

# Residential care for elderly

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A CASE STUDY

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# A G E N D A

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Introduction



Problem statement



Research questions



Approach: introduction to the queue



Results: sensitivity analysis



Demo



Conclusions and limitations

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## Results: sensitivity analysis



## Demo

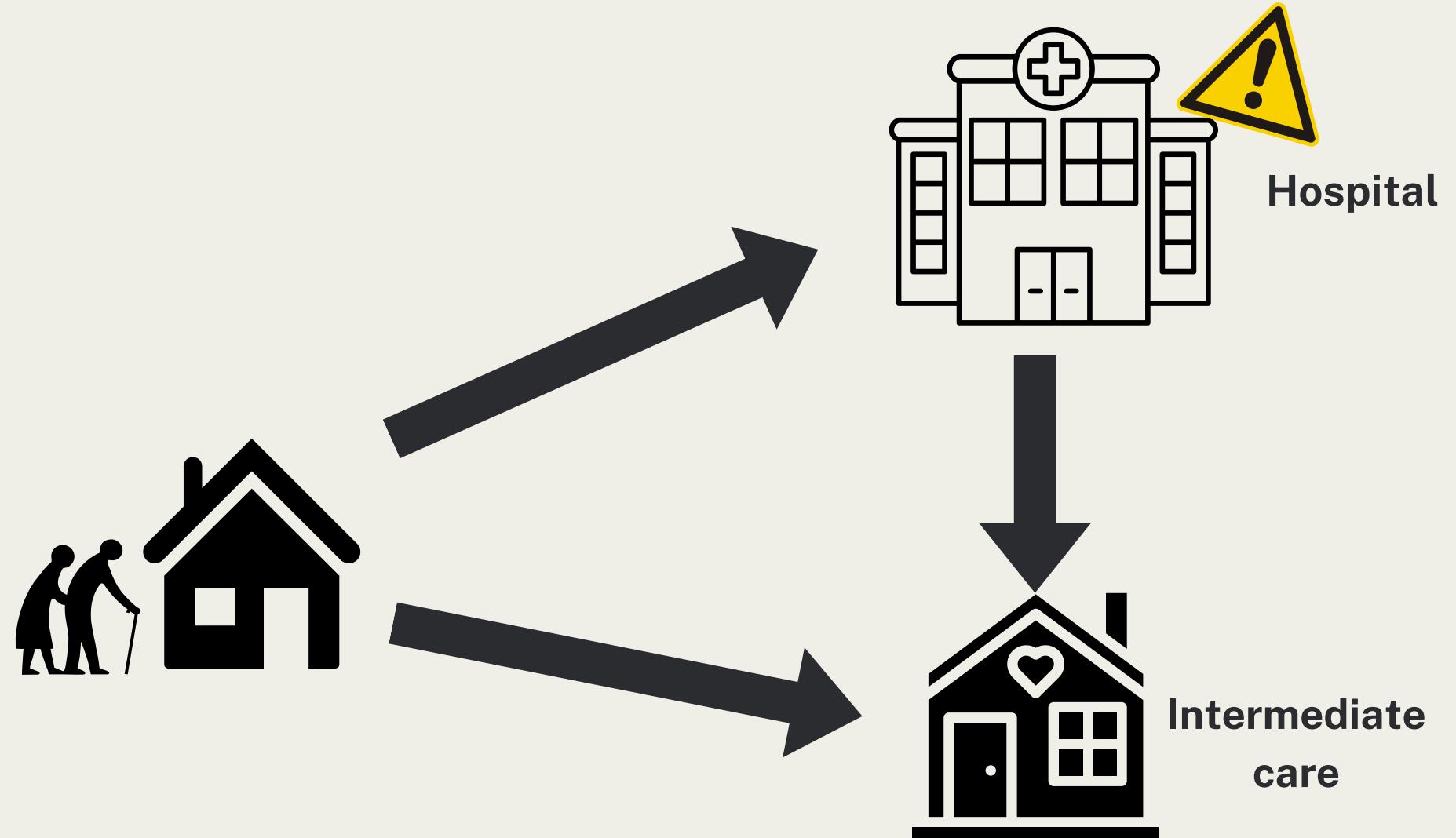


## Conclusions and limitations

# BACKGROUND INFORMATION



- Excessive workload
- Shortage of staff
- 1/4 of the Dutch population is 65 years or older
- Demand intermediate care increases and supply decreases



