"Enhancing loco-regional adaptive governance for integrated chronic care through agent based modelling (ABM)"

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Abstract
1) Introduction Moving from existing segmented care to integrated care is complex and disruptive. It is complex in the sense that the type of changes and the timeframe of these changes are not completely predictable. It is disruptive in the sense that the process of change modifies but also is influenced by the nature of interactions at the individual and organisational level. As a consequence, building competences to govern the necessary changes towards integrated care should include capacity to adapt to unexpected situations. Therefore, the tacit knowledge of the stakeholders ("knowledge-in-practice developed from direct experience; subconsciously understood and applied") should be at the centre. However, the usual research and training practices using such a knowledge (i.e. action research or case studies), are highly time-consuming. New approaches are therefore needed to elicit tacit knowledge. One of them is agent based modelling (ABM) through computer simulation. The aim ...

Document type: Communication à un colloque (Conference Paper)

Référence bibliographique
Macq, Jean ; Deconinck, Hedwig ; Van Durme, Thérèse ; Lambert, Anne-Sophie ; Karam, Marlène ; et. al. Enhancing loco-regional adaptive governance for integrated chronic care through agent based modelling (ABM). 17th International Conference on Integrated Care (Dublin, Ireland, du 08/05/2017 au 10/05/2017).
Enhancing loco-regional adaptive governance for integrated chronic care through agent based modelling (ABM)

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Justification
Building competencies to govern health and social care at loco-regional level by taking into account tacit knowledge and cognitive heuristics

Many countries (including Belgium) are attempting to move from existing segmented care to integrated care. It is complex in the sense that the type and timeframe of changes are not always predictable. It is in the nature of the processes that the process of change is related but also influenced by the nature of interactions between agents.

Facing the challenge of the transition from segmented to integrated care, this project is about to develop a loco-regional level fitness network covering between 100,000 and 500,000 people. Acknowledging the tacit knowledge and cognitive heuristics of the stakeholders is key to this learning process.

Methods
Simulating the behavior of a loco-regional system with Netlogo® and sharing it with MPH students to progressively improve it

We applied components of ABM to assess how health systems adopt and move towards integrated care. ABM allows simulating the different behaviors of CAS.

The agent-based model was developed through a process where storytelling, concept maps, group voting process (NetLogo), UML (Unified Modeling Language), and computer simulations were used. The Netlogo® version of ABM was iteratively used with different groups of MPH students.

Studying and applying ABM was initially done with students following a course on “Systemic approach to public health”. Based on that and an exchanges with the other authors, the main author developed progressively an ABM in Netlogo®

This was shown to student: following an optional module on coordination and networks organization it improve its awareness.

It was finally exchanged with 1st year MPH students to identify likely scenarios of changes and discuss it.

Aim
Making a showcase of ABM that foster sharing of tacit knowledge between stakeholders

The aim of this paper is to make a “showcase” of an agent-based model (ABM) that build on and make explicit tacit knowledge of the stakeholders to enhance loco-regional adaptive governance for improving integrated chronic care.

Theoretical lenses
Using the lenses of complex adaptive system to study the health systems integration process

We used a complex adaptive system lens to study the health systems integration process.

Generic adaptive systems (CAS) are models of agents that interact, learn from experience, self-organize, and behave unexpectedly. CAS are open systems. As a consequence, they are influenced by the environment and influence it.

Complex adaptive systems features emerge of the following behavior: path dependency; emergence “order”, bounded rationality, social learning, scale-free networks.

Generally, CAS have equivalent.

Results
Organisational features
- Market: All patients and hospitals can decide who they want
  - Number of PCPs needed to decide (simulated for 1000 patients): 4
  - Number of hospitals: 9
  - People are free to choose their provider if it is close to them
- Territorial organization:
  - 1 hospital per region
  - Equal payment of PCPs between the 4 PCPs can react when they work within a territory
  - People are free to choose their provider if it is close to them
  - “system with a gatekeeper role”:
    - People choose in the patients through a PCP, except if no access to it
- Case Management:
  - The OM ensures that people with low autonomy have better access to healthcare services (PCPs and hospitals)

Scenarios by students

Scenario 1
- Intervention: Collaborative
- Decision: CM hospital
- Outcome: CM hospital

Scenario 2
- Intervention: Collaborative
- Decision: CM hospital
- Outcome: CM hospital

Scenario 3
- Intervention: Collaborative
- Decision: CM hospital
- Outcome: CM hospital

Scenario 4
- Intervention: Collaborative
- Decision: CM hospital
- Outcome: CM hospital

Scenario 5
- Intervention: Collaborative
- Decision: CM hospital
- Outcome: CM hospital

Sharing tacit knowledge and elicit cognitive heuristics

Behavior of the system over time
(centered on ratio « cost » over « health » simulated)

Moving away from intervention evaluation towards system monitoring: promoting the development of methodology combining ABM with participative approaches to make better use of tacit knowledge

This is the initial step of an exercise to use ABM as a mean to take advantage and enhance such knowledge to strengthen governance for integrated care. It is expected that it will be used to foster dialogue between loco-regional projects to integrate health and social care for chronic diseases in Belgium (now program following federal authority).

Future research should combine the development of methodology combining ABM with participative approaches to make better use of tacit knowledge in strengthening loco-regional governance for the development of integrated care.

Figure 1: People population
- At the starting conditions:
  - Cost of health issues: 1 extra from healthy to sick
  - Autonomy
  - Health and autonomy evolve over time (spontaneously or with some external events)

Figure 2: Health care providers
- Hospitals: (yellow box) or primary care providers (PCPs) (white) providers
- Collaboration: case motivation and complementary motive without a priori relative value
- Behavior:
  - Providing care
  - Decisions: CM hospital, which is assigned through a hospital to the PCP, who visit places of patients
  - People visit hospitals or PCPs
  - Increase cost
  - Get: not consulted (stop working)
  - People with low autonomy

Discussion
Conclusion