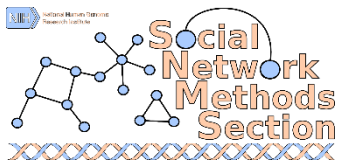


Analyzing healthcare sequences in social networks

Jeff Lienert, M.S.

ESRC Research Methods Festival

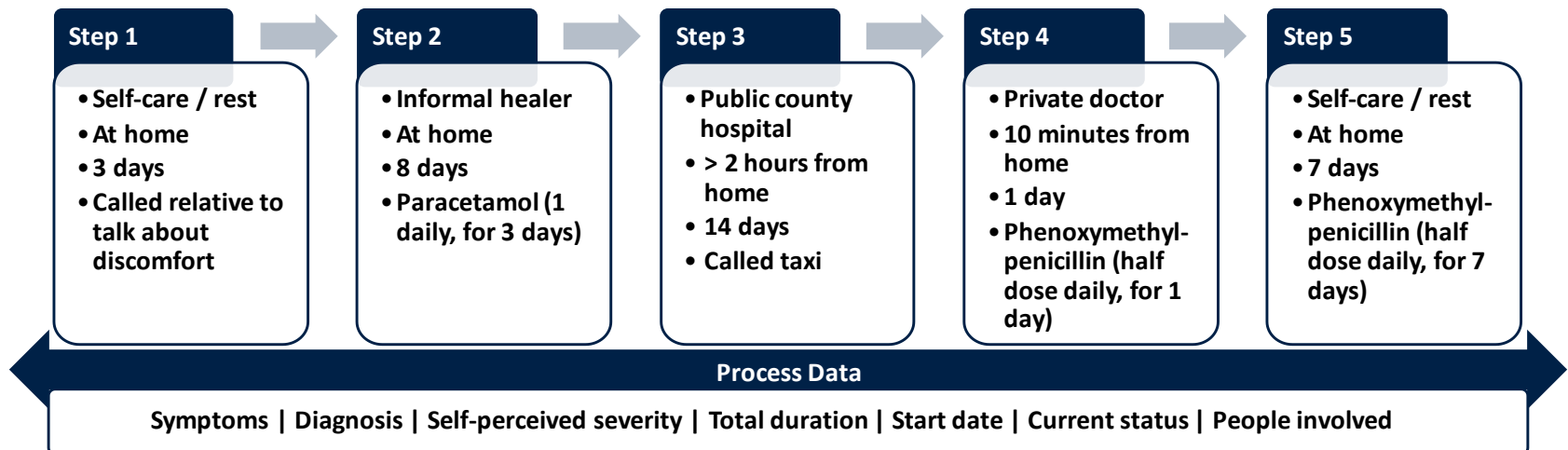
3 July, 2018



Background

- When a person becomes infected and notices symptoms, they can take multiple actions
- Depending on the outcome, they can follow-up with other actions
- Which actions they take are dependent on many things
- Actions they take affect their outcome
- May also affect others

Background



Background

- Actions can be analyzed in a number of ways
 - Counts
 - Event sequence
 - Network
- Each gives different information
- Here, we focus on the network approach, and what it offers over the others

Participant demographics

Variable	Mean (SD) or <i>N</i> (%)
Sex (Female)	<i>967 (65%)</i>
Sequence length	2.58 (1.4)

