



Data comparison of the Health Information System and regular health statistics. II analysis



Tervise Arengu Instituut
National Institute for Health Development

DATA COMPARISON OF THE HEALTH INFORMATION SYSTEM AND REGULAR HEALTH STATISTICS.

II ANALYSIS

Generalised summary

Department of Health Statistics
National Institute for Health Development

Tallinn 2012

Table of contents

INTRODUCTION	4
Definitions.....	5
Used abbreviations.....	5
1. DESCRIPTION OF THE REFERENCE DATA	6
1.1 Characteristics and submission procedure of the questionnaire “Inpatient beds and hospitalisation”	6
1.2 Description of the Health Information System data file. Data editing.....	7
2. RESULTS OF THE COMPARISON	9
2.1 Verification of the completion of characteristics and assessment of the completion by characteristic	9
2.2 Rules and practice for opening a new case	19
3. SUMMARY OF COMPARISON OF THE HEALTH INFORMATION SYSTEM AND REPORT DATA ...	22
4. CONCLUSIONS.....	26
ANNEXES.....	29
ANNEX A. Rules and formulas used to calculate the indicators in the comparative analysis.....	34

List of tables

Table 1. Cases by version number	9
Table 2. Patient condition/status upon hospital checkout	12
Table 3. Codes of the Hospital bed specialties in the report and the corresponding codes in the Health Information System	17
Table 4. Opening a new treatment case according to more frequent profiles in the same hospital	19
Table 5. Opening a new treatment case according to more frequent profiles in another hospital	20
Table 6. Number of respondents and data submission to the Health Information System by hospital type, third quarter of 2011	22
Table 7. Number of entries and treatment cases in the first and second Health Information System file	23
Table 8. Number of patients who have left the hospital in the report and the Health Information System by hospital type.....	23
Table 9. Coverage rate of those discharged from the hospital, transferred to another hospital, and deceased by hospital type, third quarter of 2011.....	24
Table 10. Number of bed days in the report and the Health Information System by hospital type, third quarter of 2011	24
Table 11. Coverage rate of patients who have left the hospital by hospital type, third quarter of 2011	25
Table 12. Hospitals that have submitted data to the Health Information System	29
Table 13. Number of hospital admissions in the report and the Health Information System and coverage rate (%) by hospital type and month	30
Table 14. Number of children’s hospital admissions in the report and the Health Information System and coverage rate (%) by hospital type and month	30

Table 15. Number of hospital discharges in the report and the Health Information System and coverage rate (%) by hospital type and month 31

Table 16. Number of hospital checkouts in the report and the Health Information System and coverage rate (%) by hospital type and month 31

Table 17. Number of patients transferred to another hospital in the report and the Health Information System and coverage rate (%) by hospital type and month 32

Table 18. Number of deceased in the report and the Health Information System and coverage rate (%) by hospital type and month..... 32

Table 19. Number of bed days in the report and the Health Information System and coverage rate (%) by hospital type and month..... 33

INTRODUCTION

The planning of the Health Information System took into account the need to start using the information received there for, among other things, compiling health statistics. The application created for this is a statistical module, the development of which is the responsibility of the Estonian e-Health Foundation.

By 2012, the amount of medical documents to be sent to the Health Information System had exceeded a certain critical limit and the possibility of using existing information has occurred. For the health care service providers, this means a potential reduction in the reporting burden, as well as the opportunity to contribute to the compiling of better and more efficient health statistics. As of the third quarter of 2011, the inpatient epicrisis are submitted to the Health Information System by 25 hospitals. In order to improve the quality of the documents received by the Health Information System and to move from health statistics reports to regular statistics based on the information provided to the Health Information System, the quantity and quality of the epicrisis must be measured. For this purpose, two analyses have been carried out by the Health Statistics Department of National Institute for Health Development (NIHD).

This document presents the results of the second comparative analysis. Comparison is carried out between the statistics collected with the statistical regular monthly report "Inpatient beds and hospitalisation" submitted to the Health Statistics Department of National Institute for Health Development and the data of notifications – inpatient epicrisis – sent to the Health Information System. The first such comparative analysis was carried out by the National Institute for Health Development in July 2011 on the data of December 2010. This work includes data of the third quarter of 2011, i.e. July, August, and September 2011.

The purpose of this analysis was the following:

1. To compare the comprehensiveness of submitting the epicrisis to the Health Information System by individual institution and hospital type.
2. To compare that coverage of characteristics by individual institution and hospital type in order to determine whether the characteristics to be entered in the Health Information System are sufficient for national statistics, or whether additional characteristics are required.
3. To compare the quality of submitting the epicrisis to the Health Information System according to the characteristics by individual institution and hospital type.
4. To examine the practice of calculating the cases and bed days and identify on which common rules should be established for documenting patient movements.
5. To compare the changes in the volume and quality of the data provided with the results of the first analysis.

The results of the comparison are used for the development of the Health Information System and the statistics module, and the planning of further activities by the Estonian e-Health Foundation, the Ministry of Social Affairs, and the National Institute for Health Development.

Definitions

Adult – in health care statistics: a person aged 15 and more

Child – in health care statistics: a person aged 0–14

Discharge type – hospital checkouts, transferred or deceased

Entry – information about a single case or a stay at the department

Hospital admission – hospitalisation of a patient in an inpatient facility, involving a stay of at least for 24 hours

Hospital bed specialty – determined through the health care services provided in connection with the hospital bed

Patient status – recovered, deteriorated or unchanged

Treatment case – a single treatment case

Used abbreviations

EHAK – Classification of Estonian administrative units and settlements

NIHD – National Institute for Health Development

1. DESCRIPTION OF THE REFERENCE DATA

1.1 Characteristics and submission procedure of the questionnaire “Inpatient beds and hospitalisation”

According to the Regulation of the Minister of Social Affairs¹, the report “Inpatient beds and hospitalisation” is submitted on each month by all inpatient health care service providers to the corresponding county governor in their site through A-veeb by the 15th date of the month following the reporting month, at the latest. The county governor submits the county aggregated reports to the National Institute for Health Development by the 20th date.

The data on 15 variables according to 49 hospital bed specialties is collected with the questionnaire. The data collected for each hospital bed specialty are as follows:

- Number of beds at the end of the month
- Average number of beds per month
- Number of patients at the beginning of the period
- Total number of hospital admission
 - including patients admitted to hospital from other counties
 - including children
 - including intra-hospital transfers
 - including transferred from other departments
 - including transferred to other departments
- Number of persons discharged from the hospital
 - including hospital checkouts
 - including transferred to another hospital
 - including deceased
- Number of patients at the end of the period
- Total number of bed days
 - including the number of bed days for residents from other counties
- Number of bed days of patient’s personal carer

Most of those variables are available from the epicrisis sent to the Health Information System, except for the number of beds at the end of the month, the average number of beds in a month, and the number of bed days of patient’s personal carer. The number of inpatient patients at the beginning of the period and the variables concerning the number of hospitalised patients can be derived from the data in the inpatient epicrisis. The **rules and formulas used to calculate** different indicators have been provided in the Annex to the analysis.

