



***Assessing Operational Excellence and  
Decisive factors to support performances of  
Hospitals departments***

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## Table of contents

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1. Introduction.....	3
2. Research purpose and orientation .....	4
2.1. Requirements .....	4
2.2. Sub-questions .....	4
3. Theoretical framework.....	5
3.1. Application and assessment of RCP .....	5
3.2. Application and assessment of hospital performance.....	5
3.3 Conclusion .....	6
4. Literature review .....	7
4.1. Methods .....	7
4.1.1. Update: Assessing the validity of the RCP questionnaire.....	7
4.1.2. Update: existence of questionnaires to measure RCP .....	8
4.1.3. Additional review: Performance indicators of hospital departments.....	8
4.2. Results .....	9
4.2.1. Update: Validity of the RCP questionnaire .....	9
4.2.1. Additional review: Performance indicators of hospital departments.....	10
4.3 Conclusion .....	12
5. Research design: correlation RCP and performances.....	14
5.1 Materials .....	14
5.1.1. Respondent selection .....	14
5.1.2. Indicator selection.....	15
5.2. Methods .....	15
5.2.1 Measuring RCP and performance in hospital departments .....	15
5.2.2. Non-response and missing data.....	17
5.3. Data-analysis.....	17
5.3.1. Validity and reliability of the questionnaire .....	17
5.3.2. Heterogeneity of outcome indicators .....	18
5.3.3. Case Mix Correction .....	18
5.3.4. Regression between RCP questionnaire and performances .....	18
5.3.4. Identifying key factors of RCP .....	19
6. Results.....	21
6.1. Performance indicator selection.....	21
6.2. Correlation RCP and Performance indicators.....	23
6.2.1. Internal consistency .....	24

6.2.2. Heterogeneity of the performance indicators .....	24
6.2.3. Regression analyses.....	25
6.2.4. Correlation of RCP-elements and individual performances indicators	<b>Fout! Bladwijzer niet gedefinieerd.</b>
7. Discussion.....	32
8. Recommendations.....	34
8.1 Recommendations for further research.....	34
8.2 Advice regarding state of RCP to hospital departments .....	34
References .....	37
Appendix 1 Search matrix .....	39
Appendix 2 Search matrix .....	45
Appendix 3 search matrix .....	47
Appendix 4 Expert's feedback on Indicator selections.....	50
Appendix 5 RCP-Questionnaire .....	51

## 1. Introduction

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Healthcare expenditures only increased over the past decade. The Dutch healthcare expenditures has risen from 12.3% in 2005 until 13.8% in 2015 of the gross domestic product. A major proportion of it goes to medical and long-term care(1). Reasons for this growth are the increasing demand for care and the rapid development of healthcare technology. Hence, the way patients are treated and the organisation of healthcare institutions are changed. Institutions have to deliver medical care in a more efficient and effective way, to keep up with the demand. Therefore, hospitals have therefore, an increasing attention for efficiency and management.

This phenomenon led to the application of logistical concepts from industry. Just-in-Time, Focussed Factory, Lean Manufacturing, Six Sigma and Manufacturing Resource Planning are examples of Operational Management (OM) concepts that are used in the health care institutions (2). The basic idea of OM is making processes valuable and efficient. Continues improvement of efficiency, flexibility and quality are keywords of OM and ensure organisation to keep their processes valuable. Industry is familiar with this OM concept for decades due to a fearsome competition within the sector.

The use of OM in healthcare knows two main pitfalls: the lack of dialog and cooperation between all stakeholders and mismatching the concepts characteristics and the needs of the hospital system (2-4). So, the several concepts that are already being used by healthcare institutions do not always result in the expected effect. This raises the question what lessons the healthcare sector should learn from OM. Unfortunately, most knowledge about the use of OM is from industry. Research into the use of OM in healthcare is, to our knowledge, limited to case studies or specific interventions. There is little known about generalizable instruments to assess the effects of OM in healthcare.

To evaluate OM, it is important to narrow it down. OM can be dissected into four operations: resource capacity planning (RCP), medical planning, financial planning and material planning(2). In previous research a questionnaire was developed to evaluate the presences and use of RCP on departmental level of hospitals(5). In this questionnaire, RCP describes the dimensioning, planning, scheduling, monitoring and control of renewable resources.

As far as we know, the RCP questionnaire is the only questionnaire for measuring RCP on tactical and operational offline level in hospital departments. It examines the presence of RCP elements in different phases of the Plan-Do-Check-Act cycle (PDCA) (6). A previous pilot study pointed out that the questionnaire provides a clear representation of RCP performance of hospital departments. However, a correlation of only the Plan phase elements and the efficiency was found. In contrast to the pilot study, the aim of this research is to determine which of the elements from all phases influences the performance of the hospital departments. Hence, the research question is: What are RCP success factors for the performance of hospital departments.

## 2. Research purpose and orientation

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Imposed financial limitations and higher demands from patients increase pressure on the performance of hospitals. Due to this pressure, the demand for OM concepts has grown. However, the current knowledge about the effects of these concepts on the (logistical) performance of hospitals is mainly based on knowledge from the industrial sector. To our Knowledge, the studies that are known about the use of these concepts often involve case studies and or research into specific management strategies.

This research Investigating the relationship between application of OM techniques and the performance of hospital departments. Ultimately, we want more knowledge about this relationship and develop an instrument which departments can use to receive advice to improve their business approach. As aforementioned, prior to this study an extensive literature study was performed to develop a first version of the measuring instrument. Which was tested in a follow-up study on several hospital departments.

