How can digital technologies be used to enhance health financing? Claims management in Estonia

Estonia

WHO Barcelona Office
for Health Systems Financing

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Abstract

Keywords

Estonia started digitalizing claims and the claims management submission process between health-care providers and the Estonian Health Insurance Fund (EHIF) in the mid-nineties. A claim is the key set of data[1] that health-care providers submit to the EHIF, with the primary purpose of obtaining payment for delivered health care. However, the data collected via the claims process serves multiple purposes, making digital claims management an essential part of the EHIF's business process and the foundation for advanced strategic purchasing instruments. This brief explores how the EHIF claims management process has been further digitalized over time, how this has enabled the introduction of other advanced purchasing instruments, the benefits of the digitalization of claims in health financing and lessons learned that can be used for other countries. This paper is a shorter version of the more detailed WHO technical report, The role of digital claims management for Estonia's health insurance: a leverage for making health-care purchasing more strategic.

Abbreviations

DRGs	diagnosis-related groups
EHIF	Estonian Health Insurance Fund
ML	machine learning
QBS	quality bonus system
XML	Extensible Markup Language

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Rationale

Estonia started digitalizing claims and the claims management submission process between health-care providers and the Estonian Health Insurance Fund (EHIF) in the mid-nineties. A claim is the key set of data[1] that health-care providers submit to the EHIF, with the primary purpose of obtaining payment for delivered health care. However, the data collected via the claims process serves multiple purposes, making digital claims management an essential part of the EHIF's business process and the foundation for advanced strategic purchasing instruments. This brief explores how the EHIF claims management process has been further digitalized over time, how this has enabled the introduction of other advanced purchasing instruments, the benefits of the digitalization of claims in health financing and lessons learned that can be used for other countries. This paper is a shorter version of the more detailed WHO technical report, *The role of digital claims management for Estonia's health insurance: a leverage for making health-care purchasing more strategic (1).*

[1] A claim is the patient level financial document that includes the necessary clinical information combined with information about the patient, provider characteristics, the care setting (inpatient, outpatient, day care/surgery, rehabilitation etc.), service tariffs and so on.

Evolution and digitalization of claims management

The evolution and digitalization of the claims management process can be divided into different phases, starting in the mid-1990s, as depicted in Fig. 1. Prior to this, claims were submitted on paper and managed manually.

Fig. 1. Evolution of digitalized claims management

Source: (1).

PHASE 1 Mid 1990s–2000	PHASE 2 2001–2003	PHASE 3 2004–2016	PHASE 4 2017–2019	PHASE 5 Since 2020
Transition to digitalized claims	Development of an e-channel between providers and the EHIF; introduction of automated controls	Fully digitalized claims submission; improvements of the e-channel and automated controls	Upgrading of the e-channel and improvements in digitalized contract monitoring	Fully automated claims management and contract monitoring

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Phase 1. Transition to digitized claims (mid-1990s–2000)

The development of an electronic solution for the EHIF database began in the mid 1990s. The EHIF strongly incentivized the transition to a full electronic claims submission to end the cumbersome paper-based claims management process. By the end of the 1990s, most data were digitized using various data delivery options; health-care providers carried diskettes, zip-drives and compact disks to the EHIF offices, with designated staff entering the data into the EHIF information system.

Phase 2. Development of an e-channel linking health providers and the EHIF (2001–2003)

In 2001, the EHIF launched a project aimed at developing a uniform, centralized and secure information system (e-channel) based on a standard software solution, in order to facilitate data transmission between providers and the EHIF. This development was also linked to the objective of improving the quality of claims data, with the introduction of automated pre-payment controls in 2003. The e-channel allowed providers to upload claims directly into the EHIF information system, making the process more effective and less time- and resource-consuming. Claims transmission was continuous in that the provider could upload claims at their own discretion, although there were particular periods (e.g. the beginning of the month) when the number of claims transmitted via the e-channel was particularly large. Payments to providers were usually made once a month.