The data of the third quarter of 2011, i.e. the data collected with the monthly questionnaire on the use of inpatient beds in July, August, and September was used for comparison. The extract of data from the A-veeb was carried out as of 17 December 2011.

¹ The requirements for the preparation of reports on health care statistics and economic activities in the field of health care, the composition of the data and the procedure for the submission thereof

1.2 Description of the Health Information System data file. Data editing

When the patient leaves the hospital, a summary of the patient's treatment period is sent to the Health Information System. This way, it might be possible to compile the statistics of patients left the hospital on the basis of the completed inpatient epicrisis. To investigate this option, the Health Information System data were analysed.

For the comparative analysis, the National Institute for Health Development received data about the treatment cases from the Estonian e-Health Foundation that

1. started before 1 July 2011 and had not ended by 30 September 2011 (required for the determination of the number of patients at the beginning of the period);
2. started before 1 July 2011 and ended between 1 July and 30 September (required for the assessment of the patients who left the hospital);
3. started and ended between 1 July and 30 September (required for the assessment of the patients admitted to hospital and the patients who left the hospital);
4. started between 1 July and 30 September, but ended after 30 September (required for the assessment of the patients admitted to hospital).

The data editing of the Health Information System file took place in cooperation with the Estonian e-Health Foundation specialists. The data extract was received from the Estonian e-Health Foundation with 178,873 entries. Initially, there were 89,657 cases. Among these, there were 40,391 treatment cases, which lacked information about the hospital bed speciality. The specification revealed that these were outpatient epicrisis, which were mistakenly submitted as inpatient epicrisis to the Health Information System. These entries were removed from further comparison.

Furthermore, the extract had duplicate entries. The uniqueness of the case is determined by the document number, the registry code of the institution, and the version number. The file had two cases with the registry code and document number of one institution, but different version numbers. According to the Estonian e-Health Foundation, such a situation may occur because downloading data from the database is a long process (the longest query lasted 24 hours!), and since it is a live environment, new versions of notifications could already be transmitted during the data loading process.

The file contained 13 duplicate treatment cases with the same version number. According to the Estonian e-Health Foundation, one of the reasons for this may have been the long duration of data exports. As another reason, the Estonian e-Health Foundation sees the possibility that there was one ID inside the document and another in the interaction message. The uniqueness is checked in the interaction message based on the given ID.

The file contained 16 duplicate cases where the document numbers were different, but the patient ID and the start and end dates submitted by the hospital were the same.

In addition to these, there were 15,605 duplicate bed profiles: 13,847 double, 1,604 triple, and 154 fourfold. Most of them (15,483, or 99%) were entries of one hospital, where, according to

the Estonian e-Health Foundation, it could have been a technical error in the compilation of documents by the institution.

There were 1,013 treatment cases with a bed profile P49. Codes starting with P denote day care (including day surgery service) and these records must remain out of the statistics of epicrisis. These entries were removed from further comparison.

After the data editing, **118,876 entries and 48,237 cases** remained for further analysis.

There were at least two entries for each treatment case in the extract: one included the so-called general information of hospital care and the other/others information about staying in the department.

The **general information of hospital care** includes the document number, the document version number, the commercial registry code of the institution, the start date of hospital care, the end date of hospital care, the number of bed days, the discharge type (both code and name), the patient status (both code and name), the location of the health care institution, the patient's ID, the patient's date of birth, the patient's place of residence.

The **information about staying in the department** included the date of arrival and leaving, number of bed days, hospital bed specialty (both code and name). The number of entries about staying in the department depends on the number of different hospital bed specialties for each particular treatment case.

As part of this analysis, the NIHD asked for more characteristics compared to the first analysis of the Health Information System data, such as the patient status, location of the health care institution, patient's ID, patient's date of birth, patient's place of residence. This made it possible to perform a more detailed analysis and establish connections between the different characteristics.

2. RESULTS OF THE COMPARISON

2.1 Verification of the completion of characteristics and assessment of the completion by characteristic

The characteristics of the Health Information System extract are described one-by-one, with comments on their completion, format, and the occurrence of other errors. Explained reasons or circumstances for differences have been added. The information in the Estonian e-Health Foundation's published standards document is given in italics.

- 1. document number** – *for each health care service provider according to its own rules. Document No OID shows which health care service provider is involved. Different versions of the document have the same document number.*

Mostly a numeric value and an integer. An exception is one hospital where the text precedes the number. The document numbers have 3–10 digits.

Comment of the Estonian e-Health Foundation: *The document's unique ID is formed by **OID + institution-based document number**. The document number may contain letters.*

- 2. version number** – *document version number. Starting from 1, increases by 1. Upon registering a new document, it is always "1" by default.*

The field was completed for all treatment cases. Numeric field. The version numbers range from 1 to 30. However, in 97.5% of cases, the version number is less than five. In order to investigate the causes for major version numbers (i.e. multiple updating needs), information is provided to the Estonian e-Health Foundation by the health care service providers.

Table 1. Cases by version number

Version No	Number of treatment cases	Share of the treatment cases' total number, %
1	40,887	84.76
2	3,645	7.56
3	1,666	3.45
4	839	1.74
5	483	1.00
6	267	0.55
7	144	0.30
8	97	0.20
9	69	0.14
10	41	0.08
11	30	0.06
12	21	0.04

Version No	Number of treatment cases	Share of the treatment cases' total number, %
13	17	0.04
14	11	0.02
15	8	0.02
16	2	0.00
17	2	0.00
19	3	0.01
20	1	0.00
21	1	0.00
22	1	0.00
27	1	0.00
30	1	0.00
TOTAL	48,237	100.00

3. institution ID – registry code of the institution.

The field was completed for all treatment cases. Numeric field. No unknown codes existed. Commercial registry codes were used and all had a match in the NIHD's database of health service providers.

4. start of the hospital care – start date of the treatment case.

According to the document of standards, the field structure should be YYYYMMDD.

The format in the Health Information System file was YYYY.MM.DD hh:mm:ss, i.e. with time. Similarly to the first Health Information System extract, the field was completed for all treatment cases.

As the extract of the Health Information System was taken on the basis of the dates of arrival and leaving, a definite conclusion – that all epicrisis are always correctly completed – cannot be made on the basis of this comparison.

The time of arrival was not specified in 16,516 cases out of 48,237, i.e. 34.2% of cases (completed for 65.8% of cases). Compared to the previous analysis, the completion of arrival has increased by 20 percentage points in terms of time accuracy.

5. end of the hospital care – end date of the treatment case.

According to the document of standards, the field structure should be YYYYMMDD.

The format in the Health Information System file was YYYY.MM.DD hh:mm:ss, i.e. with time. Similarly to the first Health Information System extract, the field was completed for all treatment cases. The time of leaving was not specified in 39,891 cases out of 48,237, i.e. 82.7% of cases. In the previous analysis, it was 97%, therefore, improvement is also seen here.

6. length of stay in hospital – total number of bed days.

