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Article

Modelling Dilemmas in Access to Specialised Healthcare Services in Sweden Using a Serious Game

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Abstract

Sweden has a socialised healthcare system, with healthcare provided through publicly funded clinics. Patients requiring specialised care are referred by primary healthcare centres, resulting in long waiting times. Long waiting times for specialised healthcare services have become a common challenge in Sweden, leading to higher healthcare costs as interest in private healthcare increases. It has been a challenge to mitigate this delay due to multiple systemic factors.

This paper presents a dilemma-based game design methodology that integrates real-world workflow mapping, stakeholder conflict analysis, and system constraints to simulate access to specialised care in the Swedish public health system. It serves as a tool for exploring systemic inefficiencies, evaluating reform scenarios, and building shared understanding among practitioners, administrators, and policymakers.

The novelty of this work lies in its use of stakeholder-centred dilemma modelling to design serious games to elicit economic, technical, ethical, and operational tensions at the level of primary access in socialised healthcare systems. This work employs a serious games-based approach to model the socio-technical dimensions of delays experienced by individuals accessing specialised care, while maintaining the fairness and constraints of public health infrastructure. The approach enables the simulation of sensitive healthcare challenges in a neutral, safe setting, offering a replicable framework for other complex domains.

1. Introduction

According to the World Health Organisation (WHO), access to health care is a fundamental human right [1]. It is also part of the Sustainable Development Goals, aligning with Goal 3: Good Health and Well-being [2]. Access to healthcare means receiving care and treatment at the appropriate time and promptly. Healthcare is a complex social system comprising numerous components and stakeholders that work together to deliver high-quality, affordable care. It is

fraught with dilemmas and difficult choices due to the presence of multiple public and private stakeholders.

Delays can arise due to limited access to resources, such as hospital beds, medical staff, or funding. Other dilemmas relate to accessing specialised services, which depend on healthcare structures, geographic location, socioeconomic status, or insurance policies. Issues can also arise from differing priorities among patients, providers, and policymakers. These challenges highlight the complexity of the healthcare landscape, where even well-intentioned decisions can have unintended consequences.

For decades, the Swedish healthcare system has faced challenges from long queues [3]. Waiting times for Swedish patients are the longest among those in other European countries. Approximately 70% of Swedish patients reported receiving an appointment with a doctor or nurse within 7 days of first seeking care. Regarding waiting times for specialised care, Sweden ranks in the bottom tier [4], [5], [6].

Due to the long wait times for accessing primary health care centres in Sweden, some patients are turning to emergency departments for care. This can lead to overcrowding in emergency departments, resulting in longer wait times for patients who require urgent care [7].

Given this complexity, practical decision-making tools are crucial for navigating the diverse interests and perspectives of all stakeholders effectively. Traditional approaches often fail to address the nuanced nature of healthcare dilemmas, leaving stakeholders struggling to find common ground. This is where serious games become relevant. Serious games engage participants and facilitate dialogue and collaboration, providing a safe space to explore difficult choices and their potential impacts.

In this work, we present the application of serious game methodologies to model dilemmas in accessing specialised care through primary health centres in Stockholm, Sweden. We used publicly available datasets to model the resources and delays in the referral system. We developed scenarios by increasing resources and introducing infrastructure changes within the game setting to elicit knowledge about the delays and the approaches stakeholders use to manage them in the current setting. The outcomes of the game sessions may prompt stakeholders to discuss the types of support that could alleviate delays in accessing specialised healthcare within the current Swedish public healthcare framework. It can also provide insights into how to develop healthcare games, particularly regarding policy dilemmas, such as the focus on primary care versus specialised care.

2. Background

2.1 Serious Games

Serious games are developed primarily to provide an interactive space with real-world models, enabling stakeholders (or players) to "play" with them in a monitored and measured setting [8]. They incorporate structured objectives, rules, dynamic feedback, and carefully calibrated scenarios, all of which are designed to engage users cognitively and emotionally while supporting knowledge acquisition, skill development, and behavioural change. Serious games have been successfully employed across domains such as education, healthcare, business, and environmental science to address complex problems and foster critical thinking and decision-making.

A key advantage of serious games is their ability to provide a safe, controlled environment for experimentation [9]. When underpinned by a robust and well-constructed model of the system or phenomenon in question, such games enable players to interact with and explore intricate processes without the ethical, financial, or physical risks associated with real-world interventions. This feature makes them particularly valuable in domains where direct experimentation is impractical or impossible.

Furthermore, serious games allow for focused engagement with specific issues or challenges [10]. By abstracting or omitting extraneous real-world complexities, they enable players to concentrate on the core variables and relationships that define the problem space. This reduction of noise facilitates more precise learning outcomes and analytical reflection, making serious games a powerful tool for both training and research.

Additionally, serious games can offer greater degrees of freedom and perspective-taking than are typically available in real-life scenarios [11]. Players may adopt multiple stakeholder roles, explore counterfactual scenarios, or make ethically charged decisions in ways that are rarely feasible outside of a simulated environment.

2.2 Dilemmas

Dilemmas are situations that require decisions among multiple conflicting interests, priorities, or stakeholders, often under conditions of uncertainty [12]. They are characterised by complexity and the need for critical trade-offs, making them ideal for investigation through serious games. The structure of serious games aligns well with the real-life elements of dilemmas because games include roles (players) and clear objectives or rewards that closely mirror the dynamics of decision-making among various stakeholders [13]. Players represent different perspectives, interests, or objectives, and the game's rules guide them in navigating choices, weighing outcomes, and exploring the implications of their actions. This format provides a "safe space" for examining various decision paths without real-world consequences, which is valuable when investigating ethically or socially sensitive issues.

2.3 Games in Swedish Healthcare

Several studies and implementations utilising serious games approaches have been conducted in Sweden's healthcare sector [14]. For example, Zhang et al. [15] developed a multi-method serious game to model a pediatric emergency department at Stockholm’s Karolinska Hospital. This game lets players experiment with patient inflow and resource allocation in a realistic ED workflow; in trials, it significantly improved participants’ decision-making and proactive management of human resources under crowding pressures. In a similar spirit, serious games were designed to create an extended-reality Emergency Department scenario, where routine tasks in the emergency department are transformed into immersive game challenges that train non-technical skills (such as situational awareness, leadership, communication, and ethical decision-making) while also highlighting system goals, including patient queue reduction [16].

