DOCTORAL CONSORTIUM

# A Proposal for a Study of the Process Aspect of the Integrated Lifelong Treatment of Healthcare to Patients

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Healthcare is in crisis. On the one hand, the population is ageing, on the other hand, we are faced with a lack of resources: human, spatial and financial. That means that we have to make the health system more efficient. During a period of treatment, patients come into contact with a variety of health providers at different levels of the health system. That leads to the gaps between different instances of treatment. According to experiences in other fields, such as industry, a process-oriented view of health treatment could be one of the components of a successful solution. We wonder: How does viewing the medical treatment a patient receives throughout their life as a process affect the gaps between different instances of treatment?

**Keywords:** healthcare, patient, integrated lifelong treatment, business process

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## 1 Introduction

Healthcare is in crisis. On the one hand, the population is ageing, which increases the number of patients requiring healthcare and necessitates ever greater amounts of medical treatment.

While new treatment methods and new drugs help people live longer and enjoy better treatment outcomes, they also require ever greater financial investment.

On the other hand, we are faced with a lack of resources: human (shortfall of doctors and other health workers), spatial and financial.

We cannot exercise a significant impact on the requirements or the restrictions, which means that we have to make the health system more efficient.

During a period of treatment, patients come into contact with a variety of health providers at different levels of the health system.

Let us give a few examples.

In Slovenia, 99.3% (source: NIPH, 2023) of children are born in a maternity unit. 99.4 % of births are attended by skilled health personnel in the Members of the European Union (*Proportion (%) of Births Attended by Skilled Health Personnel - European Health Information Gateway*, 2022). This is their first encounter with health treatment and treatment. After discharge from hospital, the newborn is visited by a home care nurse, who provides care to the baby and encouragement to the mother. The baby undergoes systematic checks, with health professionals monitoring their development in a paediatric clinic, vaccinating them and providing a number of other services. When a patient falls ill in Slovenia, they usually visit a primary-level general practitioner (GP), who provides treatment. In more complex cases, the GP sends the patient to a specialist.

In the event of an acute illness or an injury, the patient attends an emergency centre, where they begin acute treatment. In more serious cases, acute treatment continues in hospital. After the patient's condition improves, they move to non-acutFcroe treatment and an extended period of hospital treatment. After their discharge from

hospital, treatment continues at primary level. If the patient is referred for rehabilitation, this takes place when they are still in hospital, and may continue at a health resort.

After discharge from hospital, treatment, care and health promotion may also be provided by a home care nurse. For older patients, treatment and care may continue in a care home, with palliative care often being provided at medical institutions as well.

Patients can therefore be treated as follows in the course of their life:

- at primary level: by a general practitioner, family doctor or paediatrician,
- at secondary level: by specialists in specialist clinics and in hospitals (a patient may also move between hospital departments),
- at tertiary level: at University Medical Centre, where the patient may move between clinics,
- rehabilitation may be performed by hospitals, health resorts and private physiotherapists,
- home care services,
- home help, day centres for the elderly, care homes, hospices.

According to experiences in other fields, such as industry (Hammer, 2015; Hammer & Champy, 1995, 2003; Keen, 1997; Keen & Knapp, 1995; Urh et al., 2022), a process-oriented view of health treatment could be one of the components of a successful solution. It could increase quality of treatment and reduce unnecessary healthcare treatment, the duplication of medical examinations and treatment time, thereby improving treatment outcomes, reducing hospitalisation rates and, not least, bringing down costs. The benefits of improving treatment outcomes and reducing hospitalisation and sick leave rates are manifold. Patient satisfaction and quality of life improve: they do not have to spend money on treatment, and can use this renewed period of health to create new value.

The digital transformation of processes also adds a new dimension.

## 2 Problem definition

The study will look at patient treatment in all periods of life as a process. This process takes place in an environment we will refer to as the 'health system'. During a period of treatment, patients come into contact with a variety of health providers at different levels of the health system. Whether a patient's treatment is successful in a given period frequently depends on previous medical treatment and the information available on that treatment.

More than 99% of babies born in Europe are attended by skilled health personnel. (*Proportion (%) of Births Attended by Skilled Health Personnel - European Health Information Gateway*, 2022), while patients are usually treated by their GP or occasionally by specialists in other institutions. During a hospital stay, they are treated by yet another set of hospital staff. Treatment often involves nurses, physiotherapists, pharmacists or psychologists.