Numeric field. Mostly an integer. In 579 cases, the number of bed days was presented with a decimal point (reported in the data of three institutions). These were usually intensive care beds. If intensive care bed days should always be calculated with one decimal point, this should be done in all institutions that provide the service, and in the same way. In this case, the start and end time of the intensive care should be time-accurate. If the calculation of the intensive care bed days is accurate for the respective profile (department), then in case of the general treatment duration, the decimal point representation should not be necessary.

The indicated number of bed days matches with the calculated number of bed days in a total of 47,483 cases, or 98.4% of cases. Most of the differences included one day: in 508 cases, the number of bed days indicated by the hospital was one day longer than the number of calculated bed days, and in 63 cases, the number of calculated bed days was one day longer than the number of bed days indicated by the hospital. The difference of two and more days occurred in 183 cases, or 0.4% of cases.

The difference found in the first analysis was greater: the number of bed days calculated according to the arrival and leaving dates of hospital care differed from the number of bed days indicated by the hospitals in 2.2% of cases.

7. discharge type (code) – way of leaving the hospital; Classification: Discharge from the hospital.

The field was completed for all treatment cases. Numeric field. Three codes were used: 1, 2, and 3. The classification provides the option to additionally use 31 (issue of a death certificate) and 32 (forwarding to autopsy), however, these codes have not been used by the institutions.

8. discharge type (description) – way of leaving the hospital; Classification: Discharge from the hospital.

Textual interpretation of the previous indicator:

- 1 – hospital checkout;
- 2 – transfer to another hospital;
- 3 – death.

The code and description were mutually compliant in case of all entries. The field was completed for all treatment cases.

9. status code upon hospital checkout – Patient status upon hospital checkout; Classification: Patient's condition upon hospital checkout.

Numeric field. Three codes were used (1, 2, and 3), as also foreseen by the classification. The field was blank in 1,052 cases (2.2%), of which 712 cases concerned hospital checkout, 51 transfer, and 271 death.

This is a characteristic, which the National Institute for Health Development does not collect, and there is no option for comparison. The reasons for non-response should be inquired from the health care service providers.

In the health care statistics, hospital checkout is one of the ways of leaving the hospital next to transfer and death. Based on this logic, this characteristic should not be applied to all categories of patients who have left the hospital. In case of death, it is not reasonable to complete the field, however, in case of transfer to another hospital, it is important whether the transfer was due to the patient's recovery or deterioration in the patient's condition. Therefore, it should be agreed that the field is not completed in case of deceased people, only for those hospital checkouts and transferred.

10. status description upon hospital checkout – Patient's condition upon hospital checkout; Classification: Patient's condition upon hospital checkout.

Textual interpretation of the previous indicator:

- 1 – recovered or recovery (in one institution);
- 2 – unchanged;
- 3 – deteriorated or deteriorating (one institution).

The code and description were mutually compliant in case of all entries.

The field was blank in 276 cases (0.6%), of which in most cases, i.e. 271 cases, the discharge type was death (see the comment of the previous clause).

The text field of the status was completed in 776 cases, when the code was missing upon hospital checkout (previous field).

Based on the data, the problem can be confirmed upon completing the given characteristic in the case of a person's death. Specifically, it is necessary to regulate which discharge types will be required to complete the status characteristic. Secondly, consideration could be given to changing the wording of the characteristic: "recovered" refers to healing, that is probably early to say when leaving the hospital. The changes in the human condition compared to arriving to the hospital are better described by the words "recovery" and "deteriorating".

Table 2. Patient condition/status upon hospital checkout

Code	Description	Number of treatment cases
-	-	276
-	recovery	776
1	recovered/recovery	38,802
2	unchanged	6,677
3	deteriorating/deteriorated	1,706

11. location of the health care provider: county

Textual field. The county of the service provider was presented by six institutions. Different names had been used, etc. both “Harjumaa” and “harju”.

The use of text fields in case of addresses seems to be inexpedient. As a rule, text could come automatically from the information system when choosing a code. The option to add text could remain as a backup. It is necessary to complete the text field in cases where the code cannot be used for some reason or it is not available.

12. location of the health care provider: city

Textual field. The field was completed by eight institutions. The field was completed in case of two institutions in Tallinn, where the county of location was missing.

13. location of the health care institution according to the Classification of Estonian administrative units and settlements (EHAK)

EHAK

Name: Classification of Estonian administrative units and settlements

Version: 2006 v1

Responsible: Statistics Estonia

Structure:

A four-digit identification code; by the numeric value of the code are distinguishable:

- level of county (code smaller than 100)*
- level of local governments (code from 100 to 999)*
- level of settlements (code greater than 1,000)*

Numeric field. The code of EHAK was presented by nine institutions. Compared to the previous text indicator, one hospital was added on which the location information was available.

Eight institutions out of nine had a field format: the county code and the city / rural municipality code; one institution only had the city code.

The completion of the field is not so important for the hospitals, as there are few hospitals (about 60) and their location is known, however, it is essential to have the code of EHAK at the outpatient health care providers and their different locations. There should be an automated selection in the information system of the institution. It is necessary to harmonise the use of the code, the necessary level should be established. The NIHD experts’ opinion is that the institutions could use the four-digit code of EHAK; it is not necessary to add the county code. It is also necessary to

determine the use and update procedure of the versions of EHAK. Agreeing on the use of the code of EHAK is important not only to reflect the location of the service provision but also in the presentation of patient's place of residence.

14. patient's PID – *The document includes the data about this patient (statistics PID is submitted)*

Numeric field. 4–10 digits. The field was completed for all cases.

15. patient's date of birth – *On this basis, age is calculated. Age is given in days (up to 1 months old), months (up to 1 year old) or years. Outputs show age, not birth date.*

Numeric field with the format of YYYYMMDD. The patient's date of birth was missing in one case, in two cases the date of birth was incorrect, the rest was completed.

This is an important characteristic that must always be completed. Exceptional situations and their solutions must be foreseen. If the date of birth is derived from an Estonian personal identification code, then it is necessary to determine how the date of birth for the person, who does not have an Estonian personal identification code, is registered. It is also necessary to agree on how people, whose birth date until the end of their stay in the hospital will remain unknown, will be reflected.

16. patient's place of residence: county

Textual field. The data field was blank in 44,840 cases, or 93% of cases.

As the Health Information System file did not contain the code of EHAK for the patient's place of residence, it is not possible to fully assess this characteristic. This is essential information for the use and availability of health care services. The procedure for obtaining and modifying data must be clear. If the health care service provider specify the place of residence of the hospitalised person, such information can be used in the inpatient epicrisis when leaving the hospital. If the task to identify the place of residence via the population register only, remains as single option for the central system of the Health Information System, then the actual place of residence remains unknown. It is important for both the epicrisis and statistics to use real residence data.

17. patient's place of residence: country

Textual field. The three-digit country code for the classification of countries and territories was used. The field had not been completed in 9,032 cases, i.e. 18.7% of cases. At least in part, the field was completed by 24 institutions. A total of 11 institutions have filled insufficiently, including one hospital that has not completed the field in any case. There are 30 different codes used. All codes have a match in the classification.