2.4 Regulatory Authority in Swedish Healthcare

The Swedish healthcare system is decentralised, nationally regulated, and locally administered [17]. There are three levels of the Swedish government: the Ministry of Health and Social Affairs, which sets overall healthcare policy and regulation, 21 regional bodies, and 290 municipalities [17]. In addition, there are eight independent government agencies involved in healthcare with various responsibilities:

- The National Board of Health and Welfare
- The Swedish eHealth Agency

- The Health and Social Care Inspectorate
- The Swedish Agency for Health and Care Services Analysis
- The Public Health Agency
- The Swedish Council on Technology Assessment in Health Care
- The Dental and Pharmaceutical Benefits Agency
- The Medical Products Agency

The Swedish health system performs well and provides access to high-quality care [18]. Three basic principles apply to all healthcare in Sweden: human dignity, need and solidarity, and cost-effectiveness. These principles ensure that all human beings have equal rights, that those in greatest need are prioritised in treatment, and that a reasonable balance between costs and benefits is maintained to ensure the quality of health [17].

3. Proposed Methodology

The methodological approach adopted in this study, as seen in **Figure 1**. It is divided into two main phases: (1) analysis of the real-world healthcare system, and (2) design and prototyping of a serious game based on findings from that analysis.

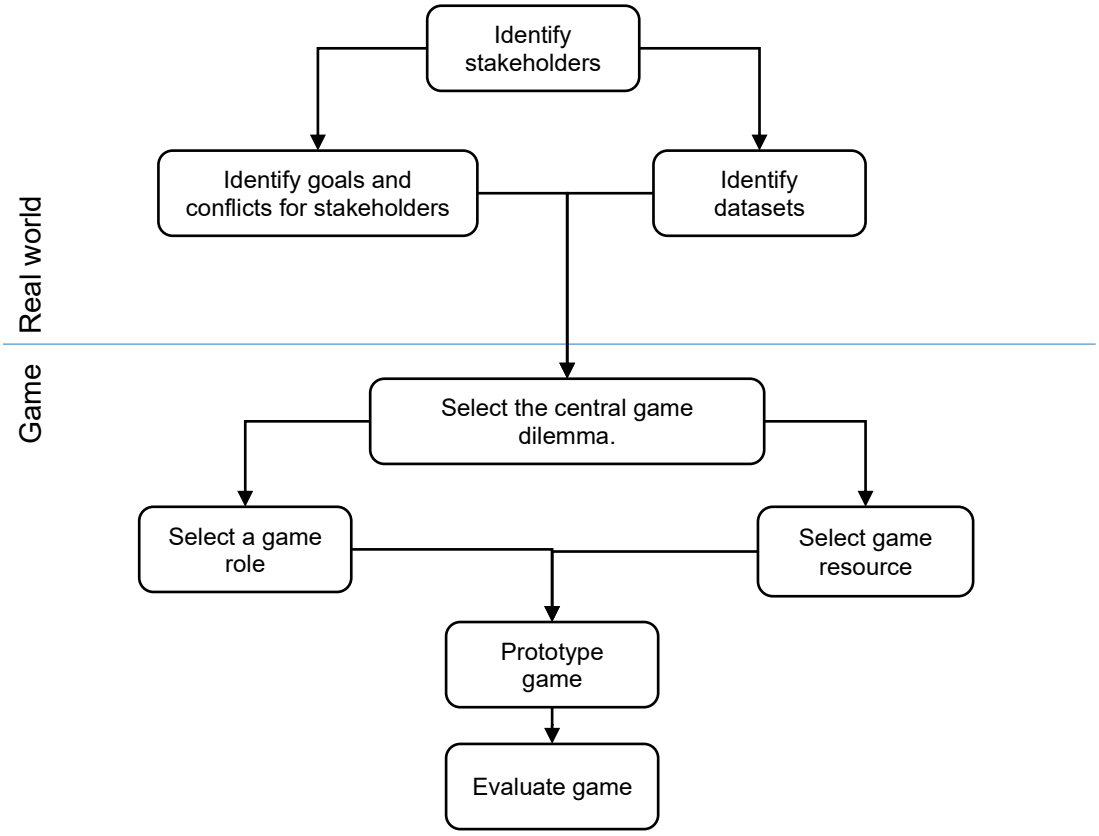

Figure 1. Proposed methodology for game prototype

3.1 Analysis of the Real-World System

The first phase of the methodology focuses on understanding process by which patients access specialised medical care. We mapped real-world workflows for how patients navigate the healthcare system from initial consultation to receipt of specialised services. We mapped both formal and informal practices for access. A conflict and criteria analysis was conducted for each stakeholder to determine their responsibilities, interests and objectives. This step identified critical tensions and dilemmas that arise in practice. Finally, relevant datasets were identified. These

datasets provide quantitative and qualitative insights into system behaviour, such as referral statistics, wait times, capacity limits, and demographic disparities.

3.2 Phase 2: Game-Based Prototype Development

We began with selection of representative dilemmas or conflicts identified through stakeholder and workflow analyses. These serve as the narrative and decision-making backbone of the game. The roles within the game are defined, mirroring real-world stakeholders identified earlier. Each role is designed with distinct goals and constraints to reflect authentic decision-making conditions. The design then incorporates relevant resources and system constraints, simulating the limitations and trade-offs present in the real healthcare system. These include elements such as time, staffing, budget, or policy constraints. the game prototype is constructed. It features interactive scenarios that allow players to assume roles, negotiate, and make decisions that affect overall system performance. The final step involves evaluation of the prototype through structured playtesting.

4. Accessing Specialised Care: System Analysis

4.1 Workflow to Access Specialised Care

Specialised care from a public provider can be accessed in three ways, depending on the type of specialist clinic you visit. The patient can contact a specialist directly to schedule the initial visit, submit a personal care request, or visit the Public Health Centre (PHC) to obtain a referral. They may also visit a emergency department and request access to specialised care. This is not a formal option within the Swedish system and serves as a workaround solution. Consequently, the patient receives a referral to a specialised care clinic or is redirected back to the PHC, where they are registered.