### 2.1. Requirements

Causal research is based on proofing a relationship between a cause and an effect. In order to claim an causal link, three criteria should be checked(7):

1. Covariation
2. Cause prior to effect
3. Absence of plausible rival hypothesis or explanations

Therefore, we have to demonstrate a constant effect on performances of hospital departments caused by the presence of OM. To proof this relationship, a difference in the presence of OM should lead to a measurable difference in performance. To demonstrate this causality both variables have to be measured.

For the measurement of the presence of OM a questionnaire can be used that is developed and tested in previous studies (5, 6). To get a reliable view on the status of OM, this questionnaire should be up-to-date and validated. The performance of hospitals can be measured by performance indicators. These indicators have to provide a good reflection of the efficiency and quality of care at hospital departments. Therefore, they should be a direct result of the performance that is caused by the OM strategy. For example, a well organised staff capacity planning will lead to a low staff to bed ratio. In short, which indicators give good insight in the department's performances.

To assess the performance of hospital departments a standard would be preferred, otherwise it is hard to tell how good or bad a department performs. The continues improvement of performance and OM makes a standardised maximum performance hard to establish. Therefore, a comparison of all participating hospital departments should be made to get an indication of a maximum achievable performance. An interpretation of this maximum is used to define the level of "acceptable goodness".

### 2.2. Sub-questions

Based on the previous requirements section and in order to answer the research question, three sub-questions were formulated:

1. Is the RCP questionnaire valid to assess the presence of RCP for hospital departments?
2. What is the relationship between the presence of RCP and the performance of hospital departments?
3. What are the RCP success factors for the relative performance of hospital departments?

### 3. Theoretical framework

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The first part of this chapter describes how the application of RCP is perceived and how it is assessed using the RCP questionnaire. The second part describes how hospital performance in this research is defined and measured.

#### 3.1. Application and assessment of RCP

In previous studies an RCP-questionnaire was developed to assess the presence of RCP in hospital departments. In order to make it possible to cover all aspects of RCP, various issues have been considered.

Rapidly changing possibilities and demand in health care will continue to change care processes. This requires a constant improvement of policies. One key-word of RCP is Continues Improvement, which focusses the continuous development of used policies. A tool to support this further development is the PDCA. After a new policy is implemented it will be checked and redesign when needed. Therefore, the questionnaire is based on the PDCA.

OM focusses on the planning and controlling of resources in a way that they create most value. In the healthcare sector most resources are scares and demand flexible, what makes the planning of optimal distributions of resources harder. However, most decisions reoccur in time which makes learning from the past possible(6). A learning cycle, like the PDCA, can be used to repeatedly evaluate events from the past and is needed to apply RCP well.

RCP concerns itself with planning of resources that are needed to carry out processes and have these resources in place at the right time. This planning work is done through the whole hospital organisation and can be divided in four organizational hierarchical levels(2):

- Strategical level
- Tactical level
- Operational offline level
- Operational online level

In time, more information becomes available and makes planning processes easier. Hence, it depends on the hierarchical level at which the policy is carried out which factors are decisive for the effectiveness of the policy. This research focusses on the use of RCP on the department level. So, only the tactical and operational offline level are evaluated.

The RCP questionnaire covers the use of RCP on department level with nine elements: access policy, admission control, ambulatory scheduling, bed assignment, capacity (re)allocation, discharge planning, patient routing, staff scheduling (nurses only) and surgery scheduling. The relevance of these elements depends on the type of hospital department, fulfilling the questionnaire. For example, the resources of an inpatient department differ from the recourses of an outpatient department. Therefore, the distributions of those resources have different focusses. To overcome these differences the questionnaire is made department specific(8).

#### 3.2. Application and assessment of hospital performance

Healthcare managers adopt new logistical concepts form other sectors to improve processes to deliver efficient and high-quality medical outcomes. This means using resources in such a way they achieve the highest possible performances.

Performances is defined as the combination of efficiency and effectiveness. Though these terms are rather vague, efficiency refers to the use of minimum resources to produce a giving amount of output. Effectiveness evaluates quality of the produced outcomes. In healthcare this means that efficiency is related to the use of the number and combination of resources to deliver a certain volume of care that meets up the quality standard, formulated as effective care (9).

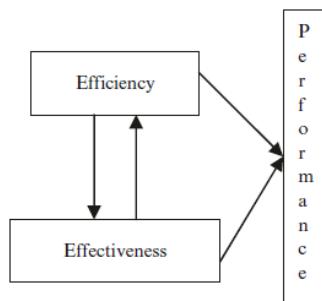


Figure 1: visual representation of performance (9)

A hospital performs well when it is effective and efficient. However, both variables influence each other with no fixed performance level as output (see Figure 1). For example, an improvement of care quality will not always lead to more efficiency. On the other hand, an improvement of efficiency will result in more quality. There is not a standard formula to improve hospital performances. Healthcare managers have to make several trade-off-decisions to find the right mix of input and output. In this context performance is seen as a relative phenomenon and should be compared with multiple inputs over time or with other healthcare institutions (9).

In healthcare three types of performance indicators can be distinguished: Structure-, process- and outcome indicators. In this research the use of outcome indicators is most obvious because of the focus on the effect of the operations management on hospital performance.

#### *Measurement methods*

Several methods can be used to analyse and measure hospital performances:

- Ratio analysis,
- Least-squares regression,
- Total factor productivity,
- Stochastic frontier analysis, and
- Data envelopment analysis (DEA).