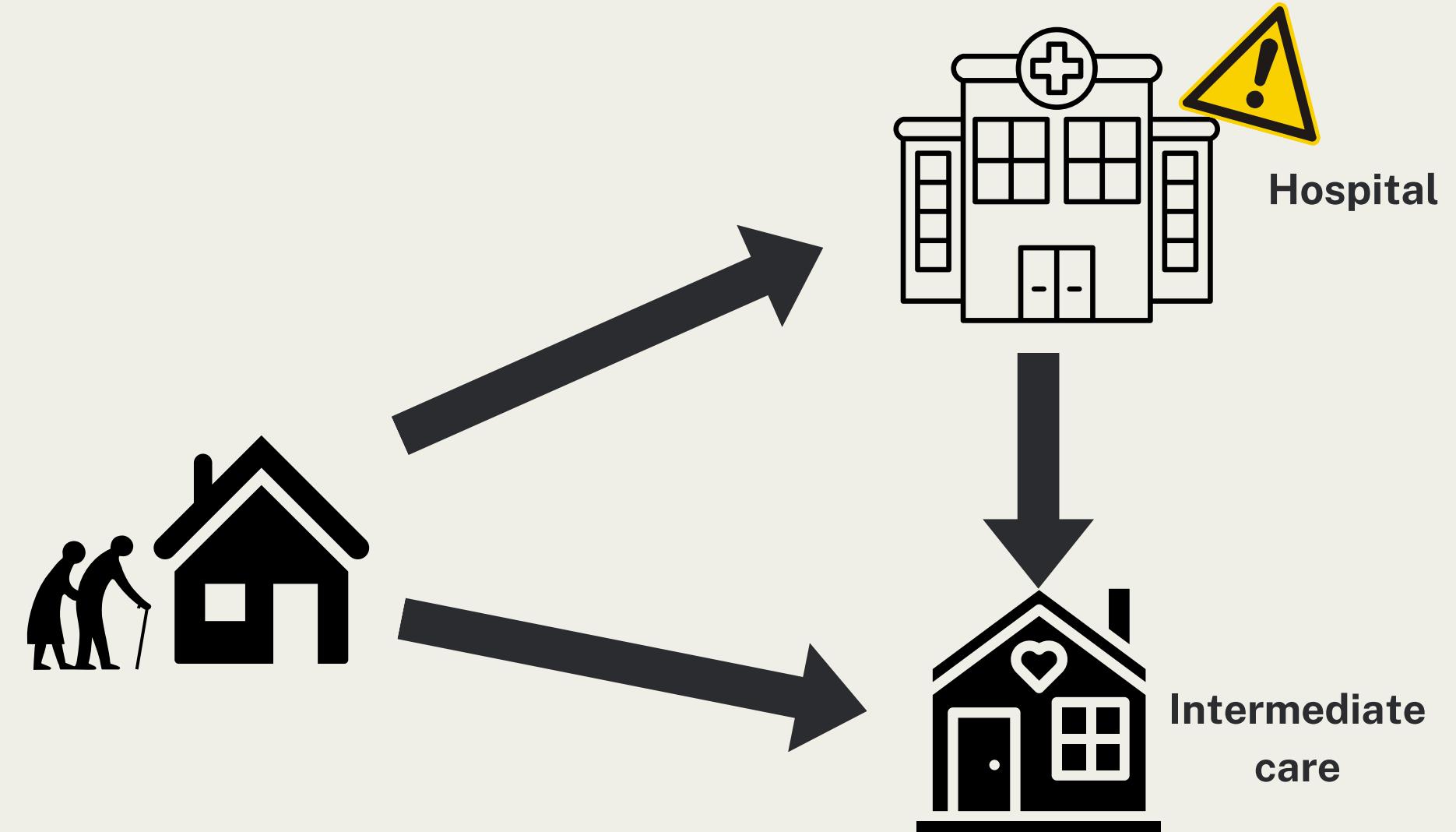
# BACKGROUND INFORMATION



- Excessive workload
- Shortage of staff
- 1/4 of the Dutch population is 65 years or older
- Demand intermediate care increases and supply decreases

## Solution: **intermediate care**

- Timely medical services to older adults
- Prevent costly hospital admissions



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# PROBLEM STATEMENT

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- CAPACITY ISSUES



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# RESEARCH QUESTIONS

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*1. How to develop a simulation model that can predict the waiting times of STRC-services, depending on the available bed capacity in the system?*

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- 1. How to develop a simulation model that can predict the waiting times of STRC-services, depending on the available bed capacity in the system?*
  
- 2. What is the effect of bed sharing on the waiting time?*

# RESEARCH QUESTIONS



- 1. How to develop a simulation model that can predict the waiting times of STRC-services, depending on the available bed capacity in the system?*
  - 2. What is the effect of bed sharing on the waiting time?*
  - 3. What is the effect of centralization vs decentralisation on the waiting time?*

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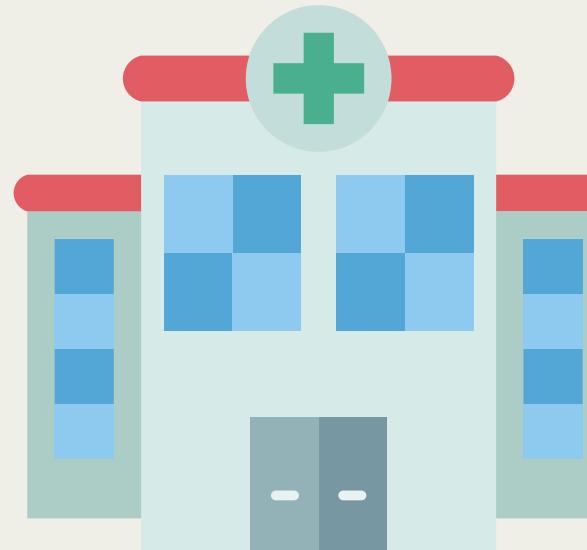