If a referral is sent to a specialised clinic, it is subsequently assessed, and depending on the wait time, either the first visit is scheduled, or the patient is informed that a first visit cannot be booked within 90 days. Lastly, the option of seeking care from a private provider is depicted, wherein patients gain almost immediate access to the clinic due to shorter wait times. The above process is depicted in **Figure 2** as sub-sections 1 and 2. Sub-section 3 indicates the direct access to private health care where a patient can approach specialized care directly.

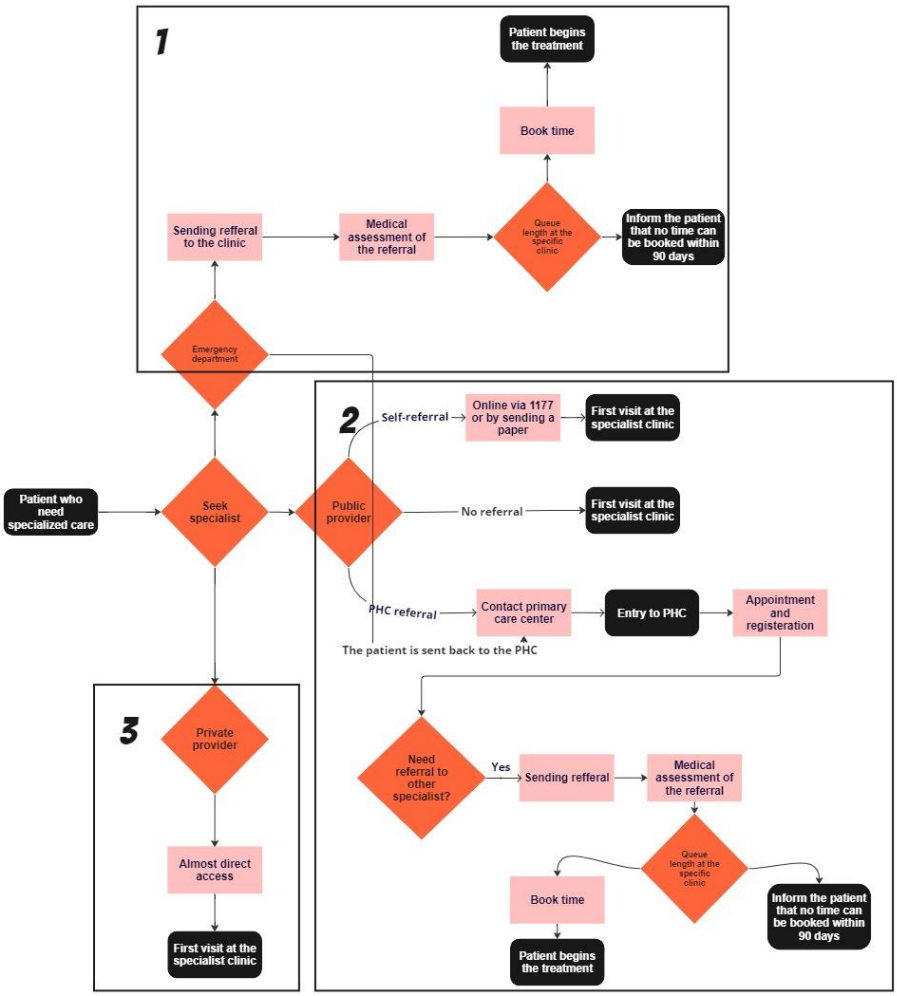

Figure 2. Patient flows to access specialized care

4.2 Stakeholder Identification

A literature survey and flow analysis identified potential stakeholders, their respective responsibilities, goals, resources, and possible conflicts. Appendix A1 lists stakeholders and maps their interests, responsibilities, resources, and areas of dispute. The key stakeholders in Swedish specialised care include patients, general practitioners, healthcare administrators, 21 regional bodies, private healthcare providers, and specialised care regional clinics [19]. The interactions between the stakeholders are presented in **Figure 3**.

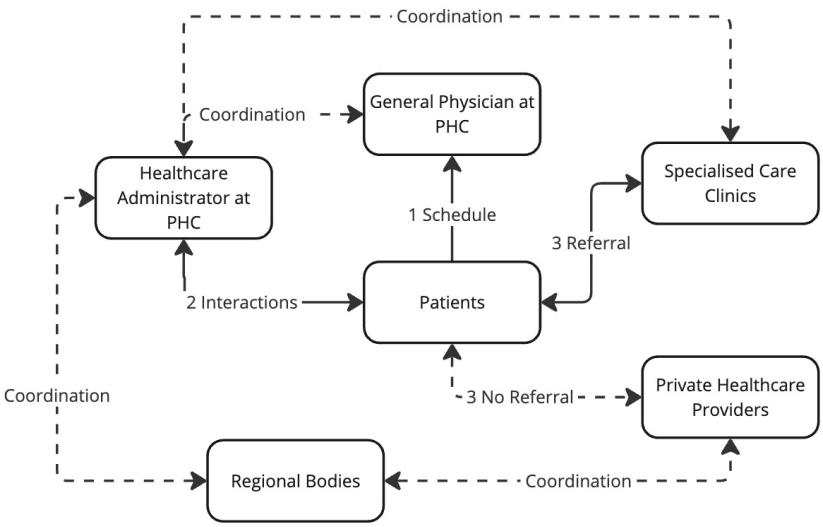

Figure 3. Interactions between stakeholders

From the figure, we see that the patient is the centre of the interactions.

- **The patient** seeks care, books an appointment at a PHC, meets a general physician at the PHC, interacts with the PHC care administrator, obtains information from a specialised clinic, and visits private healthcare centres.
- **The general physician** refers patients to specialised care clinics, interacts with the PHC care administrator, and meets with patients.
- **The PHC care administrator** interacts with the general physician, patients, and the 21 regional bodies.
- **The 21 regional bodies** interact with PHC care administrators and private healthcare providers.
- **The private care providers** receive patients and interact with the 21 regional bodies.