Making the network

Data

Network

ID	Action
1	1
1	2
2	3
3	2
3	1
3	1

Making the network

Data

Network

ID	Action
1	1
1	2
2	3
3	2
3	1
3	1

Making the network

Data

Network

ID	Action
1	1
1	2
2	3
3	2
3	1
3	1



Making the network

Data

Network

ID	Action
1	1
1	2
2	3
3	2
3	1
3	1



Making the network

Data

Network

ID	Action
1	1
1	2
2	3
3	2
3	1
3	1



Making the network

Data

ID	Action
1	1
1	2
2	3
3	2
3	1
3	1

Network



Making the network

Data

ID	Action
1	1
1	2
2	3
3	2
3	1
3	1

Network

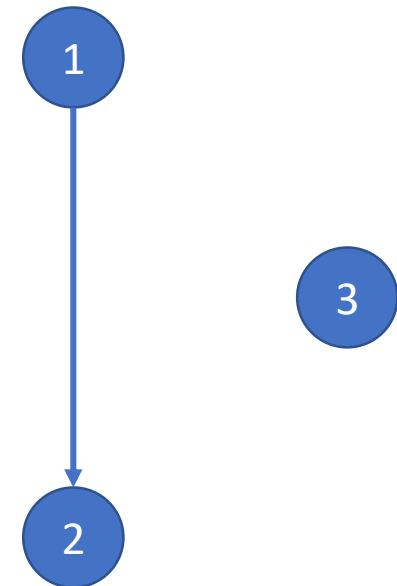


Making the network

Data

ID	Action
1	1
1	2
2	3
3	2
3	1
3	1

Network

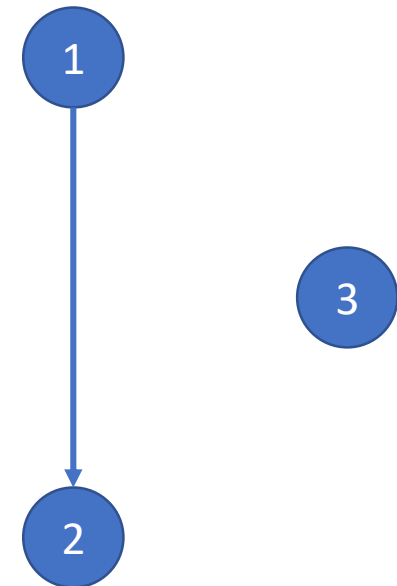


Making the network

Data

ID	Action
1	1
1	2
2	3
3	2
3	1
3	1

Network

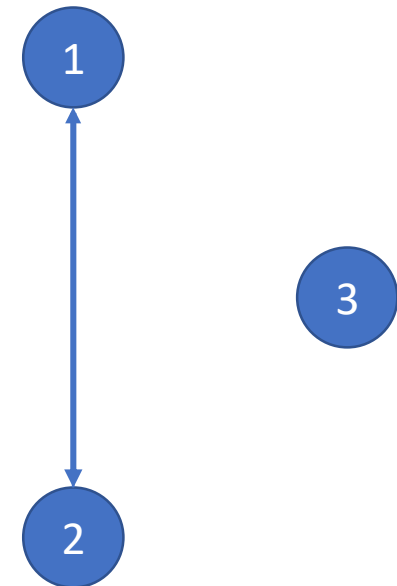


Making the network

Data

ID	Action
1	1