An important issue from the perspective of the free movement of patients. The extent to which our health care service providers offer services to the residents of other countries is not evident from the current health statistics.

18. start of stay in the department – *time of arrival to the department; Arrival date and time*

The field was completed for all treatment cases. In the Health Information System file, the format was YYYY.MM.DD hh:mm:ss. The time when the stay in the hospital begins has not been specified only in 268 cases, or with regard to 0.4% of the hospital bed specialties (total number of entries on the hospital bed specialty – 70,639). The hospital bed specialties of these cases are specific to

the institutions, however, most of them are the second level beds of intensive care, obstetrical care, psychiatry, and rehabilitation beds.

The start date of the hospital care coincided with the start date of staying in the department in a total of 96.9% of cases, i.e. 47,752 cases. The two fields differed from each other in 1,514 cases. Of the latter, 98% were cases of one institution where the starting date for the treatment on the bed profile was incorrectly equal to the end date of treatment. It seems to be a programming error.

19. end of stay in the department – time of leaving from the department; Leaving date and time

The field was completed for all treatment cases. In the Health Information System file, the format is YYYY/MM/DD hh:mm:ss. The time at the end of staying in the department was not specified in 249 cases, i.e. 0.3% of the profiles. With the exception of one case, these are entries where also the starting time is not time-accurate.

The end date of hospitalisation and the date of leaving the department matched in a total of 99.6%, or 48,058 cases. The two fields differed from each other in 179 cases and with regard to a total of 14 hospitals, but only two hospitals had the share of such cases higher than 0.4%. These two institutions had a systemic error: in one institution, the end date of hospital care was 10 October 2011, regardless of when the end date of staying in the department occurred; in the other institution, the last hospital bed specialty had been left out of the calculation of the end date of hospital care in the event of several hospital bed specialties.

20. days in the department – the number of bed days in the department in days; calculated by the health care service provider. DL does not verify the compliance between the dates and bed days.

Numeric field. In 841 cases, the value was given with a decimal point. The field was completed for all treatment cases.

The duration of hospital treatment indicated by the hospital was different from the sum of the duration of treatment of various bed profiles indicated by the hospital in 1,312 cases. One institution was behind 99.6% of cases. The difference occurs due to the fact that one is indicated as the number of bed days in case of the same arrival and leaving date while staying in the department; the duration of hospitalisation as a whole is correctly stated. The remaining individual cases where the duration of treatment indicated by the hospital was different from the total number of days in the department differed between the hospitals.

For bed days, the duration of treatment is calculated as the number of days between arrival and departure dates, with the date of arrival and departure being considered one day. Questions about calculating bed days arise when the arrival and departure were on the same date or when the date is different, but the hospital stay was only a few hours. Specifications may arise, in particular, when emergency patients arrive, moving from the Emergency Department to another department, or moving to another hospital or in case of death. The time spent in the Emergency Department is not reflected in the current health statistics separately, although there is a need to do this.

Hospitals are known to reflect the stay of newborns in hospitals differently. Newborns and their beds are not shown in the monthly report on the use of inpatient beds. However, the tables of the reasons for hospital care in the annual questionnaire “Hospital” only show the data on the sick newborns. The monthly report shows the data of sick newborns if they have been transferred to another hospital bed specialty – children’s bed. Those sick newborns born in the same hospital, who have transferred from the maternity department to another department (other hospital bed specialty), are indicated under those hospitalised, not among those transferred from another department. The Health Information System file included 1,019 cases about newborns (based on the inpatient epicrisis), including most of them concerning healthy newborns. Thus, in comparison with the data of monthly report, the Health Information System data was overcovered with regard to newborns in some respects.

Upon transfer to long-term nursing care (nursing care service in the future), it should be clear whether the hospital active care case is always ended in each hospital, and a new care case is opened or not, regardless of whether the care case is continued with the same or other service provider with regard to long-term nursing care, without a day at home. Should one also behave in the same way when moving between rehabilitation care or psychiatric beds? The topic of initiation and termination of a treatment case has been further discussed in the next chapter of the comparison, but differences in formalisation can be seen from the Health Information System data.

To summarise the dates and bed days for hospital care and hospital bed specialties, we can say that from 48,237 cases

1. in 45,221 cases (93.7%), i.e. about nine times out of ten, the start and end dates of the hospital care indicated by the hospital match the dates of arrival and leaving the department, and the number of hospital care bed days indicated by the hospital match with the sum of the bed days of different hospital bed specialties.
2. The start and end date of hospital treatment indicated by the hospital coincide with the time of arrival and departure from the department for 46,548 cases (96.5%).
3. The date of arrival at the hospital indicated by the hospital coincides with the date of arrival in the hospital’s designated department for a total of 46,723 cases (96.9%).
4. The date of hospitalization indicated by the hospital coincides with the date of leaving the department indicated by the hospital for a total of 48,058 cases (99.6%).
5. The number of hospital day beds indicated by the hospital coincides with the total number of bed days spent in the department for a total of 46,888 cases (97.2%).

Differences occurred in different institutions. In all three fields (both in terms of the start and end time and the number of bed days did not align), there was only one treatment case error.

For statistical purposes, the introduction of uniform rules with as few exceptions as possible is most appropriate. Possible ways of entering and leaving the hospital and differences (e.g. patient groups) should be mapped and their movements should be recorded in the documentation.

21. hospital bed specialty in the department (code) – hospital bed specialty in the department; Classification: Hospital bed specialties.

Textual field. The field was completed for different hospital bed specialties of all treatment cases. Two different classifications were used: 1) the hospital bed specialty classification published by the Estonian e-Health Foundation; 2) "Inpatient beds and hospitalisation" hospital bed specialty row marking (three-digit codes). The Health Information System provides encoding according to the first classification.

The report line marking was used by one hospital.

There was no difficulty in matching, as the two different classifications can be grouped by name (see Table 3). The Estonian e-Health Foundation classification distinguishes between orthopaedic and septic orthopaedic beds, the report includes one profile for orthopaedic beds. In addition, one institution used the code V261, which neither of the classifications provide, however, according to the text it was known that this is an oncology bed. The report includes data on four hospital bed specialties that the classification of the Estonian e-Health Foundation does not provide and for which the institutions have also not sent data: pediatric traumatology, pediatric orthopaedics, pediatric ear-nose-throat diseases and skin and sexually transmitted diseases in children. However, hospitals have provided data on beds of pediatric orthopaedic and ear-nose-throat diseases with the questionnaire. If it is necessary to distinguish these hospital bed specialties, these should be included in the e-Health classification.