4.3 Determination of Conflict and Criteria for Stakeholders

An analysis was conducted to identify the parameters that influence the referral process. This process commenced with a systematic breakdown into subsystems, consisting of various factors and categories. The interrelationships among these subsystems were clarified, uncovering the dynamics that guide the referral process. We studied the factors that significantly influence the referral process and its associated outcomes, exploring those with both direct and indirect effects. We identified factors encompassing regulatory aspects, financial considerations, provider incentives, service availability, staffing resources, patient-related complexities, and overarching healthcare priorities.

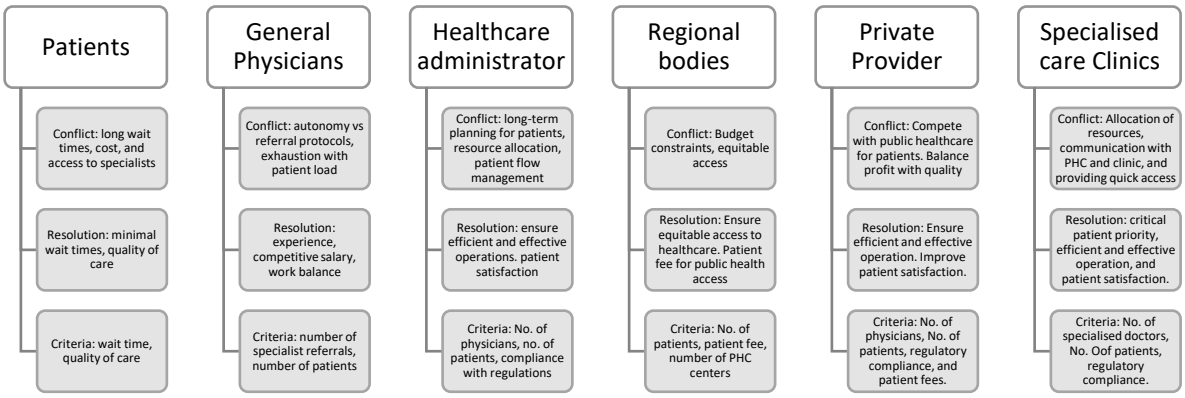

Figure 4: Conflict, resolution, and criteria identified for each stakeholder

Figure 4 summarises our analysis of identifying conflicts with a given stakeholder, their resolution approaches, and the criteria that enable such resolutions.

For patients, long wait times cause frustration and dissatisfaction. They are often unwilling to pay additional fees to reduce waiting times and desire access to specialists and the best possible diagnostic care. Consequently, criteria are established that focus on two essential aspects of waiting time and quality of care to enhance patient experiences and outcomes.

General physicians must balance their professional autonomy in diagnosing and referring patients with the need to adhere to standardised referral protocols. Additionally, increased patient loads contribute to workload strain and potential exhaustion. A reduction in the number of patients treated can improve their performance. Enhancing knowledge and experience can also improve the quality of care.

Healthcare administrators balance operational and strategic goals within primary healthcare centres. The dilemma administrators face is between prioritising long-term strategic development and addressing patients' immediate needs. This tension is further compounded by the need to allocate resources and budget for future improvements while managing patient flow. Thus, the number of general physicians available, the number of admitted patients, and compliance with regulatory guidelines and policies are essential for assessing healthcare administrators' success in maintaining balanced, patient-centred operations.

Regional healthcare bodies deliver accessible and equitable care across their respective regions. They balance budgetary constraints with the need to ensure equitable access to general and specialised healthcare services for the regional population. Three criteria: the number of patients served, the proportion of patients' fee-for-service, and the number of primary healthcare centres available in the region, are crucial for regional bodies to assess and adjust their strategies for equitable resource distribution and financial sustainability.

Private healthcare providers compete with public healthcare providers for patient retention. Additionally, they balance the drive for profitability with the need to maintain high standards of healthcare quality. Four key criteria emerge: the number of general physicians available, the number of admitted patients, compliance with regulatory guidelines and policies, and the patient fee structure. These criteria help private providers strike a balance between providing quality care and achieving financial viability.

Specialised care clinics manage resources, coordinate communication with referring physicians, and ensure prompt patient access to specialised care. To address these issues, clinics should focus on improving patient access and prioritising critical cases that require immediate care.

4.4 Dilemmas for Stakeholders

Dilemmas arise when stakeholders prioritise a goal or criterion differently, often due to contrasting perspectives or underlying motivations. For example, while patients typically desire minimal patient fees to afford healthcare, private healthcare clinics might prioritise higher fees to ensure profitability and maintain quality services. This contrast underscores the importance of understanding how each stakeholder perceives and values specific goals or criteria, as these differences can significantly influence decision-making processes and outcomes in healthcare settings.

Table 1 summarises the criteria outlined in **Figure 4** from each stakeholder's perspective. It indicates whether stakeholders aim to minimise, maximise, or remain neutral with respect to each criterion, thereby clarifying the system's conflicting objectives. For instance, criteria such as patient fees, waiting times, or compliance with regulatory guidelines vary in importance and desired outcomes depending on the perspective of a patient, a general physician, a healthcare administrator, or a private provider.

The detailed reasoning for each stakeholder's stance on these criteria is further elaborated in Appendix A1. This expanded analysis explains the underlying motivations and contextual factors that lead stakeholders to favour outcomes, providing a comprehensive understanding of the dilemmas faced in aligning objectives across the healthcare system.

Table 1. Goals for stakeholders in Swedish specialised healthcare services, criteria for minimising (↓), maximising (↑), or remaining neutral (↔)

Nr	Criterion	Patient	General Physician	Healthcare Administrator	Regional Bodies	Private Healthcare Provider	Specialized Care Clinics
1	Waiting time	↓	↑	↑	↑	↑	↑
2	Quality of care	↑	↑	↑	↑	↑	↑
3	Number of referring patients to specialists	↑	↓	↓	↓	↓	↑
4	Number of treated patients	↑	↓	↓	↓	↓	↓
5	Number of general physicians	↑	↑	↑	↓	↑	↓
6	Number of admitted patients	↑	↓	↓	↓	↓	↓
7	Compliance to policies	↑	↓	↓	↑	↔	↔
8	Number of patients	↔	↓	↓	↓	↓	↓
9	Patient fee	↓	↔	↔	↓	↔	↔
10	Number of primary healthcare centres	↑	↑	↑	↓	↓	↑
11	Number of general	↑	↓	↓	↓	↑	↑

	physicians in private sector						
12	Number of admitted patients by private healthcare provider	↑	↓	↓	↓	↑	↓
13	Compliance to policies by private healthcare provider	↑	↔	↔	↑	↓	↔
14	Patient fee in private sector	↓	↔	↔	↓	↑	↔
15	Number of specialized doctors	↑	↑	↑	↑	↑	↑
16	Number of admitted patients by specialized doctors	↑	↓	↓	↓	↓	↓
17	Compliance to policies by specialized doctors	↑	↔	↔	↑	↔	↓