The problems we can identify are the following:

P1 Organisational and informational gaps arise during medical treatment at different healthcare providers. (Bürkle et al., 2017; Amelung et al., 2021)

P2 Attending health workers are not always apprised of the activity of previous treatments. (Amelung et al., 2021)

P3 Attending health workers are not always apprised of the drugs that have been prescribed in the course of previous treatment or the drugs that the patient is currently taking. (Bürkle et al., 2017; Žerovnik et al., 2018).

P4 Fragmented care tend to foster duplication and the inefficient use of resources, producing gaps in the care of patients with multimorbidities and reducing overall health sector capacity by pushing the best health care workers to focus on single diseases (WHO Global Strategy on People-Centred and Integrated Health Services Interim Report, 2015).

P5 Whether a patient's treatment is successful in a given period frequently depends on previous medical treatment and the information available on that treatment.

The main goal of the doctoral dissertation is to look at patient health treatment as a business process – that is, as the integrated lifelong treatment of patient healthcare. We would like to demonstrate that viewing treatment over the course of a patient's life as a process has a significant positive impact on reducing the gaps between different instances of treatment and thereby improve the medical care given to a patient.

An organisational process is the organisation (Rant, 2001; Rant, 2007)

- of inputs – for example, people, equipment, energy, procedures, materials, information;
- of a sequence of work activities;
- of the coordination of actions between the people (and occasionally machines) involved in the activities required to produce
- a certain end-result or output
- that has value to the customer and to investors.

If we look at the process of integrated lifelong treatment of healthcare to patient, we can regard the individual elements in the above definition as:

- As inputs we regard
  - health workers: GPs, specialists, nurses, home care nurses, physiotherapists, care workers;
  - information – medical reports, discharge letters, recommendations, prescriptions, procedures, treatment results.
- Work activities are instances of healthcare treatment at different healthcare levels – primary, in specialist clinics and in hospital.
- The end-result is the outcome of treatment.
- The customer is the patient – a newborn baby, a patient, an injury victim, a person taking part in preventive treatment.

Based on previous research, we expect that it will be possible to propose and implement a new "integrated organisational model for lifelong integration of patient care" using appropriate digital technologies. This means that it is expected that digital transformation of processes will be required for the implementation of the model (Davenport & George, 2018; Raskino & Waller, 2015; Sajja, 2017; Van Veldhoven & Vanthienen, 2022).

### 2.1 Research question

How does viewing the medical treatment a patient receives throughout their life as a process affect the gaps between different instances of treatment?

## 3 Methodology

### 3.1 Research approaches

The following research approaches will be employed:

#### 3.1.1 Case Study Research Methodology

(Yin, 2018; Kljajić Borštnar, 2021)

This involves an in-depth study of a certain situation (integrated healthcare), which differs markedly from existing treatment practices.

#### 3.1.2 Design Science Research

If we develop a new conceptual organisational model, we will also make use of Design Science Research (Hevner, 2007; Hevner et al., 2004)

#### 3.1.3 Systems Development Life Cycle (SDLC)

To analyse the problem, we will use the Systems Development Life Cycle model (Dennis et al., 2014; Valacich et al., 2017).

This study will use the first two activities of this methodology: planning and analysis. We will use Directly observing users (Valacich et al., 2017) and Analyzing procedures and other documents (Valacich et al., 2017).

### 3.1.4 Methodology for resolving a problem and methodology for building systems

(Gričar & Piskar, 1988)

## 3.2 Working procedure

We will conduct

1. a literature review
2. an analysis of the current situation
3. a definition of the problems
4. an analysis of the problem
5. a proposed solution
6. an evaluation

# 4 Preliminary/expected results

## 4.1 Literature review

We are reviewing the literature in several broad fields:

- Literature in the field of integrated lifelong treatment of healthcare to patients.
- Literature in the field of business processes.
- Literature in the field of system theory.
- Literature in digital transformation.

Based on the findings from the literature, we will elucidate the problems identified by the authors.

We are reviewing the literature on the basis of the following key words: seamless, cross-sector treatment, integrated care, coordinated care, seamless coordinated care, Re-Engineered Discharge (RED), seamless transition (for patient), person-centred care co-ordination, integral treatment, holistic care, continuous patient care.

We have found studies on specific transitions between activities (from hospital to home care, transitions between the treatment of children and adolescents or adults (Nadarajah et al., 2021)) and on specific areas (eating disorders, EDs) (Nadarajah et al., 2021; Wade, 2022), chronic heart failure (Yang et al., 2022), heart attack (Robyn Blackadar & Mishaela Houle, 2009), anorexia nervosa (Stocker et al., 2022), frail older people (D. Kodner, 2012).

However, we did not find studies of integrated lifelong treatment of healthcare to patients.