Table 3. Codes of the Hospital bed specialties in the report and the corresponding codes in the Health Information System

Name of hospital bed specialty	Codes in the report	Codes used in the Health Information System file		
		Code1	Code2	Code3
general medicine	V02	V02	V350	
cardiology	V03	V03	V150	
gastroenterology	V05	V05	V120	
long-term nursing care	V09	V140		
endocrinology	V11	V11	V110	
infectious diseases	V13	V210		
infectious diseases in children	V14	V211		
haematology	V15	V15	V130	
nephrology	V17	V17	V220	
surgery	V20	V20	V390	
children's surgery	V21	V190		
neurosurgery	V22	V22	V230	
chest surgery	V24	V24	V330	
cardiovascular surgery	V26	V26	V161	
traumatology	V28	V28	V274	
children's traumatology	V29	-		
burn	V30	V30		
orthopaedics	V32	V32	V270	V273
paediatric orthopaedics	V33	-		
urology	V34	V34	V370	
facial and jaw surgery	V36	V36	V250	
oncology	V38	V38	V260	V261
obstetrical care	V40	V363		
obstetrical pathology	V41	V362		
gynaecology	V42	V42	V361	
tuberculosis	V44	V44	V300	
neurology	V48	V48	V240	
paediatric neurology	V49	V241		
psychiatry	V50	V50	V280	
paediatric psychiatry	V51	V51	V281	
eye diseases	V52	V340		
acute psychiatry	V53	V53		
ear-nose-throat diseases	V54	V54	V170	

Name of hospital bed specialty	Codes in the report	Codes used in the Health Information System file		
		Code1	Code2	Code3
pediatric ear-nose-throat diseases	V55	-		
skin and sexually transmitted diseases	V56	V56	V200	
children's skin and sexually transmitted diseases	V57	-		
radiology	V58	V58	V310	
paediatric diseases	V59	V180		
pulmonology	V63	V63	V290	
intensive care I stage	V66	V66		
intensive care II stage	V67	V67		
intensive care III stage	V68	V68		
vascular surgery	V70	V70	V161	
children's intensive care I stage	V71	V101		
children's intensive care II stage	V72	V102		
children's intensive care III stage	V73	V103		
rheumatology	V76	V76	V320	
rehabilitation care	V98	V380		

The differences indicate the need to coordinate the codes and names of bed profiles in a way that all parties would receive the information they need, but where the used list would be uniform and hierarchical.

22. hospital bed specialty in the department (description) – *hospital bed specialty in the department; Classification: Hospital bed specialties.*

The field was completed for different hospital bed specialties of all treatment cases. Textual explanation of the previous indicator. A very necessary characteristic, especially when different lists are used.

2.2 Rules and practice for opening a new case

The data received from the Health Information System were studied in more detail to identify what is the practice of calculating treatment periods, i.e. when a new case is opened with the patient.

The file contained a total of 1995 cases of the same patient that started the same day as the previous case ended. In 776 cases (39%), a new case was opened in the same hospital. In the same institution, a new case was opened on the same day when the former case was ended in 20 hospitals out of 25. These are mostly cases where one profile (the one which was left behind or the one where a new case was opened) is long-term nursing care, rehabilitation care and psychiatry, sometimes also follow-up care. Consequently, the question was also raised in the description of the bed days calculation in the previous chapter. When speaking about the average duration of curative care (by profile or in total), it is important to reflect movement according to common principles, for example, from long-term nursing care to the curative care profiles, or vice versa.

Table 4. Opening a new treatment case according to more frequent profiles in the same hospital

Profile from which the patient left	New case profile	Number of treatment cases
general medicine	long-term nursing care	91
neurology	rehabilitation care	61
long-term nursing care	long-term nursing care	53
general surgery	long-term nursing care	33
neurology	long-term nursing care	31
gynaecology	obstetrical care	26
general medicine	rehabilitation care	26
intensive care II stage	long-term nursing care	22
traumatology	long-term nursing care	18
long-term nursing care	general medicine	17
orthopaedics	rehabilitation care	17
obstetrical pathology	obstetrical care	16
traumatology	rehabilitation care	16
intensive care II stage	rehabilitation care	12
long-term nursing care	general surgery	12
rehabilitation care	long-term nursing care	10
septic orthopaedics	long-term nursing care	9
general medicine	psychiatry	9

Based on the data of the Health Information System, the case of the same patient was ended and a new case was opened on the same day with regard to 39 different hospital bed specialties, therefore, the opening/termination of new cases is not limited to individual hospital bed specialties. By institution, it is very different. New cases within the same institution were mostly

opened with regard to the nursing care bed (352), followed by rehabilitation care (169), obstetrical care (46), general medicine (34), general surgery (28), and psychiatry (23).

Table 5. Opening a new treatment case according to more frequent profiles in another hospital

Profile from which the patient left the hospital	New case profile	Number of treatment cases
neurology	rehabilitation care	46
traumatology	follow-up	40
general medicine	cardiology	33
neurology	long-term nursing care	30
general medicine	long-term nursing care	21
general surgery	surgery	20
general medicine	neurology	19
orthopaedics	follow-up	19
paediatric diseases	paediatric diseases	19
Intensive care II stage	rehabilitation care	19
general surgery	traumatology	17
long-term nursing care	long-term nursing care	17
Intensive care II stage	general medicine	17
general surgery	gastroenterology	16
general surgery	general surgery	16
intensive care I stage	cardiology	15
intensive care II stage	intensive care III stage	15
intensive care III stage	intensive care III stage	15
general medicine	Intensive care II stage	14
neurosurgery	rehabilitation care	12
traumatology	long-term nursing care	11
general medicine	general surgery	11
cardiology	cardiology	11
general medicine	haematology	10
intensive care III stage	follow-up	10
gastroenterology	follow-up	10
intensive care II stage	Intensive care II stage	10
cardiology	general medicine	10

In 89 cases, the case was terminated even on the same profile and in the same institution, where a new case was opened. Among the hospital bed specialties, the most cases occurred in terms of the nursing care beds (53).

In addition, the cases initiated and terminated on the same day differed to indicate the discharge type. Within the same institution, the patient's discharge type was checkout in 507 cases (65%) and transfer in 269 cases (35%). In the case of continuation of treatment in another institution, the discharge type is checkout in 264 cases (22%) and transfer in 955 cases (78%). To evaluate the

differences in the discharge type and to draw conclusions, it would be necessary to further examine the case by diagnosis.

The total number of transfers to another hospital is 2,106. In 1,341 cases, there is a new case, while there is none for the rest of 765 cases. However, in 42 cases the difference between the end of the previous treatment and the start of the new treatment was more than 14 days (max 75 days). Such a time difference suggests that some of the cases indicated as transfers might have been the summaries sent to the Health Information System, involving several previous hospital care period and not be transfers. Missing cases may also be partly related to the transfer of patients to hospitals that do not provide the Health Information System data, or have not reported all epicrisis.

3. SUMMARY OF COMPARISON OF THE HEALTH INFORMATION SYSTEM AND REPORT DATA

Data on inpatient epicrisis during the period between July and September were submitted by 25 hospitals on the form of the Health Information System file. The report “Inpatient beds and hospitalisation” on the third quarter was submitted by 58. Compared to the first comparative analysis, three institutions were added. The share of hospitals that submitted data to the Health Information System increased from 35% to 43% compared to the previous analysis period. Without the nursing hospitals, the growth was from 61% to 69%.