DEA is considered as the main performance analysing technique. Therefore, this technique is used in our research. It is a non-parametric technique that assumes that not all hospitals are efficient. DEA needs in- and outputs quantities to examine the production efficiency, whereby multiple in- and outputs are allowed (9).

### 3.3 Conclusion

As aforementioned, the RCP questionnaire is able to measure RCP in hospital departments. It applies the PDCA and nine elements to determine the level of presence of RCP. However, there is no certainty about the relevance and validity of the questionnaire to this moment.

In this research the level of RCP presence is seen as input for a process to achieve a high-performance output, whereas performance is the combination of efficiency and effectiveness and should be assessed with the use of indicators. However, there is no standard formula for optimal performance. This makes it a relative phenomenon that should be compared in time or in relation to other healthcare institutions. DEA should be an appropriate method for this comparison.

Concluding, our first sub-question on the RCP questionnaire validity must be answered and for the other two sub-questions performance must be broken down in indicators. Therefore, a literature research was done - see next chapter.

## 4. Literature review

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In this chapter, the methodology of the literature review will be described.

### 4.1. Methods

As aforementioned, this review made use of a questionnaire developed in previous studies by Van Wijk(6) and Anwar(5), respectively in 2013 and 2015. To assess the current relevance of the questionnaire, both literature reviews performed by the previous studies will be updated. The result of both updates will help answer the following sub-question:

1. *Is the RCP questionnaire valid to assess presence of RCP of hospital departments?*

The answer to this question will help to assess the current relevance of the questionnaire or to improve it. In paragraph 4.1.1 further details are explained about the update of the review on the assessment of validity of the RCP questionnaire. In paragraph 4.1.2. further details are explained about the update of the review on existence of questionnaires or methods to measure RCP.

Besides the two updates, an additional review will be completed to develop indicators to measure the performance of hospital departments. No previous research has been accomplished on this topic. Therefore, the following sub-question was used to develop performance indicators:

2. *Which performance indicators provide a good reflection of the performance of hospital departments?*

#### 4.1.1. Update: Assessing the validity of the RCP questionnaire

Both reviews performed in previous studies are up-dated until August 2015. The study performed by Anwar(5) included an update of the review performed by Van Wijk (6) and a new review first performed in his study. Therefore, both reviews were up to date till 2015. In this study an updated for both reviews will be performed with the same method for the period between August 2015 until 2018.

Search terms used in the literature review by Van Wijk (6), were checked on synonyms with the use of Thesaurus. All terms (Table 1) or combinations were used in the databases: PubMed and Business Scours Elite (BSE). The full search matrix is included in Appendix 1. Results were first checked on enforceability and appropriateness based on the title and abstract. An article was seen as relevant when it complied with the in- and exclusion criteria set in Table 2. Secondly, all relevant results were read completely. Articles were checked on methods that could be useable in the RCP questionnaire.

*Table 1: Search terms of the first literature search*

Search terms used by the previous researcher
<ul style="list-style-type: none"><li>• Patient routing</li><li>• Capacity allocation</li><li>• Temporary capacity change</li><li>• Admission control/access policy</li><li>• Staff-shift scheduling</li><li>• Staff-shift assignment</li><li>• Unused capacity re(allocation)</li><li>• Appointment scheduling</li><li>• Bed allocation</li><li>• Patient-to-appointment/surgery/admission/bed assignment</li><li>• Discharge planning</li></ul>

*Table 2: In- and exclusion criteria first literature search*

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> <li>• The paper addresses the RCP element at hand.</li> <li>• It addresses the planning of renewable resources</li> <li>• The focus is on elective care</li> <li>• The paper reports generalizable evidence about the RCP element</li> </ul>	<ul style="list-style-type: none"> <li>• The paper is unavailable within the Twente University library rights</li> <li>• Case studies without general evidence or conclusion are excluded.</li> <li>• The paper is published in a language other than English.</li> <li>• The paper is published before August 2014 and after February 2018.</li> </ul>

#### 4.1.2. Update: existence of questionnaires to measure RCP

All search terms used by Anwar (Table 3), were checked on synonyms. Terms or combinations of terms were used in the databases: PubMed, BSE and Science Direct. For PubMed this was in combination with Mesh terms, and for BSE and Science Direct in combination with keywords. Full search matrix is included in Appendix 2. The articles were selected when they were in line with the in- and exclusion criteria (Table 4), based on the title and abstract. Relevance of the article was judged on the appearance or addressing to questionnaires or methods to measure RCP. When questionnaires or methods were mentioned and they were applicable to this research, the article was seen as relevant.

*Table 3: Search terms used in the second literature search*

Search terms used by the previous researcher
<ul style="list-style-type: none"> <li>• Resource capacity planning</li> <li>• Resource capacity planning in hospital departments</li> <li>• Questionnaires for resource capacity planning</li> <li>• Questionnaires for measuring resource capacity planning in hospitals</li> <li>• Measuring resource capacity planning</li> <li>• Resource capacity planning elements</li> <li>• Indicators for resource capacity planning</li> <li>• Operations management in healthcare</li> <li>• Questionnaires for operations management</li> <li>• Questionnaires for operations management in healthcare</li> </ul>