4.5 Datasets

Datasets were identified to determine the availability of data on healthcare delivery. The Swedish Association of Local Authorities and Regions (SALAR) website was used to gather information and statistics [20]. The Swedish Agency for Health and Care Services Analysis website was used to find reports about the healthcare system [21]. Lastly, the National Board of Health and Welfare website was consulted to obtain definitions and legislation [22].

Qualitative data were collected for use in the system analysis. These data were primarily available at SALAR. Various types of qualitative data were utilised, including descriptive, categorical, observational, interview data, and text data from SKR, the National Board of Health and Welfare, and the "Care in Numbers" websites. The quantitative data included:

- Cost and budget for various primary care service centres.
- Patient satisfaction with the healthcare received.
- Several visitors to primary health centres (PHC).
- Count of PHC doctors.
- Number of people waiting for PHC visits.
- Number of people waiting for initial visits to various specialised care services.
- Estimated wait times for various specialised care first visits.
- Percentage of individuals purchasing private insurance.
- Estimated wait times at private centres.

5. Game Design

As discussed in **Figure 1** we develop a paper-based prototype to test the game in the real world.

5.1 Game Dilemma

To determine the game's core dilemmas, we analyse various criteria relevant to different stakeholders, examining areas of alignment or divergence, as described in sections 4.3 and 4.4. This approach allows us to identify key points of tension or cooperation based on how each

stakeholder group prioritises criteria. For instance, patients may value reduced waiting times, while healthcare administrators prioritise regulatory compliance and resource efficiency. By mapping these objectives, we can see where the criteria align or conflict between stakeholders, providing insight into potential dilemmas.

Based on these findings, a selection of dilemmas can be tailored to the game's objectives, allowing designers to focus on scenarios that reveal or challenge players' decision-making skills regarding complex issues. After consulting with healthcare professionals, the decision was made to centre the game's primary dilemma on the competition between public and private healthcare providers. This scenario examines which provider can reduce patient waiting times while operating within limited financial resources.

This choice of dilemma highlights the critical challenge of balancing quality, access, and efficiency in healthcare delivery. Public providers, often constrained by budgets, aim to maximise accessibility, whereas private providers may prioritise profitability and service speed, which can affect patient waiting times. This tension between patient-centred goals and operational sustainability provides a rich setting for a game-based exploration, encouraging players to navigate the complexities of resource allocation, policy impacts, and patient satisfaction. This decision ensures that policymakers, who are intended players, have sufficient autonomy.

5.2 Game Roles

To determine game roles, we examine stakeholders and relationships (see **Figure 3**) and identify three types of roles in serious games: played roles, pseudo-roles, and simulated roles. For roles played, choices were based on the game's objectives and the target audience. Pseudo-roles are selected based on the critical stakeholders for running the game, but they are not evaluated during the debriefing. Finally, simulated roles are those that are not played but are essential for player interaction, thereby maintaining gameplay.

For the game, we made patients as a simulated role. General physicians and healthcare administrators are combined into a single role. Private healthcare providers are the second most important role. Regional bodies are established as a pseudo-role by a game facilitator due to their authoritarian nature. Finally, specialised care regional clinics are excluded from the model because their actions do not affect waiting times.

5.3 Game Resources

The resources in the game were selected based on the needs of each simulated or played role. The game's dynamics were to be regulated by introducing events and scenarios. The scenarios were chosen by determining the conflicts for each role played in the game (see **Figure 4**). Additionally, events were selected based on aspects that participants needed to focus on. There were two different types of events to determine:

- **Planned events** were selected based on their timing and content. It was planned precisely when these events would be introduced.
- **Random events** were included to add the fun/challenge factor to the game. Participants will receive one randomly selected event and follow the instructions for handling it, depending on the specific event that occurs.

5.4 Game Prototype

The game prototype includes the following data:

- Number of patients

- Patients' main complaints
- Patient fees
- Number of general physicians and specialists
- Scoring and eventual calculations

Decisions regarding the values were based on the collection and analysis of real-world data and statistics from the National Board of Health and Welfare of Sweden. In Table 2. Real-world data and their corresponding values in the gamewe see information about real-world data and their corresponding values in the game. **Figure 5** shows the paper-based prototype of the developed game.

Table 2. Real-world data and their corresponding values in the game

	Real-world data	**Value in the game**	**Reason for choosing the value**
Number of patients	No available real-world data on the number of patients visiting per day or month. The available data were available per year.	100 patients	The game consisted of 4 rounds, and the number of patients was chosen to fit the game with respect to the numbers of GPs and specialized doctors in the game.
Patients' fees	PHC payment: 150-400 Sek. Public hospital: 250-450 Sek. Private clinic: 1000-3000 Sek.	PHC payment: 200 Sek. Public hospital: 400 Sek. Private clinic: 1000 Sek.	The values were chosen to fit the game and not differ very much from reality. This is with respect to costs in the game, such as the cost of hiring additional GPs and doctors.
Number of general physicians (GPs) at a PHC	GPs: 2-10 per PHC.	4 GPs at the beginning with ability to hire additional up to 6.	The values were chosen to fit the game and not differ very much from reality. This is with respect to the number of patients in the game.
Number of specialized doctors (public and private)	Specialized doctors: 1-3 per specialization.	1 specialized doctor at the beginning with ability to hire additional up to 2.	The values were chosen to fit the game and not differ very much from reality. This is with respect to the number of patients in the game.