Data submission in the Health Information System was different by type of hospital. All regional, central and general hospitals had provided data at least in some respects (see Table 6). Approximately two thirds of rehabilitation hospitals and local hospitals, and one fifth among special hospitals submitted data.

Table 6. Number of respondents and data submission to the Health Information System by hospital type, third quarter of 2011

Type of hospital	Number of respondents	Data submitted to the Health Information System	No data submitted to the Health Information System	Share of those who sent data to the Health Information System, %
Regional hospital	3	3	0	100.0
Central hospital	4	4	0	100.0
General hospital	11	11	0	100.0
Rehabilitation hospital	3	2	1	66.7
Nursing hospital	22	0	22	0.0
Special hospital	10	2	8	20.0
Local hospital	5	3	2	60.0
Total number of hospitals	58	25	33	43.1
...including without nursing hospitals	36	25	11	69.4

The volume of data submission has significantly increased compared to the first comparative analysis – both the number of cases and the number of characteristics obtained and used for the analysis.

Table 7. Number of entries and treatment cases in the first and second Health Information System file

	December 2010	Third quarter of 2011
treatment cases	6,985	48,237
entries	16,166	118,876

In the first analysis, it was possible to compare two main characteristics: the number of patients who have left the hospital and the number of bed days. For both characteristics, the share of data provided to the Health Information System in the reported data has increased significantly compared to the first comparative analysis.

The share of those who have left the hospital has increased by almost three times from the number indicated in the report. While in the first comparative analysis, the institutions that joined the Health Information System had only submitted 35% of the number of patients who had left the hospital compared to the data collected with the report, now the same indicator reached 88%. By type of hospital, the highest rate of coverage was in central hospitals, regional hospitals and general hospitals (Table 8). In the first analysis, besides special hospitals, one of the lowest coverage rates was in rehabilitation hospitals. In the second file of the Health Information System, however, the recovery rate in rehabilitation hospitals was only slightly lower than the three best hospital types.

Table 8. Number of patients who have left the hospital in the report and the Health Information System by hospital type

Type of hospital	Number of persons discharged from the hospital Third quarter of 2011		Coverage Third quarter of 2011, %	Coverage Dec 2010, %
	Report	Health Information System		
Regional	19,591	17,227	87.9	34
Central hospital	17,167	16,425	95.7	36.2
General hospital	11,909	9,997	83.9	35.7
Rehabilitation hospital	833	640	76.8	12.7
Special hospital	506	40	7.9	3.4
Local hospital	1,009	607	60.2	40.3
Total number of hospitals	51,015	44,936	88.1	34.8

Based on the way of leaving the hospital, the coverage of data submitted to the Health Information System is higher for the discharged and transferred patients and lower for the deceased when compared to the data in the report. Compared to the first analysis, the proportion of data submitted to the Health Information System increased by four times in case of deceased

and transferred patients and nearly three times in case of those discharged. However, in general hospitals, the rate of sending remains lower than in central and regional hospitals.

Table 9. Coverage rate of those discharged from the hospital, transferred to another hospital, and deceased by hospital type, third quarter of 2011

Type of hospital	Hospital checkouts	Transferred	Deceased
Regional	87.9	93.3	81.3
Central hospital	96.8	84.9	74.7
General hospital	85.6	80.4	53.4
Rehabilitation hospital	76.3	91.2	0.0
Special hospital	7.9	0.0	0.0
Local hospital	61.9	20.0	37.0
Total number of hospitals	88.8	86.4	67.5

The number of bed days submitted with the inpatient epicrisis of the Health Information System covers 80% of the number of bed days collected with the statistical questionnaire from the same institutions. Compared to the first analysis, the data coverage has increased four times. The estimation used in comparison was based on the number of days spent at the hospital, regardless of the length of stay at the hospital. In order to make a more accurate comparison, it would be necessary to take into account only the number of days spent in hospital during a particular month. As the Health Information System file contained only terminated cases, a simplified approach has been used for the overall assessment.

Table 10. Number of bed days in the report and the Health Information System by hospital type, third quarter of 2011

Type of hospital	Number of bed days		Coverage, %	Coverage Dec 2010, %
	Report	Health Information System		
Regional	142,440	123,069	86.4	18.6
Central hospital	99,435	81,060	81.5	24.0
General hospital	94,232	71,843	76.2	21.7
Rehabilitation hospital	10,471	8,646	82.6	19.2
Special hospital	987	99	10.0	5.0
Local hospital	16,189	7,859	48.5	20.9
Total number of hospitals	363,754	292,576	80.4	21.0

When looking at the submission of notifications by month, there is a certain irregularity and the presentation is not very harmonious. Furthermore, it cannot be said on the basis of the available data that the submission rate has improved over the months. The latter may be due to a holiday period.

Table 11. Coverage rate of patients who have left the hospital by hospital type, third quarter of 2011

	July	August	September	Total
Regional hospital	88.6	87.1	88.1	87.9
Central hospital	98.0	99.6	90.3	95.7
General hospital	84.0	83.0	84.7	83.9
Rehabilitation hospital	72.1	80.4	77.0	76.8
Nursing hospital	0.0	0.0	0.0	0.0
Special hospital	4.9	4.3	12.8	7.9
Local hospital	70.0	53.7	57.3	60.2
Total number of hospitals	89.1	89.0	86.5	88.1

More detailed information about different indicators by hospital type and month have been provided in the Annexes.

4. CONCLUSIONS

1. Comprehensiveness of submitting the inpatient epicrisis

The coverage of the submission of the inpatient epicrisis to the Health Information System by institutions is high. Compared to the first analysis, three more hospitals were added. By the hospital type, the result is different: data were provided by all regional, central and general hospitals, local and rehabilitation hospitals provided two-thirds of inpatient epicrisis, and one-fifth by special hospitals. There is no data about nursing hospitals in the Health Information System. The involvement of missing hospitals must be actively addressed.

Despite the relatively good coverage of hospitals, the result is not yet sufficient to produce official statistics. Under Estonian circumstances, the coverage of respondents and cases should be 100%, as due to the small number of hospitals, there are big differences within the hospital type and the making of generalisation is limited.

In order to improve coverage, it is first important to specify the reason for not submitting data by detail. To ensure the data submission by the nursing hospitals, nursing history should be established as soon as possible.

2. The quality of epicrisis submission

Completion of the characteristics

Compared to the first analysis of the Health Information System data, the number of submitted inpatient epicrisis has significantly increased by the third quarter of 2011. Of the reported number of patients who had left the hospital, the Health Information System received 88% and 80% of the bed days. In the first analysis, the result was 35% and 21%, respectively. The result is partly due to more consistent data transmission over time. The characteristics that were completed in a poorer way were as follows:

- The county of the service provider and the code of EHAK was completed by less than ten institutions;
- Patient's county of residence (missing in 93% of cases) and country (missing in 18.7% of cases);

The indicated number of bed days coincided with the calculated bed days for 98.4% of cases. Compared to the previous analysis, the difference has somewhat decreased (97.8% in the first analysis).