*Table 4: In- and exclusion criteria second literature search*

Inclusion criteria:	Exclusion criteria:
<ul style="list-style-type: none"> <li>• The paper addresses a questionnaire or method for measuring RCP.</li> <li>• It addresses the planning of renewable resources</li> <li>• The paper reports generalizable evidence about the RCP element</li> <li>• Focus of the paper is on elective care</li> <li>• The paper focuses on measurement of RCP in a hospital.</li> </ul>	<ul style="list-style-type: none"> <li>• The paper is unavailable within the Twente University library rights.</li> <li>• The paper is in other language than English.</li> <li>• The paper is published before August 2014 and after February 2018.</li> <li>• Case studies without general evidence or conclusion are excluded.</li> </ul>

#### 4.1.3. Additional review: Performance indicators of hospital departments

First step was to compose a list of search terms with synonyms and keywords or MESH terms. The result was the list of terms and keywords shown in Table 5. The Mesh terms/keywords and search terms or combinations of them were inserted in PubMed, Business scours elite and Science Direct to find relevant papers. In each database the search was started with the most specific search term and these were broadened until no relevant papers were found anymore. Search terms had to appear in the title or abstract, otherwise it was not seen as a relevant article.

*Table 5: Search terms additional literature review*

Search terms	Keywords/MESH-terms
<ul style="list-style-type: none"> <li>• Key performance indicator(s)</li> <li>• Performance indicator</li> <li>• Quality indicator</li> <li>• Measures</li> <li>• Measurement</li> <li>• Standard</li> <li>• Index</li> <li>• Quality control</li> <li>• Performance assessment</li> <li>• Process assessment</li> </ul>	<ul style="list-style-type: none"> <li>• Healthcare</li> <li>• Hospital department</li> <li>• Hospital sector</li> <li>• Hospital</li> <li>• Hospital performance</li> <li>• Efficiency</li> <li>• Value</li> <li>• Productivity</li> </ul>

Papers were sorted on relevance, and the first 50 papers were selected based on the title and abstract and the in- and exclusion criteria (Table 6). All selected articles were analysed on relevance, based on full text. Articles were included when they addressed indicators to measure performance which could be applicable to this research.

*Table 6: In- and exclusion criteria additional literature search*

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> <li>• The article addresses performance indicators</li> <li>• It addresses the planning of renewable resources</li> <li>• Focus of the paper is on elective care</li> <li>• The paper reports generalizable evidence</li> </ul>	<ul style="list-style-type: none"> <li>• The paper is unavailable within the Twente University library rights</li> <li>• The paper is published in a language other than English or Dutch</li> <li>• The paper is published before January 2003, or after January 2018</li> </ul>

## 4.2. Results

In this research two literature updates and one new literature reviews are conducted. Two are updates were done with aim to be certain of the relevance of the questionnaire. The third review was conducted to develop indicators that represent the performance of hospital departments.

Results of these reviews are described in the following sub-chapters.

### 4.2.1. Update: Validity of the RCP questionnaire

Information of the in previous studies performed literature searches, were up-dated till august 2014. In meantime insight may have changed, so it is necessary to actualise the knowledge to assess whether or not the questionnaire is valid to use in this research. Results of the renewed searches will be used to determine the relevance of the questionnaire and revised it when necessary.

*To what extent is the current RCP questionnaire valid and usable in assessing RCP of hospital departments?*

Based on the first update, three articles had to be further analysed. The first article of Li et al. (10) describes the development of a model which explores influencing factors in capacity decision-making. This model should help policymakers to make more systematically decisions. Besides that, they concluded that institutions with a high capacity resilience need less capacity, and a high quality of care can provide cost-savings. However, focus of the article is on the long-term care and the patient flow between different care settings. Therefore, the article's conclusions less generalizable to this research.

The two other articles, Chen et al. (11) and Durvasula et al. (12), did focus on hospital care, but further analysis made clear that the articles described single capacity policies instead of a manner or method to measure RCP.

Chen et al. (11) describes a mathematical model to calculate the needed amount of staff in a worst case scenario on a departmental level. A case study showed that the model can propose an appropriate number of staff needed in a radiology department. Durvasula et al. (12) describes the use of multidisciplinary care pathways to improve discharge and admission efficiency by shifting discharge

function from the day of discharge to the night before discharge. Result was an increase of early day discharges which improved safety and efficiency of care for hospitalized patients.

Both articles are focussing on a single capacity allocation or admission strategy and not on the use of policies in general. Like the first article, which had a focus on another type of care, no information was found on RCP in hospital departments. Therefore, none of these articles provided additional information and no adjustments to the RCP questionnaire were considered following the results of this update.

#### *To what extent exist questionnaires or do questionnaires measure RCP?*

Based on the review update on the existence of questionnaires to measure RCP, three articles had to be further analysed. Two of these articles describe mathematical models to predict and analyse the use of capacity of hospitals where Dellaert et al. (13) makes use of a computerised model that analyses effects on waiting time to assess tactical plans. Whereas Burdett et al. (14) makes use of a model to predicts what theoretically the maximum capacity utilisation could be, to arrange tactical plans. Although both articles describe methods to calculate the maximum utilisation, the objective of the methods is different. Delleart et al. uses the model to assess two capacity planning strategies. Burdett et al. developed a model that should be embedded in an intelligent system to support planners in their tasks. Both methods are more or less predicting and supporting models for theoretical RCP use, in contrast with this research. This research has the objective is the measure the current RCP status.

In another article of Burdett et al. (15) a comparable contrast to this research is made. This article describes a multi-objective-optimization (MOO) approach to identify the theoretical maximum capacity. This approach uses sensitivity analysis an optimal reallocation of capacity. This method showed significant results in a case study. However, improved algorithms were needed to solve applications with large numbers of objectives. In contrast with this research the method of Burdett et al. has a hospital broad focus, whereas this research's focus is on department level.

