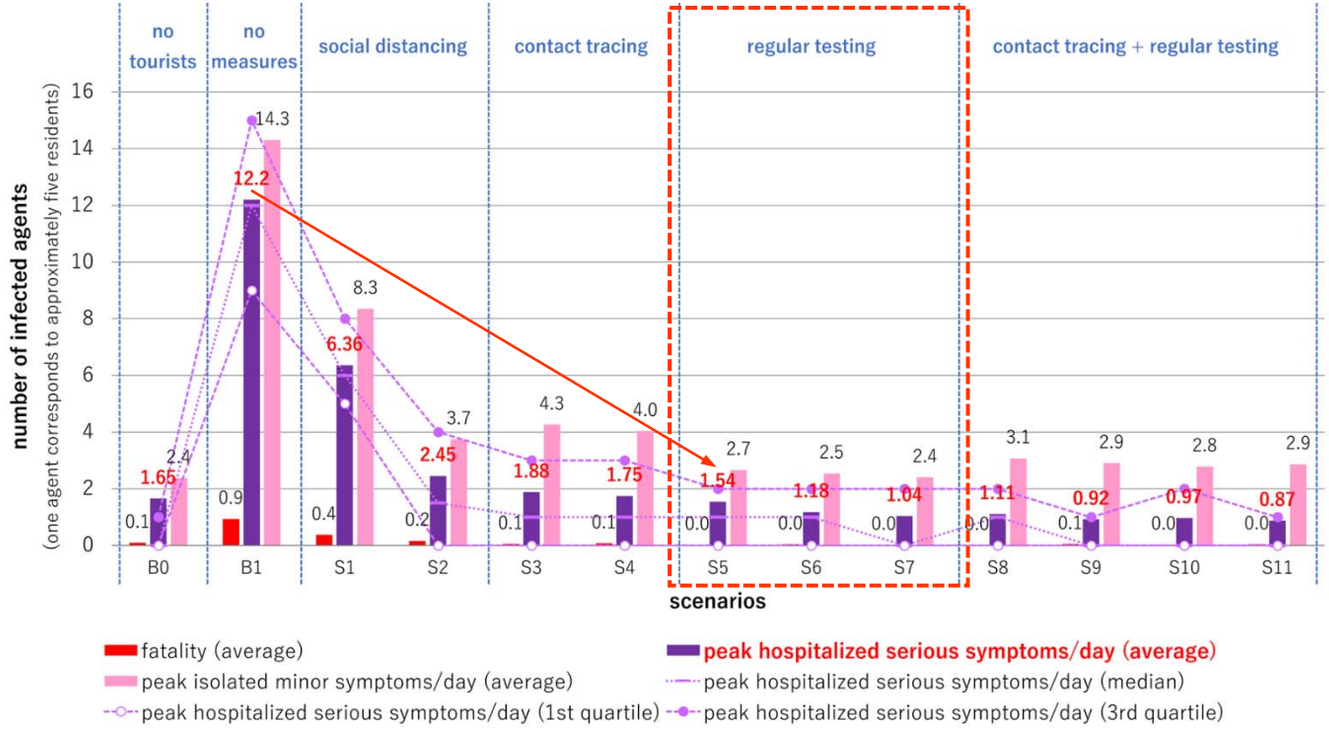
Evaluation of infection control measures

Regular testing on tourism employees & isolation

Compared to no measure (B1), in peak number of serious symptoms:

- 13% with a 50% test ratio every 2 weeks (S5)
- 10% with a 75% test ratio every 2 weeks (S6)