Use of lists and classifications

The analysis of the Health Information System data showed, among other things, that the classifications are not integrated into the hospital system; the values of characteristics are entered as text instead of code. Changes must be made to the input programme, so that the data entered in the code automatically generates a textual match using the programme. This would ensure a uniform data format and better analysis. Also, the procedure for using and updating the classification should be agreed with the health care service providers.

There are four hospital bed specialties that the list of the Estonian e-Health Foundation does not provide and for which the institutions have not sent data to the Health Information System:

pediatric traumatology, pediatric orthopaedics, pediatric ear-nose-throat diseases and skin and sexually transmitted diseases in children. It is necessary to review whether such hospital bed specialties are necessary for statistics. If so, the classification published by the Estonian e-Health Foundation should be updated.

Comparison with the health statistics report

Compared to the health statistics reporting, the following was submitted to the Health Information System:

- 89% of the discharged. In the case of central hospitals, the share of reporting is 97%, and in case of special hospitals only 8%.
- 68% of the deceased. Regional and central hospitals (70–80%) have better coverage; in case of general and local hospitals, only half of the deceased are presented.
- 80% of bed days. The share of health statistics is lower in special hospitals (10%)

Compared to the first analysis, the share of data submitted to the Health Information System in the data of health statistics increased by nearly three times about discharged and four times about deceased patients.

Next, in cooperation with hospitals, it is necessary to determine whether the results obtained are in line with the data provided by them and what may be the reason for the difference. To this end, the institutions are separately contacted and information is analysed with them with regard to different indicators. The institutions will also be given feedback on the quality of the data provided.

Need for automatic verification

This analysis confirmed that there are errors that can be avoided by adding controls. In order to minimise the number of documents to be returned to the institution for improvement, the primary control of data (verification of absolute errors) should take place in the hospitals.

3. Items for which uniform rules and definitions should be established

The analysis revealed differences in the use of some concepts and definitions that would certainly require harmonisation and review.

The analysis showed that the launch of a new case is different for institutions and cases. A new procedure for opening a case should be agreed with the hospitals. Additional characteristics of procedures and diagnoses have been requested from the Estonian e-Health Foundation to analyse the procedure for opening a new case.

One issue that needs to be discussed is the calculation of newborns. Between hospitals, the data on newborns (especially healthy newborns) are provided differently, which is illustrated in the analysis by partial coverage of the data on newborns submitted to the Health Information System compared to report-based statistics.

In addition to the case, it is necessary to harmonise the definitions of bed day and day care.

4. Determination of characteristics required for statistics and missing from the epicrisis

Characteristics that have not been included in the inpatient epicrisis, but required to produce official statistics on bed indicators, are the number of beds and the number of bed days of caring nurses, for example. To obtain these indicators, special statistical applications, such as summary notifications, etc. need to be developed.

ANNEXES

Table 12. Hospitals that have submitted data to the Health Information System

Order No	Registry code	Name of the institution
1	10050157	Põlva Haigla AS
2	10220275	Järvamaa Haigla AS
3	10351752	Valga Haigla AS
4	10361153	Keila Taastusravikeskus AS
5	10391415	Fertilitas AS
6	10822068	Ida-Tallinna Keskhaigla AS
7	10822269	Lääne-Tallinna Keskhaigla AS
8	10833853	Lõuna-Eesti Haigla AS
9	10856624	Rakvere Haigla AS
10	10955734	Kallavere Haigla AS
11	11096463	Ortopeedia Arstid AS
12	90001478	Tartu Ülikooli Kliinikum SA
13	90003217	Narva Haigla SA
14	90003433	Ida-Viru Keskhaigla SA
15	90004059	Kuressaare Haigla SA
16	90004527	Pärnu Haigla SA
17	90004585	Viljandi Haigla SA
18	90005509	Rapla Maakonna Haigla SA
19	90005917	Läänemaa Haigla SA
20	90006399	Põhja-Eesti Regionaalhaigla SA
21	90006590	Tallinna Lastehaigla SA
22	90007046	Hiiumaa Haigla SA
23	90007359	Elva Haigla TM SA
24	90007425	Jõgeva Haigla SA
25	90008123	Haapsalu Neuroloogiline Rehabilitatsioonikeskus SA

Table 13. Number of hospital admissions in the report and the Health Information System and coverage rate (%) by hospital type and month

Type of hospital	July			August			September			Total		
	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)
Regional hospital	5,568	4,928	88.5	6,563	5,797	88.3	7,684	6,791	88.4	19,815	17,516	88.4
Central hospital	5,042	4,981	98.8	5,879	5,777	98.3	6,394	5,549	86.8	17,315	16,307	94.2
General hospital	3,640	3,043	83.6	3,924	3,261	83.1	4,460	3,670	82.3	12,024	9,974	83.0
Rehabilitation hospital	273	204	74.7	297	241	81.1	280	219	78.2	850	664	78.1
Nursing hospital	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Special hospital	153	6	3.9	158	7	4.4	202	25	12.4	513	38	7.4
Local hospital	293	173	59.0	360	192	53.3	372	215	57.8	1,025	580	56.6
Total number of hospitals	14,969	13,335	89.1	17,181	15,275	88.9	19,392	16,469	84.9	51,542	45,079	87.5

Table 14. Number of children's hospital admissions in the report and the Health Information System and coverage rate (%) by hospital type and month

Type of hospital	July			August			September			Total		
	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)
Regional hospital	918	844	91.9	1,134	1,024	90.3	1,412	1,292	91.5	3,464	3,160	91.2
Central hospital	462	361	78.1	446	421	94.4	481	634	131.8	1,389	1,914	137.8
General hospital	325	133	40.9	344	173	50.3	475	411	86.5	1,144	990	86.5
Rehabilitation hospital	45	39	86.7	44	57	129.5	36	32	88.9	125	99	79.2
Nursing hospital	0	11	0.0	0	17	0.0	0	0	0.0	0	0	0.0
Special hospital	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Local hospital	0	0	0.0	2	0	0.0	0	0	0.0	2	2	100.0
Total number of hospitals	1,750	1,214	69.4	1,970	1,465	74.4	2,404	2,369	98.5	6,124	6,165	100.7

Table 15. Number of hospital discharges in the report and the Health Information System and coverage rate (%) by hospital type and month

Type of hospital	July			August			September			Total		
	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)
Regional hospital	5,792	5,131	88.6	6,174	5,378	87.1	7,625	6,718	88.1	19,591	17,227	87.9
Central hospital	5,185	5,080	98.0	5,657	5,632	99.6	6,325	5,713	90.3	17,167	16,425	95.7
General hospital	3,740	3,143	84.0	3,751	3,112	83.0	4,418	3,742	84.7	11,909	9,997	83.9
Rehabilitation hospital	226	163	72.1	281	226	80.4	326	251	77.0	833	640	76.8
Nursing hospital	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Special hospital	162	8	4.9	141	6	4.3	203	26	12.8	506	40	7.9
Local hospital	323	226	70.0	328	176	53.7	358	205	57.3	1,009	607	60.2
Total number of hospitals	15,428	13,751	89.1	16,332	14,530	89.0	19,255	16,655	86.5	51,015	44,936	88.1