Phase 3. Improvements of the e-channel and automated controls (2004–2016)

From 2004, 100% of health-care provider claims were transmitted directly into the EHIF information system via the e-channel, which was regularly maintained by the EHIF, who also further developed automated controls. The e-channel, however, was based outside the EHIF's principal software platform – a SAP[2] management platform – meaning that there was no automated link to other processes; notably, the contract monitoring process. Claims were therefore submitted via the e-channel, but further processing of claims data and contract monitoring required human action to transfer the data into the principal software platform.

Phase 4. Upgrading of the e-channel and development of an automated contract monitoring system (2017–2019)

By 2016, the e-channel that had been used for over a decade had become outdated. It was based on Extensible Markup Language (XML)[3] and used different data packages for data exchange between health-care providers and the EHIF. As such, the e-channel needed extra resources for maintenance, updating and ensuring data security. Therefore, in 2017, the EHIF launched a new project to upgrade the e-channel and to automate the contract monitoring system. The preparation and implementation of these upgrades took almost three years.

Phase 5. Introduction of fully automated claims management and digital contract monitoring (from 2020)

As of January 2020, the new and automated e-channel became operational, allowing for the data exchange of multiple digital services through a trusted execution environment (X-tee)[4] and fully automated claims processing. The e-channel is also now linked to each provider's

[2] Initially called Systemanalyse Programmentwicklung [System Analysis Program Development] later abbreviated to SAP.

[3] XML defines a set of codes, or tags, that describe the text in a digital document in a format that is both human-readable and machine-readable.

[4] X-tee is a data exchange layer for information systems. It is a technological and organizational environment that enables secure Internet-based data exchange between information systems. X-tee is a versatile security solution that includes authentication, multi-level authorization, a high-level system for processing logs, and data traffic that is encrypted and signed.

contract and thus also makes automated contract monitoring possible. Another important update in 2020 concerned the claims submission flow; health-care providers can now receive instant feedback on the state of contract execution.

[5] A summary invoice consolidated the individual claims submitted by one health-care provider to the EHIF over an agreed period of time into one aggregated invoice that was used as a basis for payment.

Digital claims management since 2020

An overview of the life cycle of typical claims is provided in Fig. 2 and expanded on below.

Fig. 2. Life cycle of claims

Note: DRGs: diagnosis-related groups.

Source: (1).

Step 1. Creation of claims by a health-care provider
1. Creation of claims by a health-care provider
2. Submission of claims via the e-channel
3. Application of automated controls in the pre-payment stage and assignment to DRGs
4. Payment of claims
5. Application of post-payment controls based on machine learning
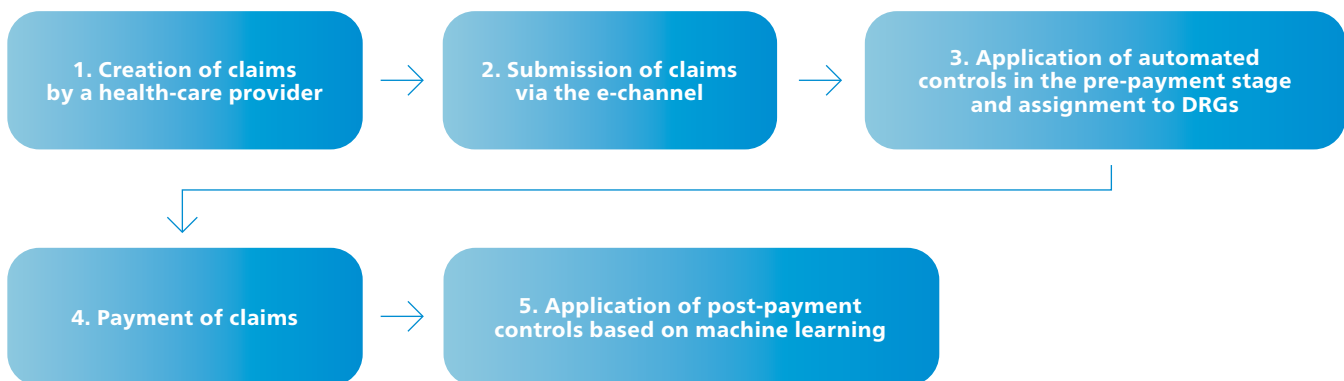
Step 1. Creation of claims by a health-care provider
After a patient's discharge from or visit to a health-care provider institution, a claim is created. The patient's unique identification code enables the EHIF database to link demographic, administrative and medical data with that patient. Although most health-care providers deploy their own information systems supported by different software developers, the claim's data standard is the same for all providers.