All three articles do not describe any form of questionnaire or part of a questionnaire that measures RCP. Therefore, they do not contain additional information featuring RCP questionnaires. However, they describe methods to assess the use of RCP. The latter is in line with this study, but due to difference of the article's focusses, the articles are also not applicable to this research.

In conclusion, to our knowledge there are no other questionnaires or methods to assess the current state of RCP in hospitals departments. Beside that to our knowledge there are no indications that suggest further adjustments of the questionnaire.

#### *4.2.1. Additional review: Performance indicators of hospital departments*

In the new auditioned review on performance indicators, 23 articles were selected during the literature search. 16 articles were rejected due to inconformity focus on evaluation systems, indicators or due to many differences in geographic characteristics. The remaining seven articles were considered as relevant after further analysis of the articles.

#### *Results*

RCP is used in healthcare to improve the efficiency of processes. The World Health Organization (WHO) has identified efficiency as one of the six dimensions which indicates the performance of health care processes. The performance on every individual dimension reflects (in)direct the outcome of the healthcare process (16). This means that healthcare processes need to be efficient in order to perform well.

#### *Efficiency*

There are several types of efficiency mentioned in literature. All of these types have in common that efficiency is described as the relation between input and output, which effects the outcome of a process (9). However, how this relation is defined differs:

- Allocative efficiency: Mix of inputs that is needed to reach a given output at minimum resources.
- Technical efficiency: Maximum output with a given input.
- Scale efficiency: An efficient ratio of inputs and outputs, with an in- or decrease of scale. Also known as diminishing returns.(17, 18).

Romley et al.(19), described four types of efficiency measures used in managed care environments: productivity, cost of service, cost of episode a cost of covered life. The WHO focusses more on financial efficiency. So, they relate efficiency to the use of resources and cost-effectiveness.

Efficiency can also be measured on different levels. It can be applied from macro-level to assess the efficiency of a national healthcare system, to meso- and micro level to assess the performance of hospital departments or care pathways. This research focused on the tactical and offline-operational level. Therefore, the focus is on indicators for the hospital department's level.

### *Indicators*

Efficiency is the ratio of input and output and influences the outcome of health care processes (16). Therefore, input, output and outcome variables should be taken in account by selecting performance indicators. Literature identifies several indicators for the performance of hospital departments, which can be designated in three types of indicators(20):

- Structure – The attributes of the setting in which care is delivered
- Process – What is done in delivering care
- Outcome – Variables that describe the effects of the care process

The focus of this research is mainly on the effects of the used care process on the department level. Therefore, not all types of indicators are equally usable. For example, how the care process is performed depends on the used RCP method. The same concerns for the structure indicators, analysing the efficiency of the capacity use does not depend on the amount of capacity available. Outcome indicators are, in our opinion, most useful. RCP focus on efficiency which is seen as one of the six dimensions that indicates the performance of health care processes. Because efficiency is a ratio of inputs and outputs, outcome indicators provide most direct reflection of the performance of the three indicator types.

Table 7 provides an overview of indicators found in literature. All Indicators are divided based on type of indicator and relevance to the different types of departments.

Table 7: Performance indicators mentioned in literature

	<b>Structure indicators</b>	<b>Process Indicators</b>	<b>Outcome indicators</b>	<b>Reference</b>
Ambulatory care	• Amount of staff (FTE)	• Amount of scans	<ul style="list-style-type: none"> <li>• Equipment utilization (MRI, CT, Ultrasound)</li> <li>• Equipment idle time</li> <li>• Professional Staff Productivity</li> <li>• Technical staff productivity</li> </ul>	Adujudeh(21) Harvey(22) Karami(23)
			<ul style="list-style-type: none"> <li>• Patient access time</li> <li>• Patient waiting time</li> <li>• Absences due to sickness</li> <li>• Staff turnover</li> </ul>	Davis(24) Si(25) simou (26)
			<ul style="list-style-type: none"> <li>• Revenue</li> <li>• Expense</li> </ul>	Davis(24) Si (25) Simou (26) Abujudeh(21) Romley(19) Karami(23)
Inpatient care			<ul style="list-style-type: none"> <li>▪ Length of stay</li> <li>▪ Unplanned readmissions with a certain time</li> <li>▪ Capacity utilization</li> <li>▪ Bed occupation</li> </ul>	Veillard(16) Davis(24) Si(25) Simou (26)
	<ul style="list-style-type: none"> <li>▪ Amount of beds</li> <li>▪ Amount of staff (FTE)</li> </ul>		<ul style="list-style-type: none"> <li>▪ Absences due to sickness</li> <li>▪ Staff turnover</li> </ul>	Davis(24) Si(25) Simou (26) Adujudeh (21)
			<ul style="list-style-type: none"> <li>▪ Revenue</li> <li>▪ Expense</li> </ul>	Davis(24) Si(25) Simou (26) Adujudeh (21) Romley (19)

Financial measures, length of stay, bed/equipment occupation and unplanned readmissions are the most frequently named indicators in literature. All of these indicators are outcome indicators and are expressed in a proportional value to a certain input. The latter makes the indicators more useful in the comparison between different hospital departments.

#### 4.3 Conclusion

To our knowledge there are no other questionnaires for the measurement of RCP of hospital departments. The articles which were found focus mainly on redistribution strategies of resources and on the evaluation of demand in order to plan resources more efficient. No information on the evaluation of RCP of hospital department was found. Also, no information was found that initiated improvements of the RCP questionnaire. According to our literature results, no cause is found to suggest the RCP questionnaire in this form should not be up-to-date.