1	2
2	3
3	2
3	1
3	1

Network

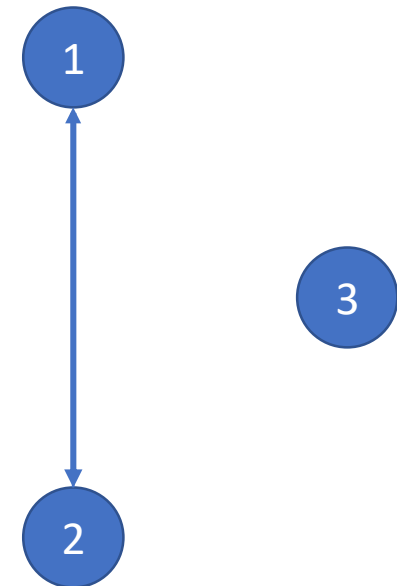


Making the network

Data

ID	Action
1	1
1	2
2	3
3	2
3	1
3	1

Network

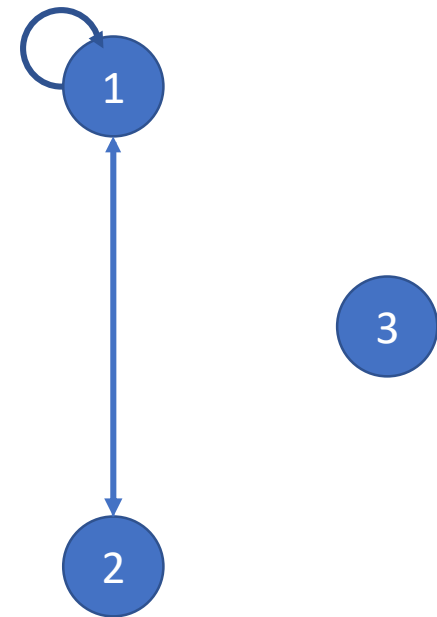


Making the network

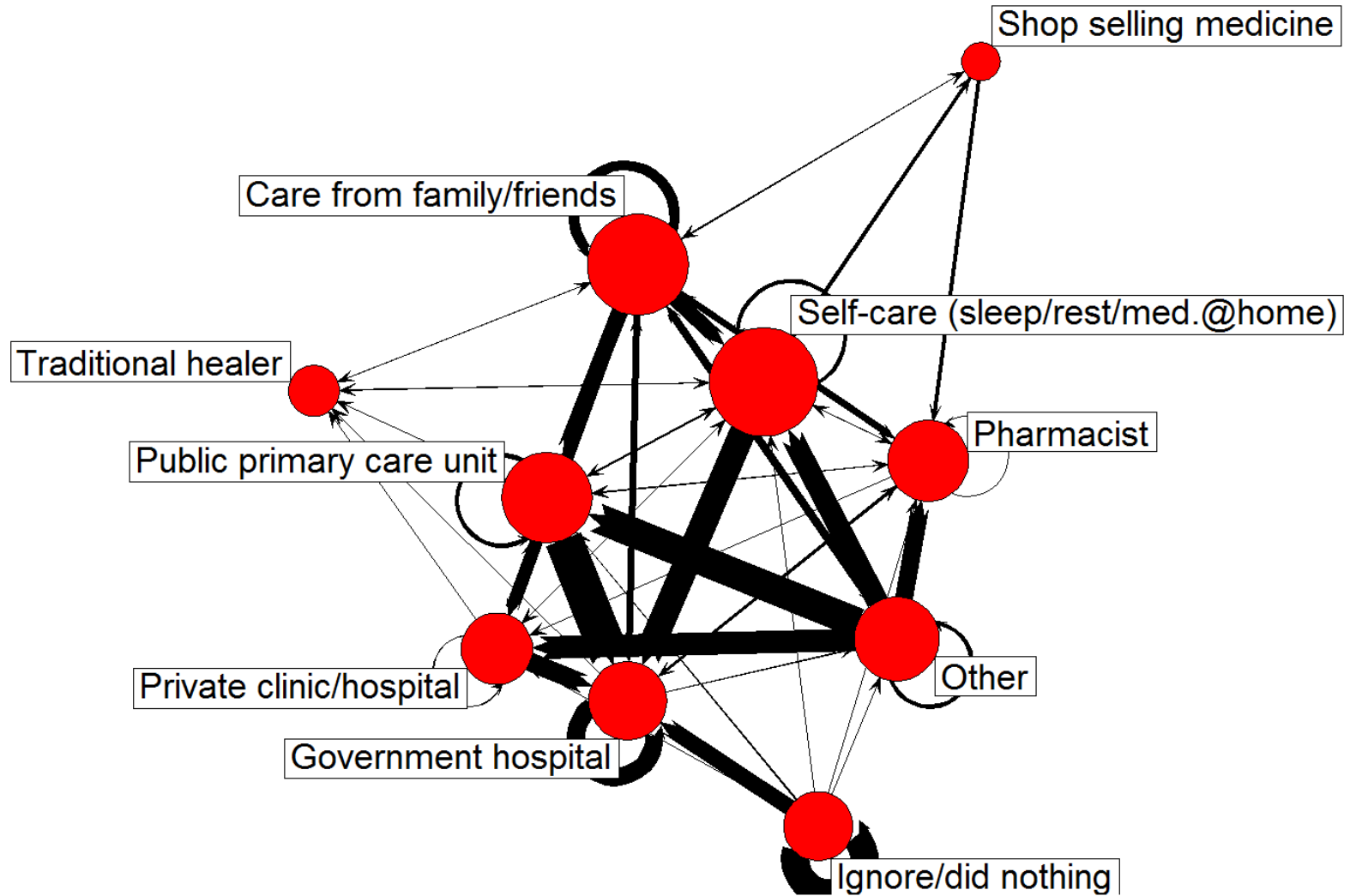
Data

ID	Action
1	1
1	2
2	3
3	2
3	1
3	1

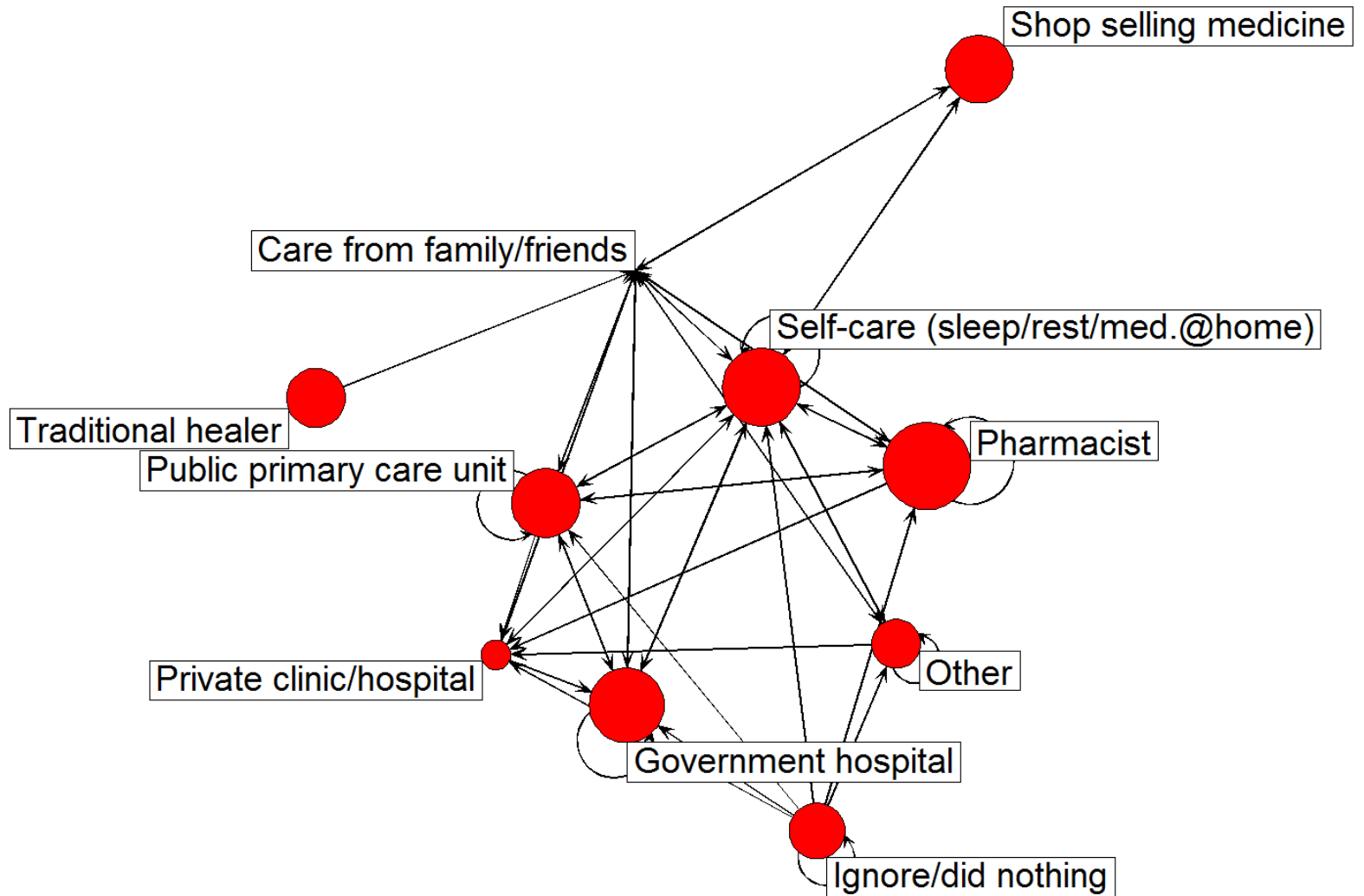
Network



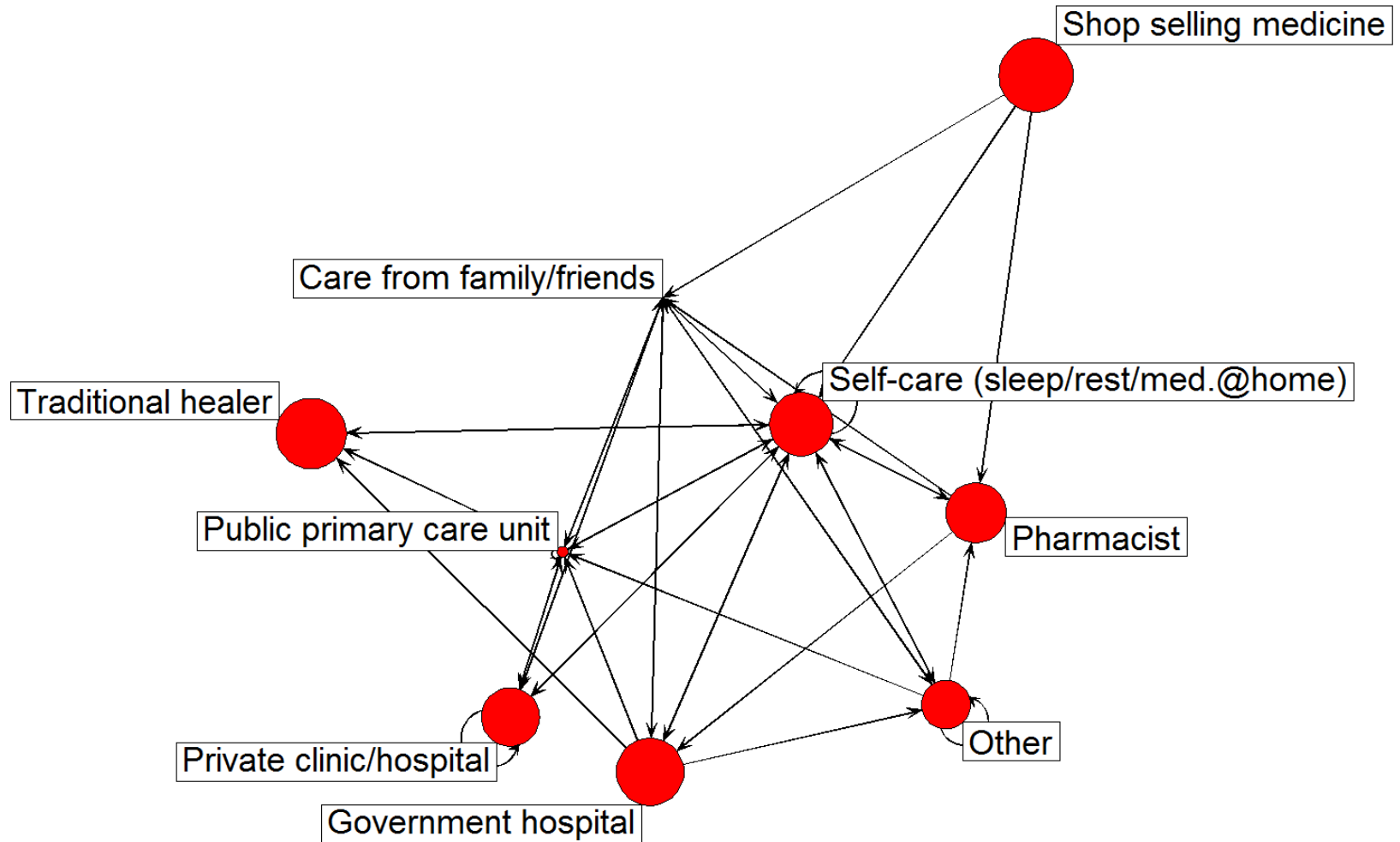
All steps