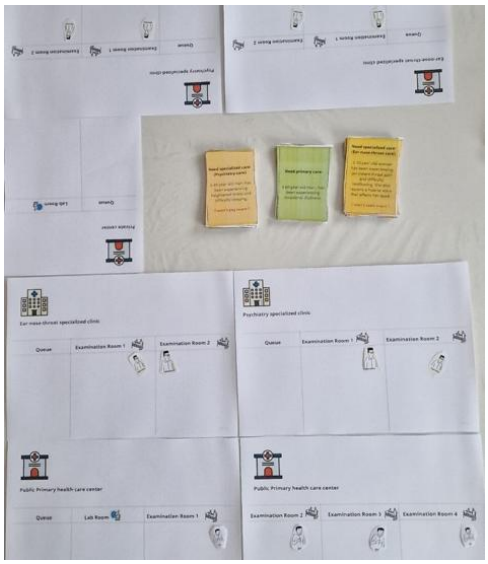

Figure 5. Paper-based prototype of the game

5.5 Game mechanics

Based on available resources and real-world facilitators, we designed the game to simulate the daily operations of different care facilities. This allows us to observe how patient load is distributed across different facility types and to understand how patient load affects patients and facilities within each region of Stockholm. Thus, the game simulates the local primary health center, a public hospital, and a private facility.

The game consists of four rounds, which represent about 4 days in the real world. Players collectively win or lose the game. The objective for all players is to treat all patients or have no more than 10 waiting patients (out of 100) at the end of four days. At the end of the game, the number of waiting patients at each facility will be considered to discuss the reasons and gameplay.

Players can assume one of two game roles:

- Public health center with capacity for two specialized care.
- Public hospital with an emergency department.
- Private facilities with capacity for two patients requiring specialized care.

Each player is presented with resources in the form of doctors to treat patients. Doctors can be General Practitioners (GPs) or Specialized Practitioners (SPs), trained to treat specific conditions. The PHC player starts with four GP and can hire up to six GP. Public hospitals start with one SP and can hire one more. Specialized care facilities start with one SP and can hire one more. All facilities will have three queues to represent different patient types: general, psychiatry, and ear, nose, and throat (ENT).

Players will follow a “doctor guide” to determine whether the patient requires a lab test or a referral. If the player makes a ‘misdiagnosis’, the facilitator will send the patient again. For each treated patient, the PHC receives 200 SEK, the hospital receives 400 SEK, and the private clinic receives 1000 SEK. New GPs or SPs can be hired for 1000 SEK or 2000 SEK, respectively.

For the prototype, we simulated 100 patients. The patients consist of a mix of people who are willing to pay more for treatment and those who may be willing to wait longer. Players can be

of three types: patients who need general care, patients who require psychiatric care, or patients who require ear, nose, and throat care. Patients may approach the PHC or a private facility.

The rounds progress in the following way:

- In each round, a player handles waiting patients from previous rounds, if available, and receives new patients.
- At the beginning of the round, players discuss among themselves and collectively select 25 patients to treat. The players then treat the patients according to the descriptions provided. This represents collaboration between facilities, i.e., the public PHC and private specialized clinics.
- If patients are treated, the facilitator simulates the facility by having the players occupy it for the stated number of rounds, and then gives money to the players.
- Players can hire new doctors if they can afford to.

The game ends when all the patients are exhausted. If the total number of waiting patients across all players exceeds 10, the players collectively lose; otherwise, the players win. The player (i.e., the facility) with the most waiting patients is encouraged to discuss this during the debriefing.

5.6 Game evaluation

The objective of the game is to understand how patients are distributed across facilities and how one could influence more effective management of patient flows without compromising quality. The game was envisioned for a general audience in a typical Swedish municipality, including government personnel from various departments and citizens. They would be interested in expanding capacity to treat patients and reducing wait times, but may not be familiar with the detailed logistics constraints involved in such expansion.

To test this goal, three iterative playtesting sessions were conducted with a total of seven participants drawn from the Swedish healthcare context, with two to three participants per session. Each session was facilitated by one of the authors, and when required to support gameplay dynamics, other authors participated as additional players. Participants represented mixed professional backgrounds, with the majority being researchers possessing experience related to healthcare systems and policy. Sessions with experts were limited, as each game session lasted approximately two hours, including discussions and debriefing.

The sessions were facilitated using a structured playtesting format that allowed for both individual gameplay and group discussion. In each session, a new paper-based prototype was used for each test audience. During the debrief sessions, we documented the player's perspective on each game element, focusing on the resources, constraints, and their experience in the game world compared with their daily real-world experience managing treatment and resources.

In each test session, the game prototype incorporated feedback from the previous sessions. The prototypes focused on selecting game roles, dilemmas, and resources. These were evaluated to identify the most appropriate options that meet the constraints imposed on stakeholders directly involved in patient care. We focused on the resources and constraints available to various facility types (e.g., PHCs, hospitals, and clinics) to identify how the current patient load is being managed.

Feedback was collected through a combination of observation and post-session surveys. Participants were invited to reflect on both the structure and mechanics of the game. This included the roles we selected to simulate (i.e., at the level of institutions) and the resources available to them (e.g., the ability to hire new people). They evaluated game rules and the level of immersion of modelled scenarios.

Specialists were also requested to evaluate the dilemmas embedded in the game for each player. One of the central dilemmas that emerged from the discussion was access to trained professionals and doctors, which was ranked higher than cost in improving capacity and maintaining the quality of care. Attention was paid to how the game represented tensions and trade-offs related to access to specialised care, including prioritisation strategies, resource constraints, and equity concerns. The evaluation aimed to assess engagement and the game's potential to support reflection, dialogue, and learning around complex systemic issues.

6. Discussion

This study's findings reveal that identifying stakeholders and analysing the criteria that matter most to each group are critical first steps in pinpointing the dilemmas and conflicts that underpin a serious game. Stakeholders within healthcare (for example, patients, general practitioners, healthcare administrators, private providers, and regulatory bodies) often have objectives that vary and sometimes conflict. Patients, for example, typically prioritise low fees and timely access, whereas private providers might prioritise profitability and patient throughput. By examining each stakeholder's priorities and defining the specific criteria they aim to maximise, minimise, or remain neutral towards, we can identify where objectives diverge, resulting in conflicts that mirror real-life dilemmas. This analysis provides an in-depth map of the disputes, enabling designers to translate these insights into game-based dilemmas that players can meaningfully explore.