Whereas little information was found regarding RCP, more literature was found on the use of performance indicators measuring efficiency in hospital departments. This research focused on technical efficiency for which three types of indicators can be found in literature. Most relevant to this research are the type of outcome indicators because of their reflection of care process effects.

The indicators selection found in literature were presented to a group of experts. Subsequently, the feedback of the experts is used to carry out a second selection of indicators.

## 5. Research design: correlation RCP and performances

In this chapter, the research design will be described. The objective was to get more insight in the relationship between the presence of RCP and the performance of hospital departments.

### 5.1 Materials

#### 5.1.1. Respondent selection

To reinforce reliability, low variation of participant characteristic is preferred. In case of, high variation of characteristics makes comparing hospitals hard and possible unreliable.

##### Hospitals

In the Netherlands several types of hospitals exist: academic hospital, ambulatory hospital, specialist hospital, private clinic and general hospitals. All types of hospital have their own characteristics. In order to obtain a homogenous group of participants the following in- and exclusion criteria were set (see Table 8).

*Table 8: In- and exclusion criteria respondent selection*

Inclusion	Exclusion
<ul style="list-style-type: none"><li>Availability of minimum 2 nursing - and 1 radiological department</li></ul>	<ul style="list-style-type: none"><li>Other than general hospital</li><li>Hospital located outside the Netherlands</li></ul>

##### Departments

A selection of departments with a high similarity is preferred. The selection criteria for hospital departments should provide a clear definition and boundaries to reduce the interference of confounders. In this research, a hospital department is defined as division in a hospital with its own very specific tasks, employees and budget. It operates parallel to other departments and provides support/care for specific type of patients or other departments.

Hospitals deliver different types of care which makes the use of RCP also different between the different departments. This research focused on two types of care: ambulatory - and inpatient care. These two types are common in most general hospitals and can provide enough similarity to provide reliable results for this research.

*Table 9: Definitions of hospital departments*

Type of care	Type of department	Definition
Ambulatory care	Radiology	Hospital department which is responsible for the administration of radiological diagnosis or -treatments
Inpatient care	Nursing	Hospital department which is responsible for diagnosing and/or treating patient who need overnight care

In case of the nursing department, only departments with standard patient population can cooperate within the research. Departments like the MCU and ICU were excluded.

##### Sample size

In the Netherlands there are 61 general hospitals (27). Normally, a general hospital has a maximum of one Radiology department. So, in order to get a good representation of the Radiology departments a sample size of six radiology departments was used. Furthermore, most Dutch hospitals have more than one nursing departments. Therefore, in this research 12 Nursing departments, two of each participating hospital, were used.

##### Informing respondents

All respondents will be informed about the research by an information letter. In this letter the purpose of the research and methods were explained. Also, an email-address was provided to send questions

or remarks to the researchers. Before fulfilling the questionnaire, an informed consent had to be filled in. This explained the conditions of the research for respondent and researchers.

### 5.1.2. Indicator selection

An iteratively process was used for the selection of the performance indicators (Figure 2). Two feedback rounds were completed to refine the indicator selection. First, a concept selection of indicators was made based on the literature review. In the first feedback round this selection was presented to a group of capacity experts from six Dutch hospitals. Based on the expert's opinion the subsequently selection of indicators was made. In the second round, the same experts reevaluated the refined indicator selection. Feedback of the second feedback round was processed into a final selection of performance indicators for both hospital departments. The final set of indicators is presented in paragraph 6.1.

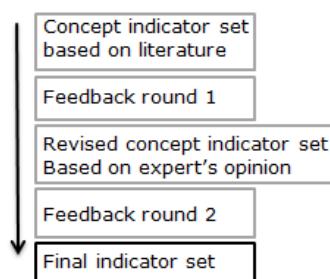


Figure 2: Visual representation of indicator selection process

## 5.2. Methods

Data was collected with a survey using a cross-sectional design. This meant, that the survey would only be taken once for every hospital department. Therefore, findings are only generalizable for the sampled hospital departments(7). In the following paragraph all methods used in the survey, to measure RCP and the performance of hospital departments are explained.

### 5.2.1 Measuring RCP and performance in hospital departments

For measuring RCP in hospital departments, the RCP-questionnaire developed in previous studies will be used(5, 6). This is, to our knowledge, the only questionnaire that is capable to measure the presence of RCP on department level. The questionnaire is based on the PDCA cycle, which divides RCP in nine elements (see Table 10).

In order to compress the questionnaire, a previous study by Anwar(5) conducted an importance ranking to assign the different RCP elements to the related types of hospital department. This made it possible, for this research, to use only those questions related to the examined department. Therefore, not all RCP elements were used in the assessment of departments because of this research's focus on Nursing- and Radiology departments.