Conclusions and limitations

# USE CASE TWENTE SITUATION



- 4 types of care (Input rates)
  - Low complex
  - Respite care
  - High complex
  - GRZ



# 4 TYPES OF CARE

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## LOW COMPLEX

1. common flu
2. UTI (blaasontsteking)



## RESPITE CARE

1. Absence of family member



# 4 TYPES OF CARE

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## HIGH COMPLEX

1. Heart failure
2. Stroke
3. Cancer
4. Dementia



## GERIATRIC REHABILITATION (GRZ)

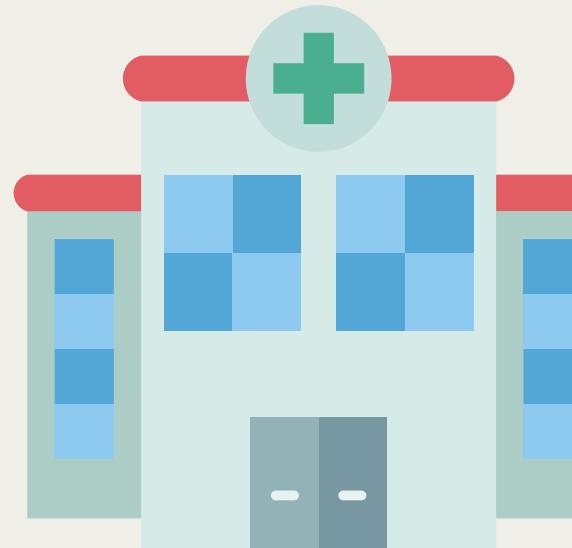
1. Hip fracture recovery
2. Parkinson
3. Post-cardiac surgery rehabilitation