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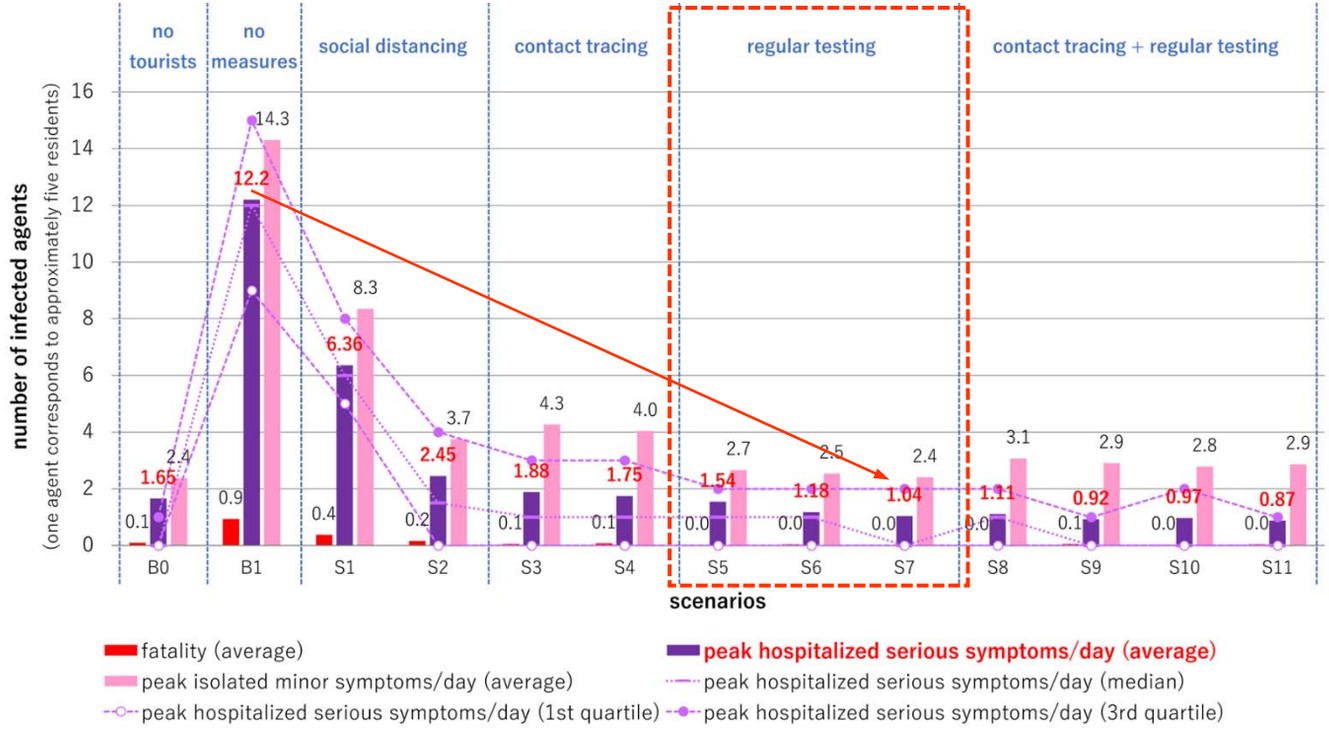
Evaluation of infection control measures

Regular testing on tourism employees & isolation

Compared to no measure (B1), in peak number of serious symptoms:

- 8.5% with a 100% test ratio every 2 weeks (S7)



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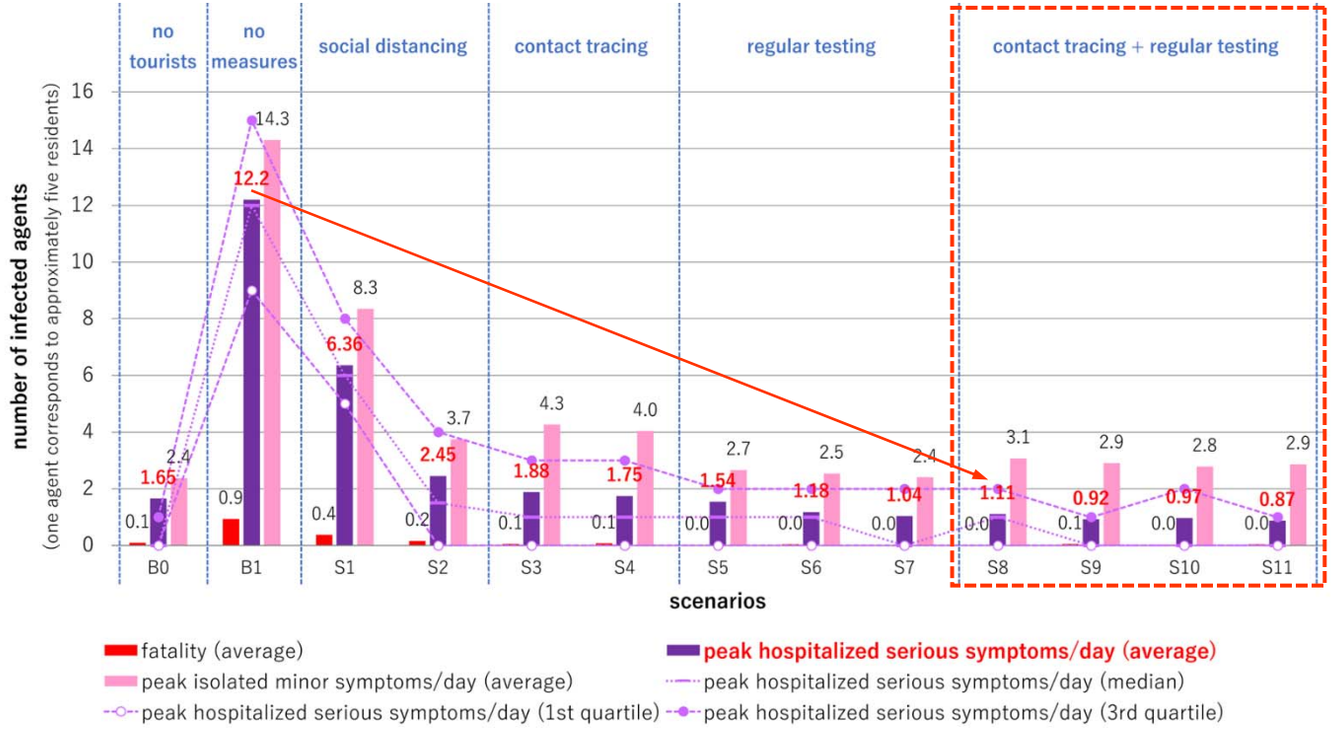
Evaluation of infection control measures