Table 16. Number of hospital checkouts in the report and the Health Information System and coverage rate (%) by hospital type and month

Type of hospital	July			August			September			Total		
	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)
Regional hospital	5,354	4,729	88.3	5,747	5,001	87.0	7,168	6,323	88.2	18,269	16,053	87.9
Central hospital	4,796	4,778	99.6	5,271	5,314	100.8	5,941	5,396	90.8	16,008	15,488	96.8
General hospital	3,392	2,901	85.5	3,391	2,864	84.5	4,060	3,514	86.6	10,843	9,279	85.6
Rehabilitation hospital	221	159	71.9	270	215	79.6	307	235	76.5	798	609	76.3
Nursing hospital	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Special hospital	162	8	4.9	140	6	4.3	203	26	12.8	505	40	7.9
Local hospital	271	197	72.7	281	154	54.8	315	186	59.0	867	537	61.9
Total number of hospitals	14,196	12,772	90.0	15,100	13,554	89.8	17,994	15,680	87.1	47,290	42,006	88.8

Table 17. Number of patients transferred to another hospital in the report and the Health Information System and coverage rate (%) by hospital type and month

Type of hospital	July			August			September			Total		
	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)
Regional hospital	275	259	94.2	269	249	92.6	281	262	93.2	825	770	93.3
Central hospital	225	179	79.6	223	194	87.0	248	218	87.9	696	591	84.9
General hospital	196	170	86.7	218	177	81.2	210	155	73.8	624	502	80.4
Rehabilitation hospital	5	4	80.0	11	11	100.0	18	16	88.9	34	31	91.2
Nursing hospital	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Special hospital	0	0	0.0	1	0	0.0	0	0	0.0	1	0	0.0
Local hospital	4	2	50.0	4	0	0.0	7	1	14.3	15	3	20.0
Total number of hospitals	705	614	87.1	726	631	86.9	764	652	85.3	2,195	1,897	86.4

Table 18. Number of deceased in the report and the Health Information System and coverage rate (%) by hospital type and month

Type of hospital	July			August			September			Total		
	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)
Regional hospital	163	143	87.7	158	128	81.0	176	133	75.6	497	404	81.3
Central hospital	164	123	75.0	163	124	76.1	136	99	72.8	463	346	74.7
General hospital	152	80	52.6	142	76	53.5	148	80	54.1	442	236	53.4
Rehabilitation hospital	0	0	0.0	0	0	0.0	1	0	0.0	1	0	0.0
Nursing hospital	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Special hospital	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Local hospital	48	19	39.6	43	17	39.5	36	11	30.6	127	47	37.0
Total number of hospitals	527	365	69.3	506	345	68.2	497	323	65.0	1,530	1,033	67.5

Table 19. Number of bed days in the report and the Health Information System and coverage rate (%) by hospital type and month

Type of hospital	July			August			September			Total		
	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)	Report	Health Information System	Coverage (%)
Regional hospital	42,711	39,524.5	92.5	46,773	39,547.4	84.6	52,956	43,996.9	83.1	142,440	123,068.9	86.4
Central hospital	29,930	25,815.4	86.3	32,798	26,714.7	81.5	36,707	28,529.8	77.7	99,435	81,059.9	81.5
General hospital	28,695	20,465.0	71.3	30,552	20,880.0	68.3	34,985	30,498.0	87.2	94,232	71,843.0	76.2
Rehabilitation hospital	2,944	2,018.0	68.5	3,846	2,979.0	77.5	3,681	3,649.0	99.1	10,471	8,646.0	82.6
Nursing hospital	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Special hospital	292	8.0	2.7	304	6.0	2.0	391	85.0	21.7	987	99.0	10.0
Local hospital	5,260	3,032.0	57.6	5,325	2,546.5	47.8	5,604	2,280.8	40.7	16,189	7,859.3	48.5
Total number of hospitals	109,832	90,862.9	82.7	119,598	92,673.6	77.5	134,324	109,039.5	81.2	363,754	292,576.0	80.4

ANNEX A. Rules and formulas used to calculate the indicators in the comparative analysis

Number of patients at the beginning of the period

Cases that started before the beginning of the period but have not ended by the beginning of the period.

For example, the number of patients at the beginning of July:

start date of hospital care < 1 July 2011

end date of hospital care ≥ 1 July 2011

Number of hospital admissions

Cases that started in the corresponding period.

For example, number of patients admitted to hospital in July:

Start date of hospital care ≥ 1 July 2011 and < 1 August 2011

Number of children admitted to hospital

Cases that started in the corresponding period and the patient is hospitalised at the age of 0–14.

For example, number of children admitted to hospital in July:

Start date of hospital care ≥ 1 July 2011 and < 1 August 2011

Patient's age [start date of hospital care – date of birth of patient] = 0–14

Number of persons discharged from the hospital

Cases that ended in the corresponding period.

For example, number of patients discharged from hospital in July:

end date of hospital care ≥ 1 July 2011 and ≤ 31 July 2011

Number of persons who have left from the hospital: hospital checkouts

The cases that ended in the corresponding period and the way of leaving is checkout.

For example, number of hospital checkout patients in July:

end date of hospital care ≥ 1 July 2011 and ≤ 31 July 2011

way of leaving the hospital: checkout

Number of persons who have left from the hospital: transferred to another hospital

The cases that ended in the corresponding period and the discharge type is transfer to another hospital.

For example, number of patients transferred to another hospital in July:

end date of hospital care ≥ 1 July 2011 and ≤ 31 July 2011

way of leaving the hospital: transfer

Number of persons discharged from the hospital: deceased

The cases that ended in the corresponding period and the discharge type is death.

For example, number of deceased patients in July:

end date of hospital care \geq 1 July 2011 and \leq 31 July 2011

way of leaving the hospital: deceased

Number of patients at the end of the period

Cases that started before the end of the period and have not ended by the end of the period.

For example, the number of patients at the end of July:

start date of hospital care $<$ 1 August 2011

end date of hospital care $>$ 31 July 2011

Total number of bed days

The total number of bed days in those cases that ended in the corresponding period.

For example, total number of bed days in July:

end date of hospital care \geq 1 July 2011 and \leq 31 July 2011

Sum of days spent in hospital care – duration of hospital care in days indicated by hospitals

Health and health care statistics:

- **Health statistics and health research database**
<http://www.tai.ee/tstua>
- **Website of Health Statistics Department of National Institute for Health Development**
<http://www.tai.ee/en/r-and-d/health-statistics/activities>
- **Dataquery to National Institute for Health Development**
tai@tai.ee
- **Database of Statistics Estonia**
<http://www.stat.ee/en>
- **Statistics of European Union**
<http://ec.europa.eu/eurostat>
- **European health for all database (HFA-DB)**
<http://data.euro.who.int/hfadb/>
- **OECD's statistical databases (OECD.Stat)**
http://stats.oecd.org/index.aspx?DataSetCode=HEALTH_STAT