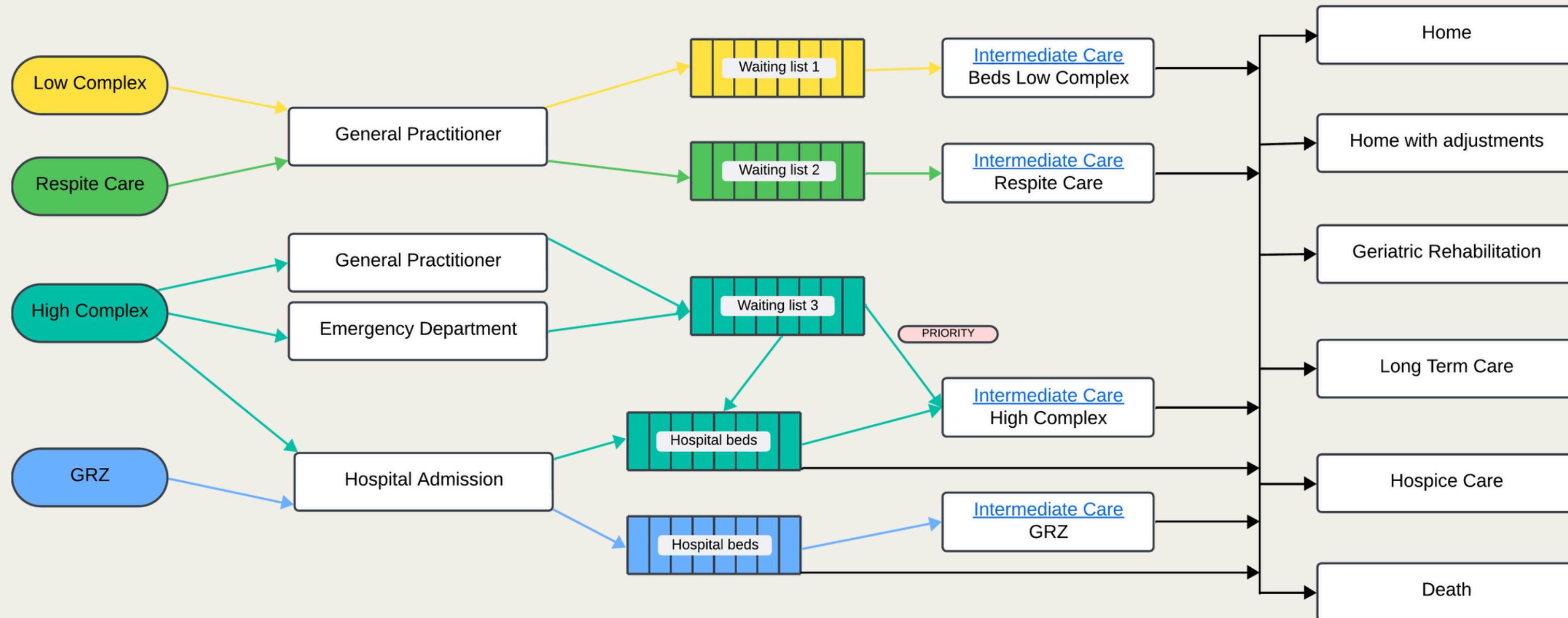
# USE CASE TWENTE SITUATION



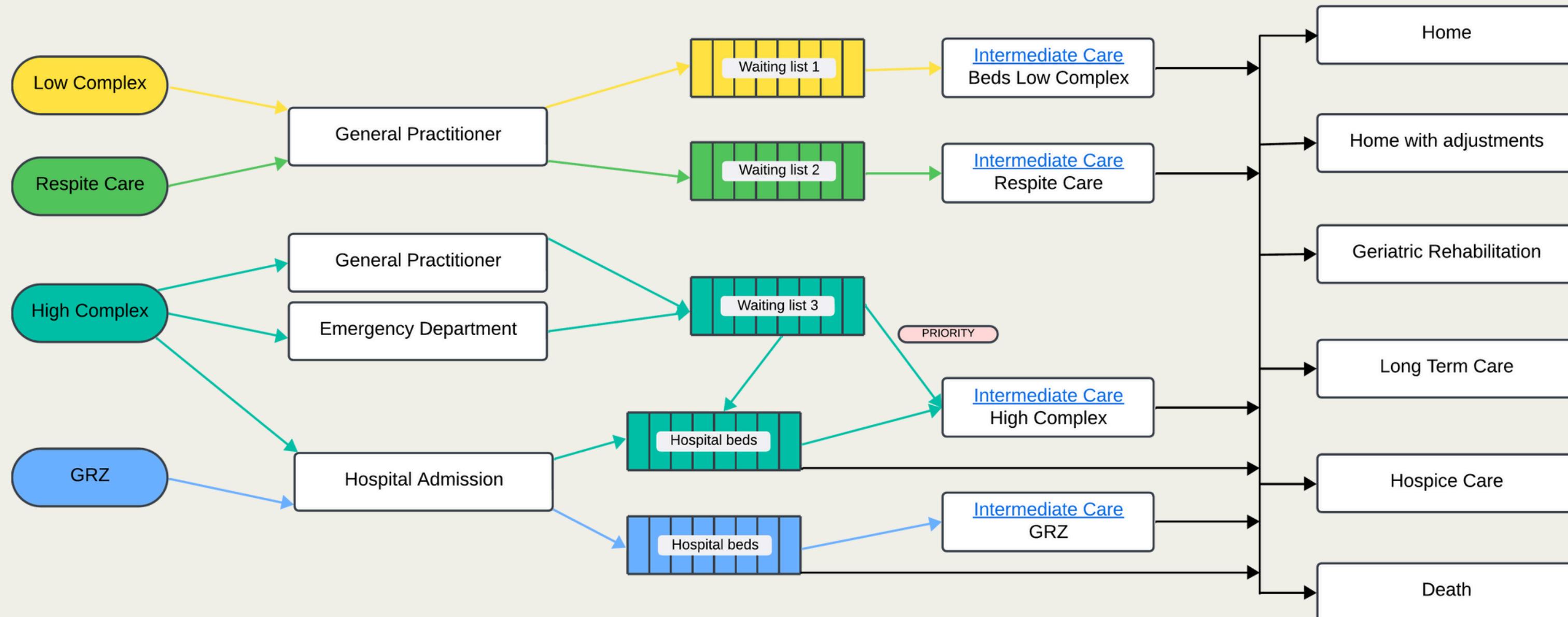
- 4 types of care (Input rates)
  - Low complex
  - Respite care
  - High complex
  - GRZ
- Output rates
  - Home
  - Home with adjustments
  - Long-term Care
  - Geriatric Rehabilitation
  - Hospice Care
  - Death