Step 2. Submission of claims via the e-channel
Patient case-specific claims are submitted through the e-channel. In the past, providers were responsible for submitting summary invoices[5] by merging individual claims, but since 2020, these are created by the EHIF.

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Step 3. Application of automated controls in the pre-payment stage and the assignment of selected claims to diagnosis-related groups (DRGs)

Once claims are submitted to the EHIF via the e-channel, automated controls are applied. As of December 2021, 368 different controls were applied during the pre-payment verification stage, of which 300 were content controls and the remaining format controls. Format controls check if all data fields are filled and if field values correspond to agreed requirements and conditions, while content controls check if the content of the claim corresponds to the terms and conditions stated in the contract and relevant legislation. Content controls are applied only after the claim has passed the format controls. If an error is detected, the claim is returned to the provider. Upon claim acceptance, a unique claim identifier is automatically created in the e-channel. The list of controls is publicly available on the EHIF webpage, thus creating transparency in EHIF's claims control process. The list also allows providers to make necessary adjustments to the claim in their own information systems and can also be used to verify a claim before its submission to the EHIF. In addition to facilitating the payment process, the automated claim controls are also fundamental in improving the quality of the claims data.

Following the automated controls, inpatient care and selected day care claims are assigned to a DRG using a DRG grouper[6], with checks on whether the claims constitute DRG outliers according to stated rules. The health-care provider can also use the e-channel to pre-submit a claim to the DRG grouper for testing the correctness of the DRG grouping.

Step 4. Payments of claims

Once claims have passed successfully through all automated controls, payments for patient-related claims are made; details of which are stored in a data warehouse.

Step 5. Application of post-payment controls based on machine learning (ML)

Various post-payment controls are applied – with the main purpose of detecting potential fraud and/or errors – and ML models play an important role in this process. ML has improved the speed of claims processing in the post-payment phase, as it has replaced time-consuming analytical reporting and standard data queries. The EHIF started to use ML in 2019 with the aim of automating the verification of claims, prescriptions, certificates for sick leave and other digital documents submitted to the EHIF. All claims and other digital documents which are submitted via the e-channel and pass the automated controls for payment are processed by a ML model.

[6] A central DRG grouper is accommodated in the EHIF server. All providers can use the central grouper for the grouping process.

Advanced purchasing instruments enabled by digital claims

Digital claims management has enabled the introduction of various advanced purchasing instruments in Estonia, which are vital in making purchasing more strategic. Two of these instruments are presented here.

Contract setting and monitoring

Contracts with health-care providers are an important element of the EHIF's endeavours in strategic purchasing.

The claims data is essential in conducting the health needs assessment of the population and in contract planning to ensure equitable access across the country. The analysis of the available digital claims data informs the setting of provider-specific contract volumes (number of treated patients/cases) and amounts (monetary value of the contract) for each half-year. Importantly, (minimum and maximum) volume and budget caps by clinical specialties and types of care (i.e. outpatient, one-day and inpatient) are used to manage available budgetary funds and to incentivize providers to deliver certain types of care over others, such as more outpatient care over inpatient care.

As the contract volume of each provider is capped, it is important to monitor contract execution for each provider to ensure that the resources allocated and used meet the health needs of the population. The upgrade of the e-channel for claims submission and the digitalization of contracts starting from 2020 made it possible to directly link real-time claims data with the actual contract volume per provider and to the specialty and care setting under which the health services are performed. This is then compared with the planned contract volume and allows for automated monitoring of the execution of the contract on an ongoing basis and in real-time. Reasons for deviations are discussed with providers and adjustments in contract volumes may be negotiated and put in place as a result. There might be a justified need to reallocate volumes, to use reserves, or to increase the contract volumes.