Tracking tests for persons in contact & regular testing on tourism employees & isolation

- 9.1% with 50% tracking ratio & 50% test ratio every 2 weeks (S8)
- 7.5% with 50% tracking ratio & 75% test ratio every 2 weeks (S9)



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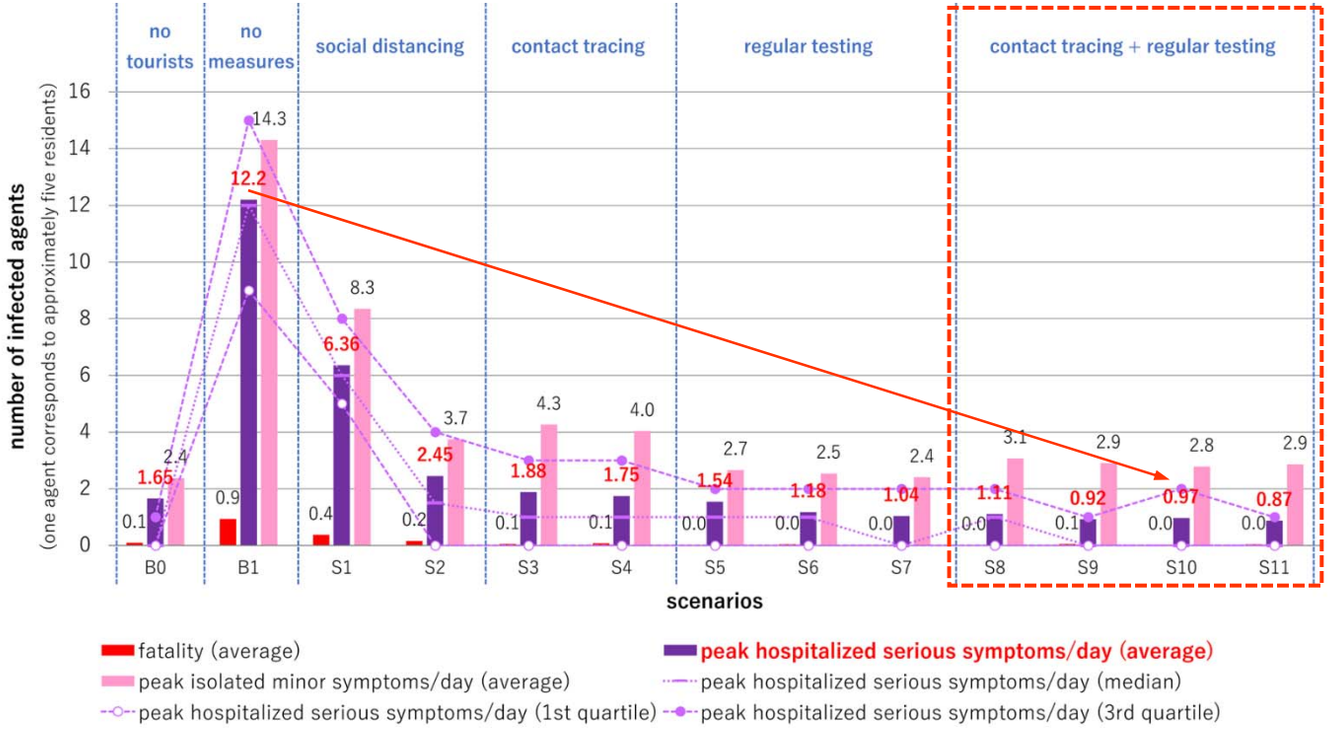
Myoko Model for Balancing Infectious Disease Control and Local Economy

Evaluation of infection control measures

Tracking tests for persons in contact & regular testing on tourism employees & isolation

- 8.0% with 80% tracking ratio & 50% test ratio every 2 weeks (S10)
- 7.2% with 80% tracking ratio & 75% test ratio every 2 weeks (S11)



03 - 07

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Evaluation of infection control measures

Discussion on experimental results

- Effects of changes in local residents and tourists' lifestyles or tourism business service methods were limited on infection control.
- Active epidemiological surveillance was as effective as canceling tourism.
- Regular testing to tourism business employees was more effective than canceling tourism.
- Combination of active epidemiological surveillance and regular testing showed major effects while reducing number of testing.
- **Integrated systems of comprehensive surveillance and sufficient testing would realize a balance between infection control and local economy in tourism locations.**

summary

01

Challenges for tourism locations under COVID-19

Infection control or/and local economy?

02

COVID-19 infection model for tourism locations

Complexity science on infection spread

03

Evaluation of infection control measures

Effectiveness of combined measures