# MODEL



# MODEL



## ASSUMPTIONS

- Service time is exponential
- Arrival rate is poisson

## SIMULATION

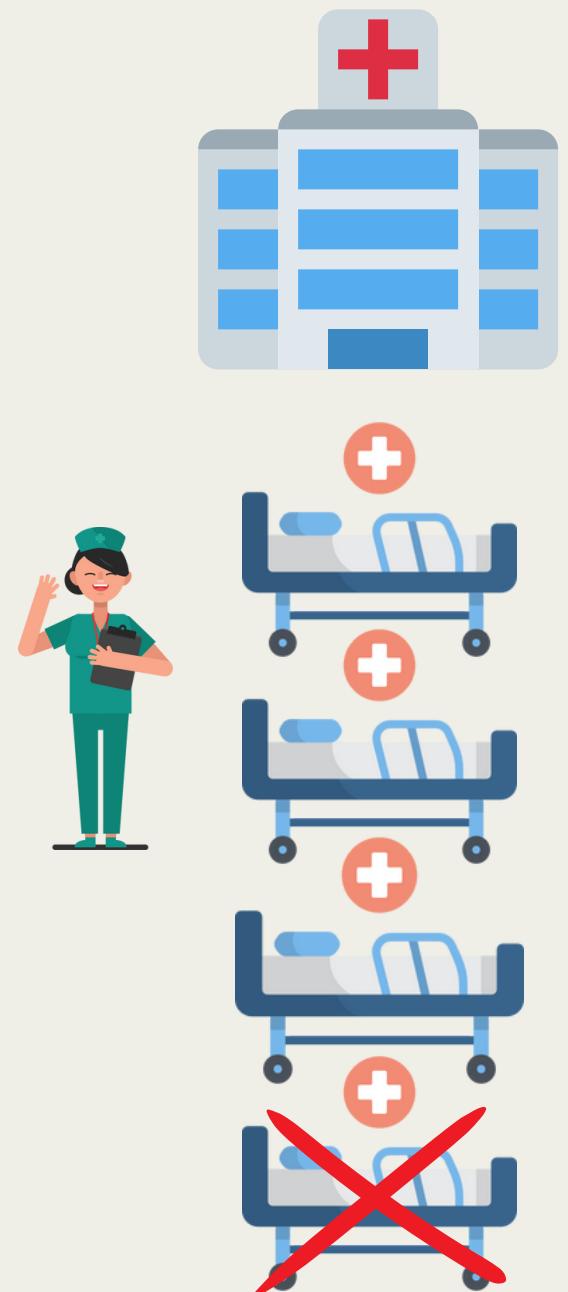
- Discrete-event simulation

# CENTRALIZATION

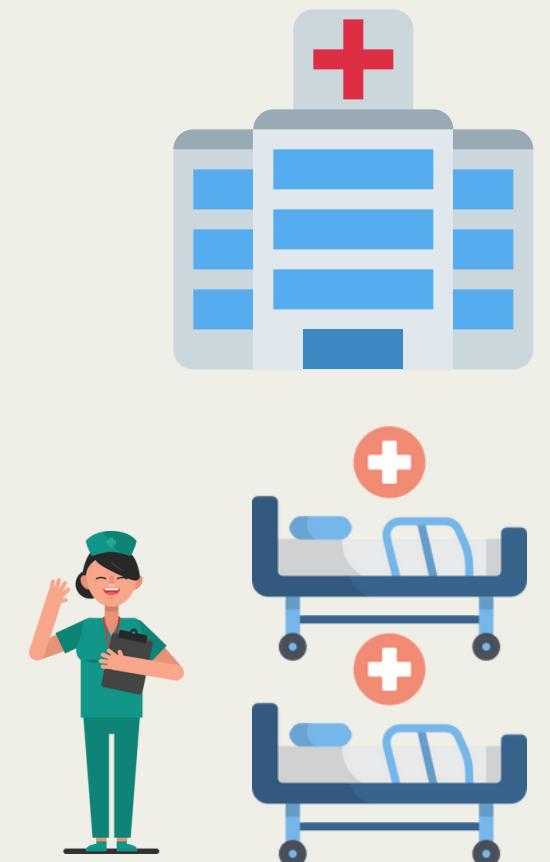


## Decentral

Location 1



Location 2



# CENTRALIZATION



## Decentral

Location 1



Location 2



## Central

1 location

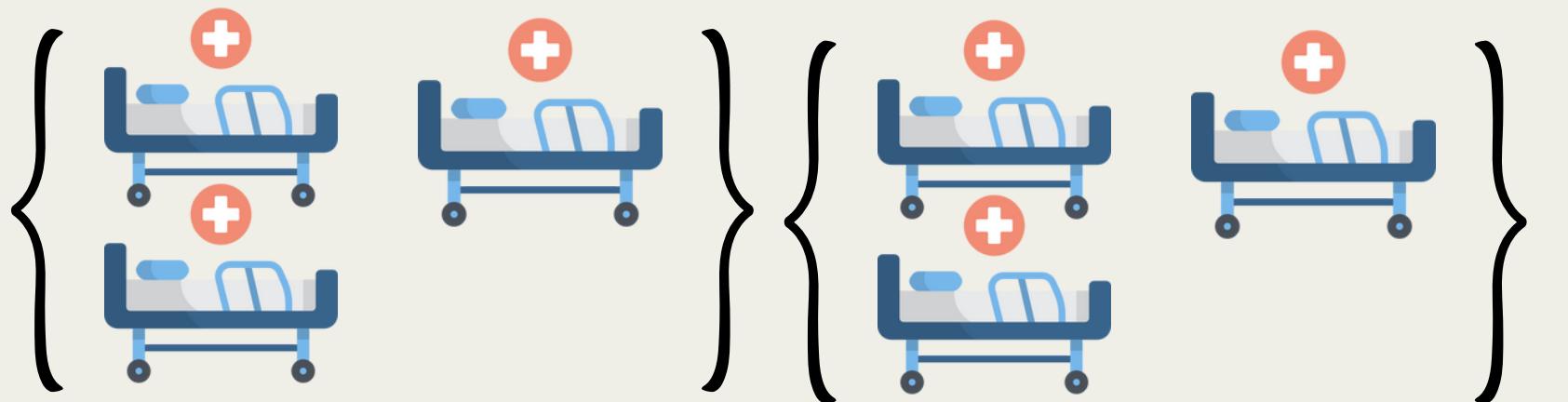


# BED SHARING



## No bed sharing

Low complex



Respite care

# BED SHARING



## No bed sharing

Low complex

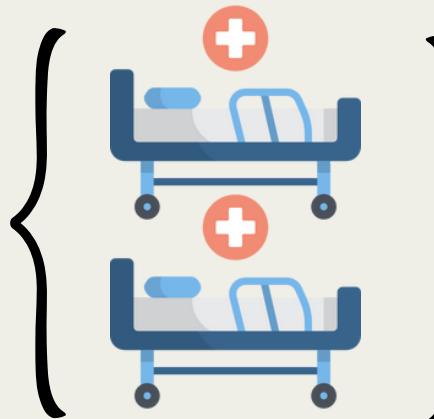