*Table 10: Definitions of RCP elements*

RCP elements	Definition	Related hospital departments
Capacity (re)allocation	The subdivision of resource capacity amongst different patient groups. Or temporary reallocation of resources to improve performance of the capacity allocation.	Nursing, Radiology
Patient routing	The optimization of the sequence and division of tasks in the route of a patient.	Nursing, Radiology
Discharge planning	The policy to ensure that individual patients can and are discharged when they are clinically fit to leave the hospital.	Nursing
Access policy	The policy concerning the ways a patient can access the facility to receive the healthcare.	Radiology
Staff scheduling	The dimensioning and fulfilment of staff capacity needs.	Nursing, Radiology
Admission control	The policy to determine how many patients are to be selected for admission from the waiting lists from different patient groups.	Nursing
Ambulatory appointment schedule	Rules and regulations for an optimal scheduling of ambulatory appointments.	Radiology
Bed assignment	The assignment of a specific bed to a specific patient.	Nursing
Surgery scheduling	The assignment of a date and time to a surgery that optimizes OR use within the boundaries of clinical guidelines.	Other

#### *The RCP-questionnaire*

The questionnaire could be taken digitally using the survey tool Qualtrics. This program has the option to invite participants with the use of a link. Therefore, it was only possible for the selected participants to fill in the survey.

The RCP questionnaire was designed as a four-point Likert scale. The advantage of a four-point scale is, that it forces respondents to choose, and prevents them from just filling in the mean category. Interpretation and definitions of the Likert scale are defined in Table 11.

*Table 11: Interpretation and definition of the Likert scale used in the RCP questionnaire*

Scale	1	2	3	4	*Don't know/not applicable*
Interpretation	No policy present	Policy is partly present	Policy is present	Policy is clearly present	-
Definition	<ul style="list-style-type: none"> <li>• No agreement on policy.</li> <li>• No policy implemented</li> <li>• No support of staff.</li> </ul>	<ul style="list-style-type: none"> <li>• Agreement on policy, but not recorded in writing.</li> <li>• Policy partly implemented</li> <li>• Moderately support of staff.</li> </ul>	<ul style="list-style-type: none"> <li>• Policy is recorded in writing</li> <li>• Policy is implemented in more than half of the cases</li> <li>• Average support of staff.</li> </ul>	<ul style="list-style-type: none"> <li>• Policy is recorded in writing and known by all those concerned.</li> <li>• Policy is implemented in almost all cases.</li> <li>• More than average support by staff.</li> </ul>	No information known

To make the questionnaire more manageable an assumption was made. It was assumed when a policy is not or moderately present in a planning phase it is not possible that it is more present in the following phases. This allowed participant to skip phases of the different RCP-elements when a policy is not or moderately present in a previous phase. The questionnaire was programmed to skip the following phases, Do and/or Check-Act phase, of the same RCP-element when the mean score was less than three on the Likert scale.

### *Performance indicators*

In measuring performance of hospital departments, a set of six indicators was used. The indicators were selected following the earlier described method (see Figure 2). All participants got a clearly defined explanation of the indicators (Table 16) and were asked to deliver this performance information about their department.

### *Importance ranking*

The focus of the hospital management can be different among hospitals. As a result, the value assigned to the indicators can be interpreted differently. Therefore, to make it possible to predict a theoretically best overall performance, the indicators should be ranked on importance. Otherwise, the assumption is made that all indicators are equally important. So, in the survey participants were asked to rank all indicators on importance by allocating points, between 0 and 100 points, to all indicators. The most points had to be given to the most important indicator.

### **5.2.2. Non-response and missing data**

Non-response is a common phenomenon in scientific research. It depends on the selectivity of the non-response to what extent it is a danger to the results. When the non-response is of selective nature, it will influence results. This makes results less reliable. When it is not of a selective nature, only the sample size will decrease. This sample size decrease can decrease the confidence interval, which in its turn can affect the power of the conclusions.(7).

In this research selective nonresponse can appear when data from specific departments of an entire hospital is missing. To prevent this latter from happening, potential selective non-response was identified timely by checking constantly received surveys. When surveys were not send back timely there was responded on. First option was to contact the respondent and point on the nonresponse. Another option is to exclude the concerted department or hospitals form the research.

Missing data can occur when respondents forget to fill in a question. The risk in this research for missing data occurs due to the fact that researcher do not have a direct control of the respondent. To prevent this from happening, the questionnaire was programmed in such a way no questions could be left unfilled. Besides that, results of the data collection were checked. In case of missing data, the respondent got a reminder of the missing data. If no action was taken on the reminder, the specific department was excluded from the research.

## **5.3. Data-analysis**

In this chapter the analysis used for the evaluation of the questionnaire and its findings will be discussed. To answer the research question sufficiently, the analysis is divided into three sections. In the first section, the Validity of the questionnaire questions was examined. In the second section, the correlation between the results of the RCP questionnaire and the individual indicators was evaluated. And at last, the relative performance of all hospital departments was compared to define success factors of RCP utilization.

### **5.3.1. Validity and reliability of the questionnaire**

The usability of the survey results depended on the validity and reliability of the questionnaire. A high validity and reliability suggest that the test results provide a good representation of the RCP status.

The validity of the RCP-questionnaire was achieved with the coverage of RCP by nine elements(8). For each of these elements several questions were formulated to measure the presence of it. Previous studies showed that the questionnaire was able to provide a valid picture of the presence of RCP for all nine elements(5).

The reliability of the questionnaire was evaluated with internal consistency. This describes to which extent the questions of an RCP element, are capable to measure this element. Therefore, a higher reliability suggests that is likely that the questions represent the real presence of RCP.

The Cronbach's Alpha is a ratio to evaluate the internal consistency of a questionnaire. It uses the variation of answers and the number of questions to produce a ratio, in which a high ratio suggests a high consistency of the answers. The higher the consistency the more likely it is that the questions represent the real presence of RCP. Form literature an Alpha of .7 is seen as acceptable and was also preferred in this research.