Game evaluation revealed that a dilemma-based game enables players to experience the motivations, constraints, and responsibilities of each group. Players navigated complex scenarios, made trade-offs, and witnessed the effects of their decisions. The game demonstrated that no single strategy could fully satisfy all stakeholders' needs. Players were consistently required to make trade-offs, prioritising specific goals while temporarily setting aside others. Notably, the perceived importance of elements varied throughout the game. This dynamic highlighted how evolving dilemmas and changing in-game circumstances influenced players' decision-making processes and strategic adaptations over time. For instance, players might assume roles such as a private provider managing profitability while endeavouring to reduce patient wait times. These roles and objectives not only ground the game in real-world conflicts but also provide players with a hands-on understanding of the complexities of healthcare decision-making.

This structured, stakeholder-focused approach has the advantage of introducing healthcare decision-making to game design in a manner that respects the sector's sensitive and politically charged nature. While this work does not propose a new game development methodology, it provides a preparatory framework for designing games through an in-depth analysis of stakeholders and criteria. By breaking down healthcare dilemmas into concrete, game-compatible components, this approach enables game developers to tackle challenging

healthcare topics, providing a model for designing games that explore ethically complex and operationally intricate issues without risking harm.

In the Swedish context, the game highlights tensions that are central to ongoing reform discussions, particularly the balance between primary care strengthening and reliance on specialised services, as well as the role of private providers within a publicly financed system. The accumulation of waiting patients across rounds illustrates how short term prioritisation strategies, for example shifting patients to specialised or private care to reduce immediate queues, may relieve pressure temporarily while creating downstream bottlenecks or equity concerns. These dynamics mirror challenges faced in managing access guarantees, referral pathways, and regional capacity planning in Swedish healthcare.

More broadly, the game can function as a policy dialogue tool rather than an evaluative instrument. It provides a shared experiential reference point that can support structured discussion among policymakers, clinicians, administrators, and researchers. By externalising assumptions about capacity, incentives, and patient behaviour into concrete game mechanics, the game helps participants articulate and challenge implicit policy logics, making trade-offs more explicit and negotiable.

The design principles underlying the game are not specific to Sweden and can be adapted to other healthcare systems that combine public financing with mixed provision. Similar pressures related to workforce constraints, prioritisation of specialised care, and public to private patient flows are present in many high income healthcare systems. By adjusting parameters such as reimbursement levels, capacity limits, or referral rules, the game could be used to explore reform scenarios in different national or regional contexts without requiring comprehensive simulation models.

Beyond the immediate application in healthcare, this approach has broader implications for serious games across other sectors with similarly complex, multi-stakeholder environments. Defining stakeholder objectives, identifying criteria, and developing dilemmas based on real-life conflicts provide a replicable model that can be applied to other fields in which decisions affect diverse groups and require balancing competing needs. Social services, education, and public policy involve multiple stakeholders and conflicting priorities. By adopting this approach, game designers can create serious games that allow players to navigate these complex relationships, understand the trade-offs involved, and explore alternative strategies in a safe, simulated setting. Thus, the findings of this study contribute not only to healthcare gaming but also to serious game design as a tool for problem-solving in any field with intricate, stakeholder-driven dynamics.

7. Conclusions

This study highlights the dilemmas inherent in healthcare systems and underscores the need to address these challenges through innovative, practical solutions. Serious games are a valuable research method, providing a safe, controlled environment in which stakeholders can explore complex healthcare dilemmas without real-life consequences or distractions.

The key findings reveal that a systematic approach to identifying stakeholders and analysing their criteria is essential for uncovering the multifaceted conflicts that can inform serious games. By understanding the varying priorities of different stakeholders, game designers can translate real-world dilemmas into game design that authentically reflects real-world tensions.

This stakeholder-focused analysis enables the development of roles and objectives that enhance player engagement and deepen their understanding of the complexities of healthcare decision-making.

We developed a serious game prototype that models the referral process to specialised care within the Swedish healthcare system. The prototype was designed as a research tool to learn about referral care delays. The proposed dilemma-based serious game can facilitate the creation of healthcare-focused games that address politically sensitive issues and complex challenges while fostering a collaborative understanding of diverse perspectives.

The novelty of this work lies in its systematic, dilemma-based game design approach grounded in stakeholder conflict analysis. Unlike traditional simulations, our method identifies and embeds stakeholder-specific priorities, constraints, and tensions into gameplay, enabling participants to experience the ethical and operational complexity of healthcare decision-making.

The impact of this work extends beyond education and training, offering policymakers and healthcare administrators a compelling, low-risk platform to explore the consequences of system reforms, test alternative scenarios, and foster shared understanding among competing stakeholders. By simulating sensitive policy environments, the game supports more inclusive and informed decision-making processes.

In conclusion, effectively utilising serious games to explore healthcare dilemmas enhances the player experience and can inform real-world decision-making and policy development. By designing thoughtfully grounded games informed by stakeholder analysis and dilemma identification, we can create impactful experiences that encourage critical thinking and collaboration among stakeholders, ultimately improving outcomes in healthcare and beyond.

Conflicts of interest

There are no conflicts of interest.

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Appendix

A1. Stakeholders, their interests, responsibilities, conflicts, and resources for the game design process

Stakeholders	Interests	Responsibilities	Conflict/Tension	Resources
Patients	Minimal wait times for specialized care Receive high-quality care.	Seek and choose healthcare providers. Provide feedback.	May experience frustration and dissatisfaction if waiting times are long. Affordability: People may not like to pay more to reduce waiting time. Would like to meet specialists or get diagnosis from best possible person.	Health insurance Feedback to municipality
General physician	Competitive salary and compensation Experience and knowledge	Accurate diagnoses Referring patients to specialists Patient interaction for explaining options.	May feel torn between their professional autonomy in diagnosing and referring patients and the systemic pressures to conform to standardized referral protocols. This tension can impact their decision-making process. Workload or exhaustion when patient load increases. Personal risks during emergencies	Diagnostic tools and medical equipment Healthcare support staff (nurses, physician assistants Standards and information from Swedish national agencies and universities Technology tools such as AI or databases
Healthcare administrator	Ensure the efficient and effective operation of the healthcare centre. Improve patient access and satisfaction.	Strategic planning and decision-making Budget and resources allocation Financial management, payment Staff Appointment booking Journal writing reception service Statistics and follow up. Referral management Optimize patient flow. Compliance with healthcare regulations and policies Daily operations management Contact with authorities and patients. purchase of materials archiving managing health records assessment of lab results	Balancing long-term strategic planning for the primary healthcare centre with the immediate needs of patients. Administrators may need to allocate resources for future improvements while addressing current patient demands. Administrators are responsible for budget allocation, which may lead to conflicts with staff and physicians who prioritize maintaining or enhancing the quality of care. Decisions on resource allocation can affect the level of care provided. Hiring and maintaining an adequate number of staff members to meet patient demand while staying within budget constraints can create tension.	Budget and financial resources Healthcare facility management systems Administrative staff and support Regulatory guidelines and policies