Respite care

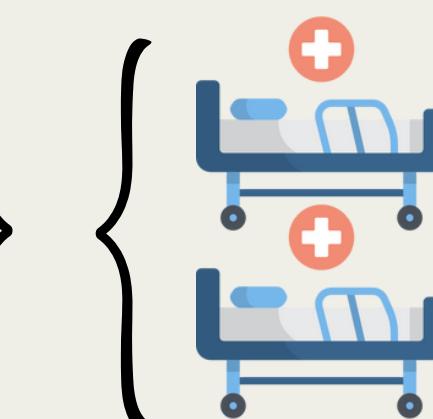


## Partial sharing

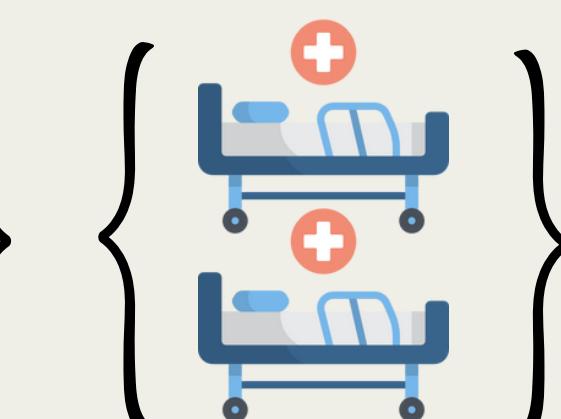
Only low complex



Shared beds



Only respite

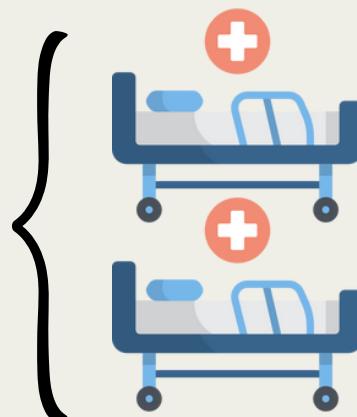


# BED SHARING



## No bed sharing

Low complex

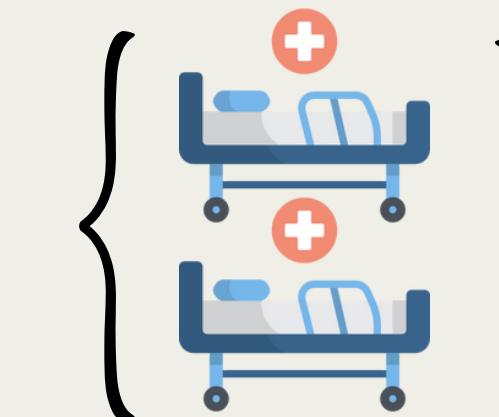


Respite care

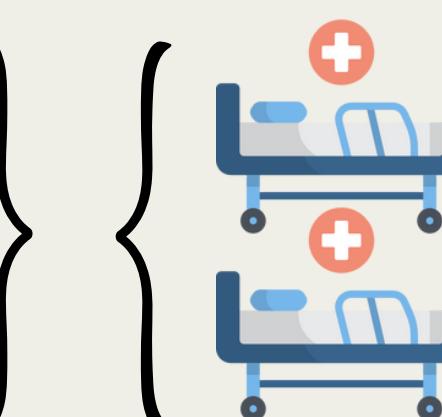


## Partial sharing

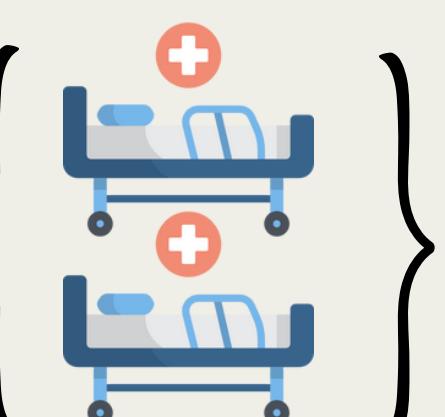
Only low complex



Shared beds



Only respite

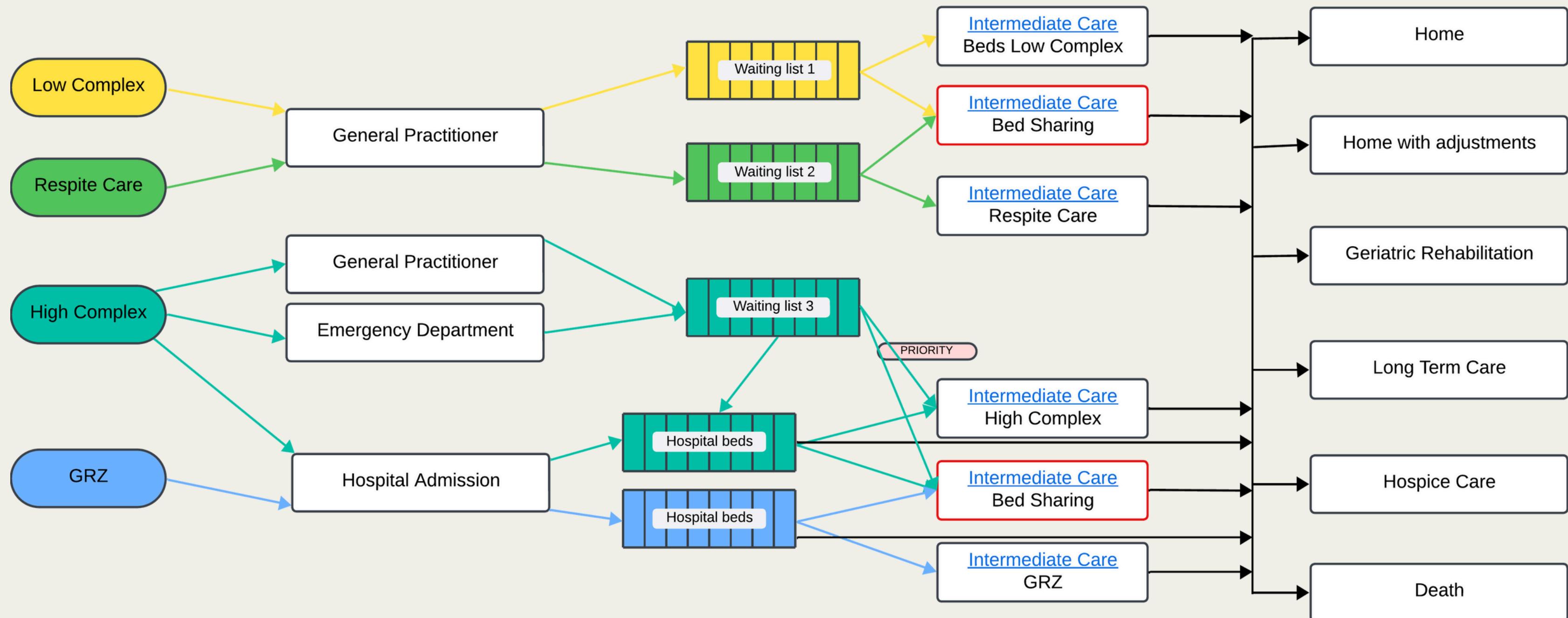


## Full sharing

All beds shared