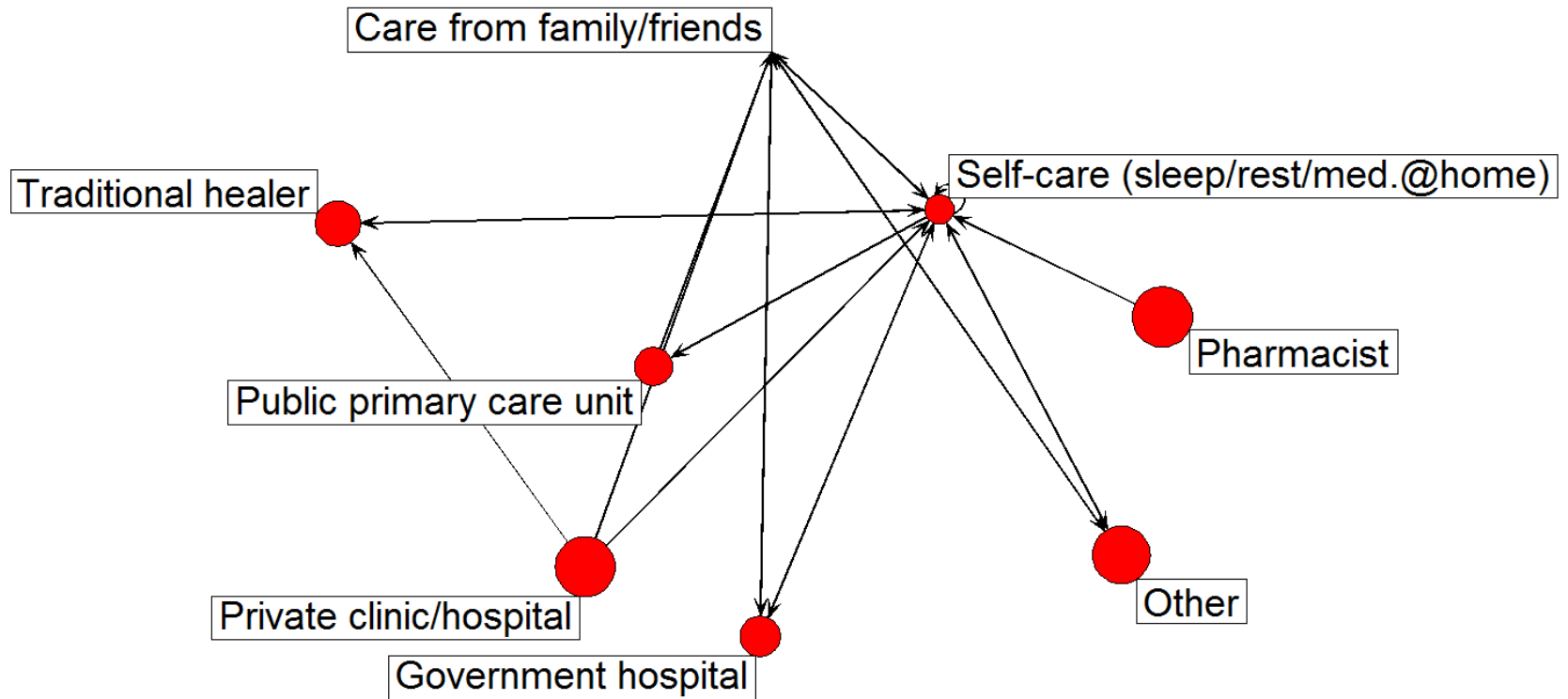
Step 1



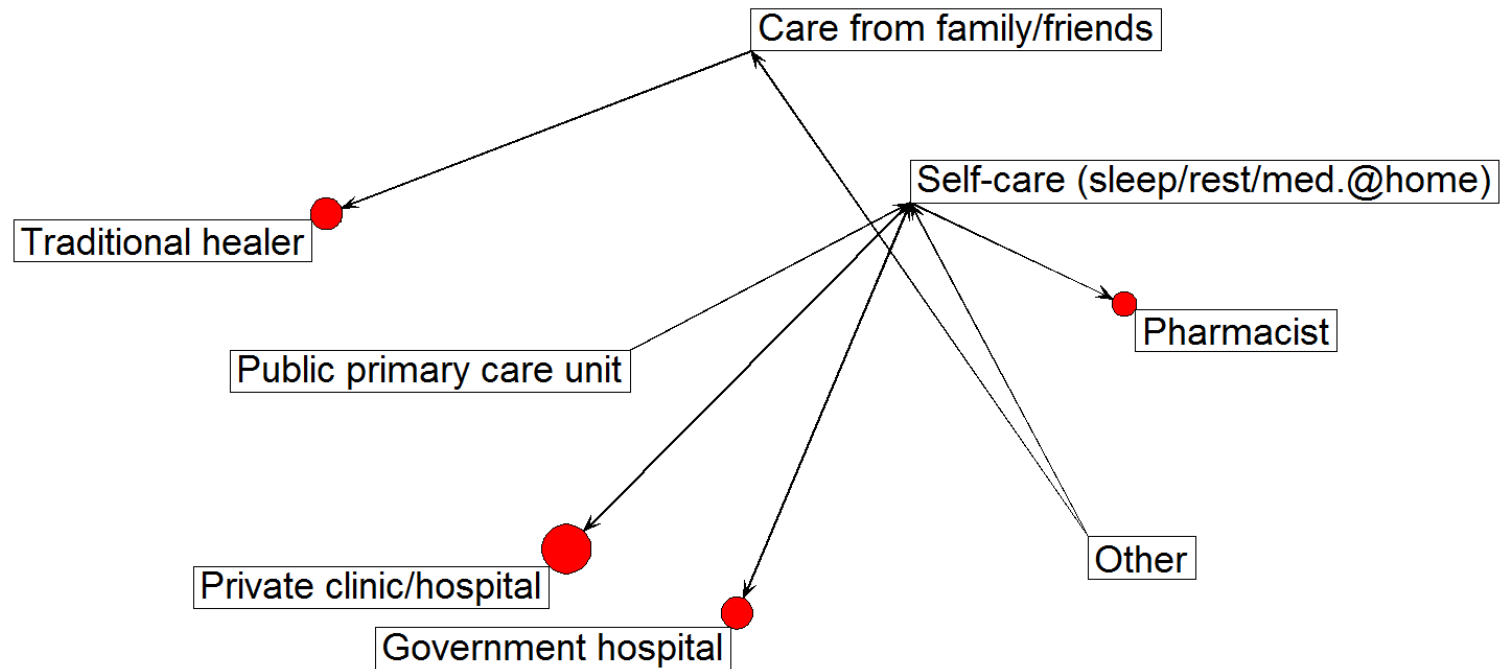
Step 2



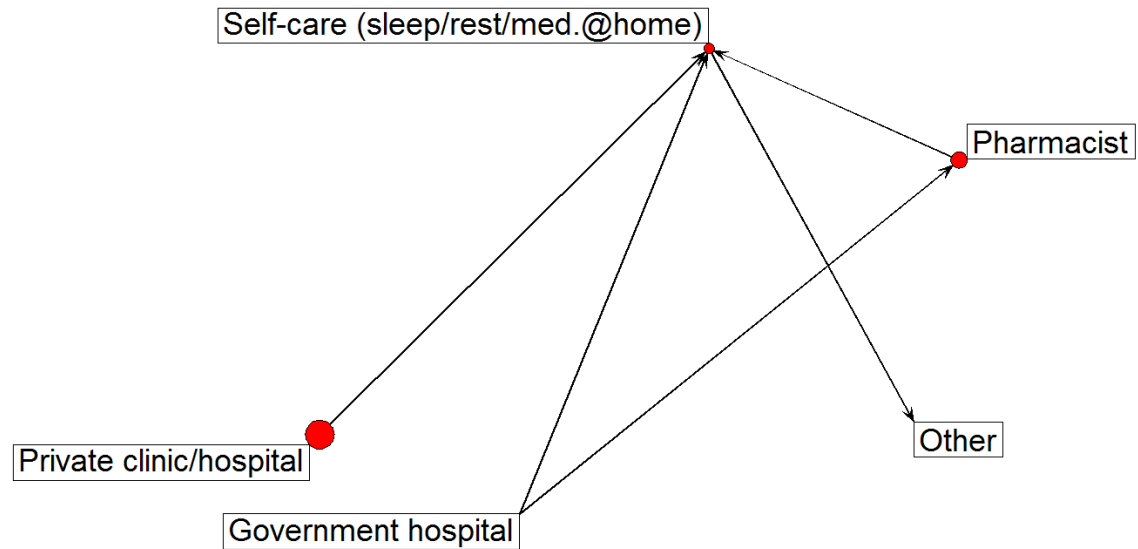
Step 3



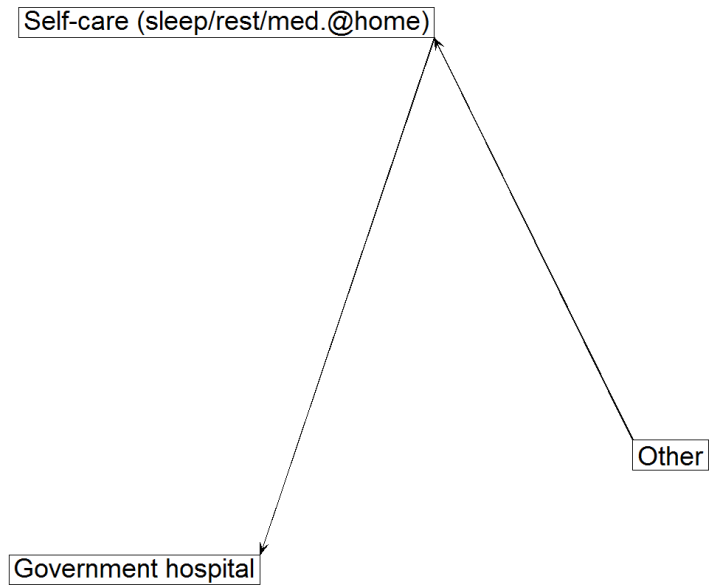
Step 4



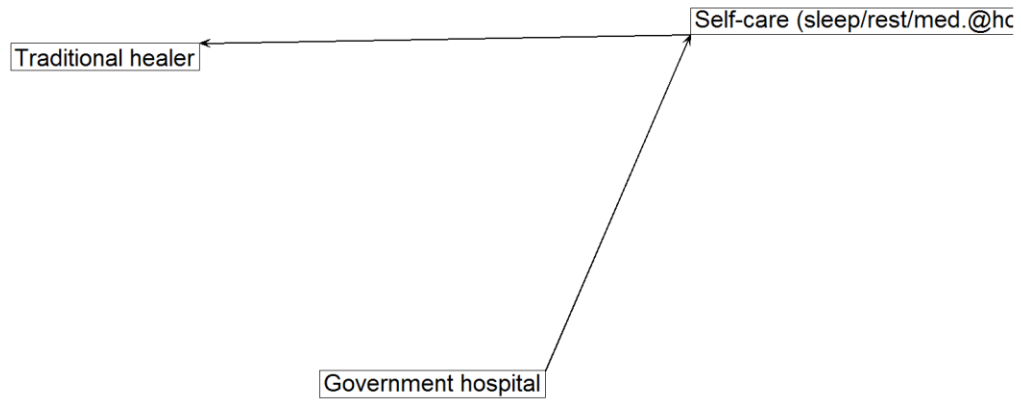
Step 5



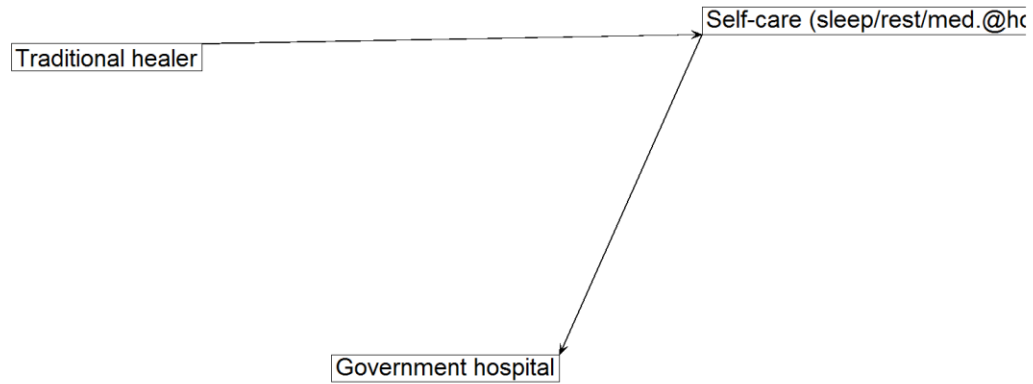
Step 6



Step 7



Step 8



Step 9



Centrality measures

Action	In-degree	Out-degree	Betweenness
Care from family/friends	297	156	9.6
Government hospital	92	108	1.87
Ignore/did nothing	0	33	0
Other	95	149	0.37
Pharmacist	65	124	1.57
Private clinic/hospital	47	71	1.07
Public primary care unit	116	216	1.52
Self-care (sleep/rest/med.@home)	404	256	11.02
Shop selling medicine	5	10	0
Traditional healer	16	14	0

Centrality measures

- Common first steps
 - Doing nothing
 - Pharmacist
 - Primary care
- Common last steps
 - Self-care
 - Care from family and friends
- Common intermediate steps
 - Self-care
 - Care from family and friends

Correlation of centrality and stage

	Sequence	Indegree	Outdegree	Betweenness
Sequence	1.00	-0.01	0.02	0.00
Indegree	-0.01	1.00	-0.56	-0.19
Outdegree	0.02	-0.56	1.00	0.09
Betweenness	0.00	-0.19	0.09	1.00

Conclusions

- Network analysis provides important information about event history of infection healthcare-seeking behaviors
- Network centrality parameters independent of event sequence parameters
- The small number of those seeking traditional healers have unique trajectory

Next steps

- Dynamic network modeling (SAOMs)
- Multilevel network modeling to understand how social network influences event sequence and vice-versa

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