The business process literature focuses mainly on business processes in industry, not on business processes in healthcare (Dumas et al., 2018; Hammer, 2015; Hammer & Champy, 1995, 2003; Keen, 1997; Keen & Knapp, 1995; Urh et al., 2022).

### 4.2 Further results

We will carry out an analysis of the existing situation.

With the help of real-world data collected by the National Institute of Public Health, we will attempt to provide evidence for the problems we have identified regarding organisational and informational gaps. It is not enough for data to exist. It must be used. (Stevens et al., 2022) define the flow of data through the ecosystem: collection, transfer, processing and interpretation. (Rant, 2010) establishes that the data process comprises: the receipt of data, data control, the preparation of a database, a standard report and analysis, and the dissemination of data and information.

We have obtained the number of discharge letters reported to the central repository of patient data (CRPD). We have obtained information on the number of hospitalisations completed in hospitals. We will also try to obtain information on the number of times doctors have viewed discharge letters in the CRPD. This will help us to demonstrate that attending health professionals are not always apprised of the course of previous treatments.

We have obtained data on prescriptions issued, and will attempt to obtain information on the number of times prescriptions have been viewed. This will help us to demonstrate that attending health workers are not always apprised of the drugs

that have been prescribed in the course of previous treatment or the drugs that the patient is currently taking.

From both aspects we will define the problems, analyse them and make a proposal for a solution, which we will also evaluate.

### 4.3 Scientific contribution

Medical treatment must place the patient at the centre and connect medical professionals around him. We can see treatment of a patient as a business process and individual types of medical treatment as phases and activities within this process. In process terms, we can deal with the general practitioner as the owner of the process, in conjunction with the patient and his family. Here the GP operates on the 'case manager' or 'care manager' principle. They manage the treatment process as a whole, calling on specialists in other fields for more in-depth activities.

Access to information on previous instances of medical treatment must be provided to those currently providing healthcare at any level. This can be provided by a single repository: the central electronic health record (EHR). In Slovenia this is the Central Registry of Patient Data (CRPD).

We are looking for the intersection between business processes, healthcare and digital transformation (Figure 1).

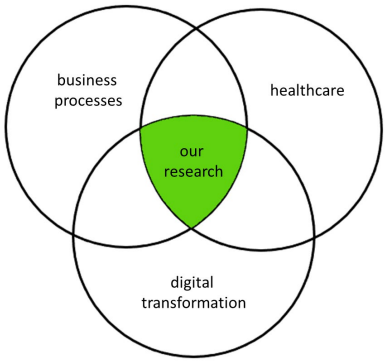


**Figure 1: The intersection between business processes, healthcare and digital transformation**

## 4.4 Objectives of the doctoral dissertation and the envisaged scientific research results

The aim of the research is to look at healthcare treatment to a patient as a business process, i.e. as the integrated lifelong treatment of healthcare to a patient. We would like to demonstrate that viewing treatment over the course of a life as a process can have a positive impact on reducing the gaps between different instances of treatment and thereby improve the medical care given to a patient.

The objectives of the doctoral dissertation are:

- To explore the literature in the field of integrated lifelong treatment of healthcare to patients – examination of the theoretical premises.
- To bring together the theoretical premises in this field.
- To determine the stakeholders in integrated lifelong patient treatment.
- To research the problems (challenges and difficulties) that arise in healthcare treatment (analysis of the problem).
- To lay the foundations for an integrated organisational model of integrated lifelong treatment of healthcare to patients.

### 4.5 Potential results of the study and the importance of those results

The results of the study will contribute to an in-depth understanding of the process view of integrated lifelong treatment of healthcare to patients. The findings will therefore contribute to knowledge in this field, as they will build on previous studies in this field.

The result will also contain a presentation of the conceptual organisational model of integrated lifelong treatment of healthcare to patients based on theoretical findings and practical experiences. This will enable us to describe healthcare treatment as a business process from birth to death.

In addition to activities in terms of organisation, we will also look in detail at the information systems associated with those activities. This requires us to set the following requirements:

1. Access to data on all instances of healthcare treatment is required if the work is to be successful.
2. Access to information on previous instances of medical treatment must be provided to those currently providing healthcare at any level.
3. A single repository is required – central EHR. An example of this is the Slovenian Central Registry of Patient Data.

## 5 Future development

In our research, we aim to show that looking at lifelong healthcare as a process has a significant positive impact on reducing the gaps between different treatments and, as a result, can improve patient care.

The implementation of such a view is beyond the scope of our research and may be a challenge in the future.

It would also be interesting to longitudinally monitor the results of the introduction of a process view of lifelong healthcare and to compare them in terms of the consequences of different treatments.

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