# MODEL INCLUDING BED SHARING



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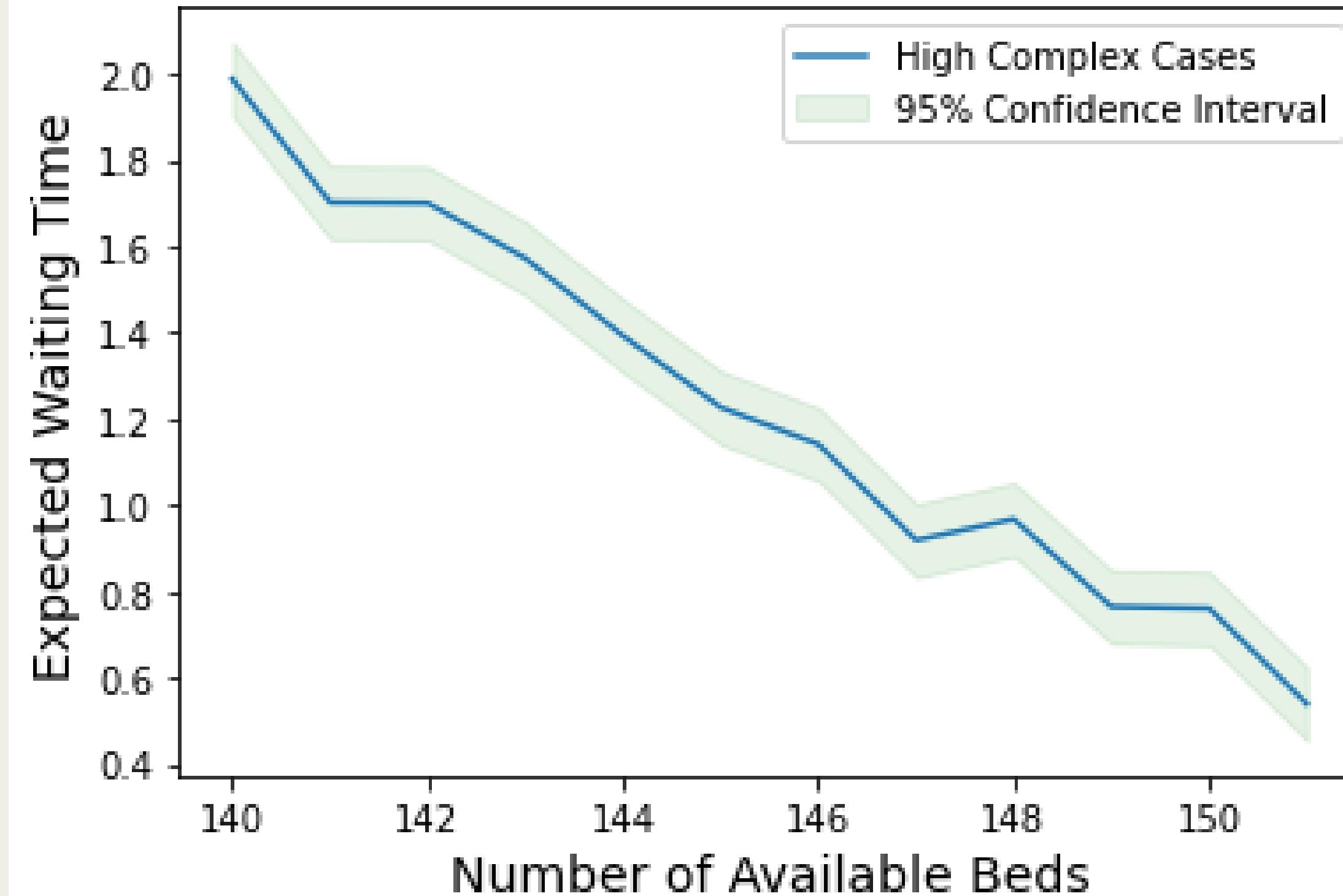


Conclusions and limitations

# WAITING TIME VS. NUMBER OF BEDS



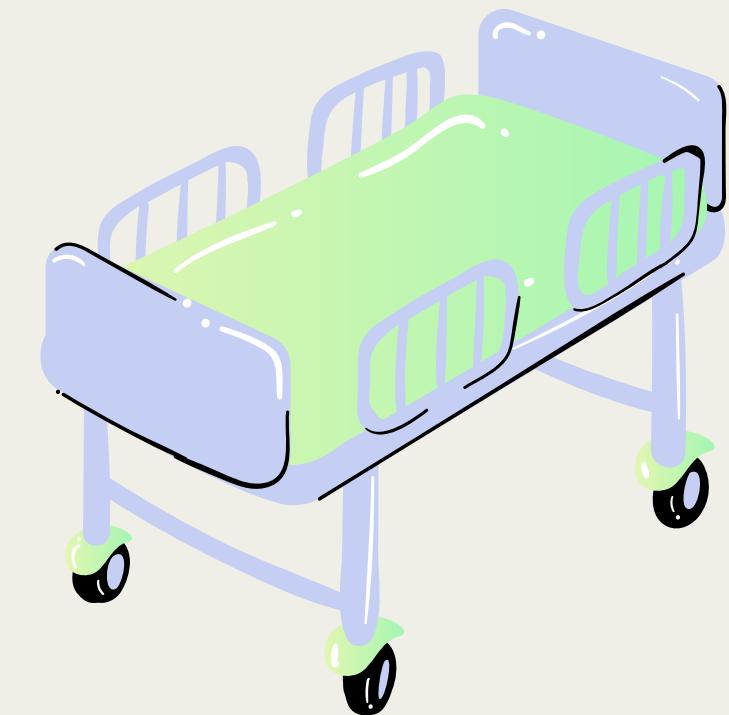
$E(W_q)$  for Different Numbers of Available Beds



# OUTCOMES BASED ON SHARED BEDS



Shared Beds	Simple Queue	
	Low Complex	Respite Care
0	Beds Waiting Time	Beds Waiting Time
0	14 <b>2.96</b>	5 <b>2.27</b>
2	14 <b>0.53</b>	5 <b>1.6</b>
0	15 <b>1.23</b>	6 <b>0.48</b>



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# Demo



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# CONCLUSION

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## What is the effect of bed sharing on the waiting time?

- decreases waiting time
- Especially for queue 2
- Less beneficial for respite care

## What is the effect of centralization vs decentralisation on the waiting time?

- Number of nurses and beds
- Decrease in time



# LIMITATIONS

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## No data

- No validation

## Nurse analysis

- How many nurses is optimal?

## Remove priority

- No time...
- Seems irrelevant