			Ensuring the financial sustainability of the healthcare centre can sometimes conflict with the goal of improving access to care. Administrators must balance budgets while addressing the need for expanded services. Efficient appointment booking is necessary for patient flow, but it can lead to frustration among patients if they perceive that they cannot secure timely appointments.	
21 regional bodies	Ensuring equitable access to healthcare. Cost control: Ensuring that patients pay don't exceed the maximum values.	Financing Delivering health services to residents Regulatory compliance.	Balance budget constraints with the need to ensure equitable access to specialized care.	Regulatory authority. Financial resources. For example, contracts between regions and private specialists are usually based on a tendering process in which costs constitute one of the variables used to evaluate providers.
Private healthcare provider	Provide high quality care at lower waiting time. Maintain profitability. Accessibility: Attracting patients seeking shorter wait times Compliance to all regulations	Offer quick access to specialized care. Providing high-quality specialized care	Competition with public healthcare for patients. and other providers Balancing profit motives with healthcare quality.	Specialized medical expertise. Financial resources to hire or attract other doctors. Faster adoption of new technologies.
Specialized care regional clinics	Assess and prioritize the received referrals as soon as possible.	Treat patients. Hiring specialized doctors Referral assessment: Immediately confirm to the remitter that the referral is accepted. Confirm to the patient within five (5) working days that the referral is accepted. Either in the form of a notification about the appointment, or with information about the estimated waiting time, information about the care guarantee and a telephone number for the reception where the patient can contact.	The clinic must allocate its limited specialized care resources efficiently. This can create tension when there are more referrals than available appointments, forcing decisions about which patients to prioritize. Effective communication between the clinic and referring physicians is crucial for patient care. Delays or miscommunication can lead to frustration and tension between the two parties. Patients referred to the clinic may have high expectations for quick access to specialized care. Meeting these expectations while managing the clinic's capacity can be a source of tension.	Appointment Slots: The availability of appointment slots for patients is a critical resource. Managing and allocating these slots efficiently is essential to meet patient demand. Patient Records and Data: Access to patient records and historical medical data is essential for providing personalized care and making informed medical decisions. Referral Guidelines: Clear referral guidelines and criteria are a resource that helps the clinic make informed decisions about which patients to accept for specialized care. Specialized personnel, equipment

A2. The game concept report for the final prototype

1. **Scenario:**
   You will play the role of the stakeholders of the Swedish healthcare system, consisting of:

- Facility 1: A public PHC and a public hospital with two specialised clinics
- Facility 2: A private centre with two specialised clinics.

There are 100 patients to be treated in 4 days, represented by four rounds in the game. You both aim to treat all the patients in the queues to win the game! You will play four rounds; your goal is to have no waiting patients, or as few as possible, in your facilities.

Patient distribution:
The patients are a mix of those willing to pay more at the private centre and those unwilling to pay more and would rather wait longer. There are three kinds of patients in the game:

- Patients who need primary care and seek care at the PHC.
- Patients requiring psychiatric care seek treatment at private or public facilities.
- Patients who require ear, nose, and throat specialised care seek care at private or public facilities.

2. **Scoring:**

   Collective win/lose.
   At the end of the game, if the number of waiting patients exceeds 10, the players lose. The player with the most waiting patients remaining at their facility at the end of the game will be discussed in the debriefing.

3. **Players:**
   - A private facility consisting of two specialised clinics.
   - A public facility that consists of a PHC and two specialised clinics.

4. **Initial set-up:**

   - From the start of the game, the primary healthcare centre will have 4 GPs and can hire up to 6 more (once the player earns money over the rounds).
   - Each hospital-specialised clinic will have one specialist, and each can hire one more specialist.
   - The private centre's specialised clinics will each have one specialist, and each clinic can hire one more specialist.
   - Each player will have a **"Doctor-guidance**" that helps the player to decide if the patient needs a lab or a referral… (if the player makes a wrong diagnosis, the facilitator will resend the patient)
   - Money and payment: PHC payment 200 SEK, public hospital: 400 SEK, Private clinic: 1000 SEK
   - Hire additional GP cost: 1000 SEK, additional specialist cost: 2000 SEK.
   - There are three patient queues: primary, psychiatry, and ear, nose, and throat.

5. **Gameplay:** For each round:
   1. The players deal with the patients from the previous round (waiting and lab patients)

2. The players discuss and decide on the strategy of drawing patients for the round. (The players must draw 25 patients at each round)
3. The players draw “Patient cards”.
4. The players treat their patients.
5. The facilitator awards money to the treated patients. The players hire additional doctors if they want.
6. A new round has started.

6. **Procedures:**
   - **Patient division:** You are free to choose the best strategy for drawing patients (i.e., the patient type drawn in each round). The players must draw the first card of each queue (can’t draw whatever card in the queue)
   - **Patient treatment:**
     - You will read the patient’s complaint and determine if a lab test is necessary. You can get help by reading the “Doctor-manual”. The patient who requires the lab must spend one round in the lab.
     - Waiting patients at the queue, and lab patients are treated at the next round and prioritised.
     - The patient is first assigned a doctor and then sent to the lab, where they are assigned a doctor again, either to be treated or referred.
     - Each patient spends one round in the examination room for treatment or referral.
     - After the rounds, any patient who exits from the consultation is considered treated. Any patient who exits from the lab is reintroduced to the respective queue and considered waiting.