The status of contract execution is calculated on the basis of claims data and updated daily. All contract volumes (planned and actual) per provider and type of health service (primary and specialized health care, dental, disease prevention, nursing care etc.) are visible for all health-care providers via specific Internet portal dashboards. The objective of the dashboards is to make the contracting system transparent and to allow all providers to see the contract information of other providers and compare themselves with their peers.

The availability of detailed claims data of high quality has enabled improved decision-making related to budget allocations related to patient needs. Moreover, the automation of the contract monitoring process via digital technology, has made it less time-consuming as well as more efficient, transparent and user-friendly.

Performance payment in primary health care

In 2006, the EHIF introduced a quality bonus system (QBS) with the overall aim of incentivizing preventive care and the management of chronic conditions at primary health care level. A key requisite for the pay-for-performance mechanism in primary health care was the existence of digital claims submitted by family doctors to the EHIF as data collected via digital claims allowed for the development of performance indicators. The detailed patient-level information submitted via the claims makes it possible to assess the achievement of performance measures without the need for additional data collection and also allows for automatic calculation of the bonus payments without additional administrative burden on providers or the EHIF.

The QBS has played an important role in providing feedback to providers on their performance. Improvement and revision of the QBS indicators on the basis of digital claims data is an ongoing process in order to further fine-tune the financial incentives to encourage family physicians to continuously focus on disease prevention, the monitoring of patients with chronic illness and to increase their own competence. Realizing such policy instruments through digital technologies is again a critical part of making purchasing more strategic.

What are the benefits of digitalized claims management?

The benefits of digitalized claims management observed in Estonia are:

- A simplified and improved claims submission for providers
  In Estonia, the claims creation and submission process has been optimized and simplified enormously over time – notably via the e-channel and its upgrades – with automated controls facilitating the pre-payment verification of claims, improving the quality of claims data, reducing the time needed to make payments to providers. The use of a ML approach has also sped up the targeted claim reviews conducted shortly after payment. This optimization has reduced provider administrative costs related to claims processing and the introduction of the continuous claims submission feature has made the cash flow to providers more stable throughout the month, compared to just one monthly payment in the past. As a result, the period between service provision and payment for it, has reduced considerably; supporting effective financial management at provider level.

- Efficiency gains and better use of the EHIF's human resources
  Digital claims management and related supporting digital technologies have reduced data input times and human resource costs. The most notable changes in this respect took place in 2004 after which all claims were submitted by providers to the EHIF via the e-channel. This reduced the need for EHIF staff to inspect claims data and the patient's use of health insurance benefits, and therefore from 2003 to 2004 the number of person-years needed for health insurance claims processing went from 62 to 43 (a reduction of 31%), and the number of required clerks for the task

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fell from 53 in to 23 (*2*). This led to the EHIF employing predominantly highly-qualified personnel and fewer staff performing routine tasks (*3*).

• Patient needs oriented contract setting, efficient contract monitoring and more flexible contract adjustment
The claims data in Estonia is essential in planning and setting contract volumes and amounts with health-care providers based on patient need, in order to enhance equitable access, as well as in the monitoring of contract execution. Digital technologies have allowed for the automation of contract monitoring and simplified contract adjustments, making both less time-consuming and hence more efficient, transparent and user-friendly.

• Continuous improvement of the provider payment system
Digital claims provide granular and easily accessible information for continuously improving the provider payment system through regular monitoring that informs adjustments of payment methods and rates. Moreover, the digital claims data is also used for further developing specific provider payment methods such as bundled payment for selected care episodes (e.g. stroke), adjustment in per capita payments based on age groups and the introduction of pay-for-performance mechanisms in primary health care.

• Improved performance monitoring and benchmarking to enhance quality of care
Digital claims coupled with data visualization have improved the process of provider performance monitoring through the provision and assessment of various quality/clinical indicators (*3*). The purpose of performance monitoring is to give providers feedback on their performance so that they can evaluate and review their own practice – particularly their treatment practices (including clinical variances) – use of different diagnostic procedures, coding practice, and drug prescription practices. In Estonia, performance indicator data for health-care providers are calculated and published once a year.

• Improved transparency for patients
Digital solutions have made it possible for individuals to access their own health data via the patient portal. This portal is linked to the EHIF claims database enabling the disclosure of individual medical claims to patients. This access allows for the detection of potential provider errors/misbehaviour, with the patient able, as of 2020, to dispute a claim and inform the EHIF directly through the patient portal.

• Ability to quickly respond to the challenges from the COVID-19 pandemic
The upgraded e-channel for claims management was launched in January 2020 just before the COVID-19 pandemic began. The patient claims and contract monitoring processes were fit for purpose and did not have to be adjusted due to the pandemic. Notably, the new e-channel included a feature for the automated production of non-personalized invoices by providers (e.g. for hospital preparedness fees, family practitioners' per capita payments and basic allowances), which made it easy to make payments for COVID-19-related expenses and to bring in additional resources to front-line providers. Furthermore, via

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the individual patient claims, it was straightforward to obtain reports on caseloads and hence on patient needs. This helped the health system to better plan, implement and monitor the COVID-19 health sector response.

Lessons learned for other countries

There are a number of lessons learned from the digitalization of claims processing in Estonia that could be relevant for other countries, including:

• Finding the right level of "leapfrogging"
The digitalization of claims is a key policy recommendation because of the many opportunities it creates to optimize purchasing-related tasks, such as contracting, contract and performance monitoring, provider payment method setting and automated pre-payment controls of claims, all of which contribute to making purchasing more strategic. Estonia's digitalization process started more than 20 years ago, and at the beginning of its implementation reflected the available technology of that time. Countries starting the digitalization process today can immediately begin with a more advanced digital claims submission channel – "leapfrogging" over less sophisticated systems. However, the selection of the right entry point and level of sophistication must be considered.

• Sequencing
Each country must explore its capacity and need for digitalization within a reform package. The process of digitalization will normally start with claim forms and their digital submission. Once this is established, more functions can follow – such as introducing automated controls for the optimization of claims management, post-submission controls for fraud detection, quality review and outlier identification. However, planning the sequence of the introductions to be made is important, in order to build synergies between these processes and to maximise the potential for introducing advanced purchasing instruments.

• Capacity strengthening and enabling learning through a gradual approach
It is important to build up organizational and analytical capacity within the purchasing agency to be able to collect the required data, to assure quality data and then to analyse and use the collected data. This is the basis for making purchasing increasingly strategic. In fact, along with the abovementioned sequencing of reform measures, a gradual approach allows for a learning process that is critical for building skills and for identifying and addressing challenges.

• Using the available windows of opportunity
It is important to seize windows of opportunity within faster paced phases of reform to initiate the next reform step. As skills improve and the system's capacities are progressively enhanced, these windows of opportunity can occur more regularly; institutional competencies are built at all levels, providers enhance their skills and the purchaser builds

its capacities. As the system matures, it may also become easier to identify which new digital technology is most needed.

• **Setting the right level of standardization and putting focus on data governance**
It is important to avoid a fragmented software solution as this can create enormous transaction costs, yet providers should still be able to maintain their existing software set-up. There are arguments both for and against the standardization of digitalized technology to consider in an environment of market competition. The question must be asked as to whether there is need to operate a standard and uniform model across all providers or whether to aim for the harmonization of different approaches – with the consideration of the technical and cost issues of creating and ensuring interoperability. Furthermore, the digitalization of claims management requires adequate data governance, involving a range of domains, and foremost, ensuring privacy and data protection. Finally, when artificial intelligence and ML approaches come into play, it is important to install an effective regulatory framework to guarantee equity and nondiscrimination, in order to receive trusted algorithmic outcomes.

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