In the analysis, the responses of the two types of hospital departments were evaluated separately. The reliability of questions for each element was analysed with to use of the Cronbach's alpha. In case of an Alpha lower as .6, questions with a high internal variation will be excluded to guaranty reliable questionnaire results.

### 5.3.2. Heterogeneity of outcome indicators

To provide a proper outcome measure, the scores of the performance indicators were combined to one construct. This construct is the sum of the relative scores multiplied by the weights given by the participants in the importance ranking. This construct provided a relative overall outcome score, making it possible to compare the different departments. However, this method only works when indicators are heterogenic, which means that there are no mutual correlations. Otherwise, there is the risk of double counting performances resulting in an incorrect representation of outcomes.

The method to assess the heterogeneity of the outcome indicators was made by analysing the mutual correlations. High correlations suggest a low heterogeneity. The Pearson correlation coefficient (PCC) is a sufficient analysing method for correlations. The coefficient has a value between -1 and 1 and measures the linear correlation between two variables. A coefficient between -0.3 and 0.3 suggests an absence of this correlation and is therefore preferred between the outcome indicators. Outcome indicators with a moderate or strong correlation will not be used in the construct.

### 5.3.3. Case Mix Correction

As aforementioned, the nursing departments had different patient groups. More sever patients need more care and will have longer hospital stays, both could affect the amount of personnel needed. In order to prevent misinterpretation of findings, a Case Mix (CM) correction was used. This CM correction permits comparison between all nursing departments with respect to the differences in patient groups.

As CM coefficient, the national mean length of stay for each patient group was used(28). The length of stay provided an indication of the severity of care needed. In case of departments with multiple patient groups, the CM coefficient was composed by the proportion to bed use for each patient group within the department. So, to correct the outcome indicators, they were multiplied by the CM variable corresponding to the patient group(s) within the department. This allowed us to compare findings across departments.

### 5.3.4. Regression between RCP questionnaire and performances

To identify the correlation between the results of the RCP questionnaire and the results of performance indicators a linear regression analysis was used. Linear regression is a method to identify a causal correlation between an independent and a dependent variable. This correlation is formulated with the following equation:

$$z = kx + c$$

In this equation  $k$  is the coefficient that stands for the slope of the relations between the variables  $x$  and  $z$ .  $c$  is the constant and is termed the "z intercept", because it stands for the value where the function crosses the z-axis. For this linear regression four assumptions had to be made:

1. There is a linear relation between independent and the dependent variable;
2. Variation around the regression line has to be constant;
3. Variation of the data follows a normal distribution;
4. Each data point is independent for other data points.

The optimal regression fit depends on the variation of all data points. Each data point has a certain variation to the mean outcome of the data set. This variation can be represented by the total vertical distance from the data point to the mean outcome (tot), the distance between the regression line and the mean outcome (reg.) and the distances between the data point and the regression line (res). The last distance, also known as the residual (res), is used in the method of least squares. In the least squares method, the sum of the residuals squares is minimized. In other words, it optimizes the regression line in a way that all data points are as close as possible to the regression line. The strength of the correlation is measured with the Pearson correlation coefficient,  $R(29, 30)$ . In case of a perfect linear relation  $R^2 = 1$ , and if there is no linear relation, then  $R^2 = 0$ .

$$\frac{SS_{reg}}{SS_{tot}} = R^2$$

#### *Outliers*

Outliers are data points with an abnormal high or low value in comparison to the rest of the data. In linear regression it is assumed that all data points are normally distributed around the regression line. A data point is seen as an outlier when the residual distance is  $\leq Q_1 - 1.5(IQR)$  or  $\geq Q_3 + 1.5(IQR)$ . These outliers can cause a deformed regression line, which effects the outcome of the correlation analysis. This makes it necessary to check for the cause of the inconsistency. Before determining how to deal with the outlier. Several causes exist, creating outliers:

- Incorrect entry of the data;
- Sample error;
- Exceptional but true value.

#### 5.3.4. Identifying key factors of RCP

A strong regression between the RCP questionnaire and the performances of hospital departments will provide inside in what way performance can be influenced by the presence of RCP. This raises the following questions: What is the most technical efficient performance possible? And what are key success factors for an effective use of RCP?

#### *Data Envelopment analysis*

Data envelopment analysis (DEA) is an appropriate method to assess the relative technical efficiency of producing units. DEA is a linear programming technique that uses the technical most efficient department as a benchmark for other departments. The relative distance between each unit and the best performing unit is interpreted as the economic performance. (31-33).

Technical efficiency of a hospital department is defined as the weighted sum of the outputs divided by the weighted sum of the inputs. The efficiency should be maximized represented by  $f$  in this model.

$$f(u, v) = \frac{u'q_i}{v'x_i}$$

Where  $q_i$  is the output for unit  $i$ ,  $x_i$  is the input for unit  $i$ . Variables  $u$  and  $v$  stand for the weights of the in- and output variables. The DEA approach has the advantage that it does not assume a particular combination of outcome values as ideal. For example, when indicator 1 has a score of 50 and indicator 2 has a value of 25 it is performing equally efficient as the situation where indicator 1 has a score of 25 and indicator 2 has a score of 50. (31).

### *Weights*

Organisational focus of the hospitals and even of the departments can be different. This effects the scores across the indicators. For example, a hospital department with a focus on patient satisfaction will probably have higher costs and lower utilizations and vice-versa.

As aforementioned, the questionnaire asked respondents to rank the indicators on importance by assigning points. The mean was used as weight factor for the individual indicators to simulate an average influence distribution. The weight factors, represented as  $u$ , were used to determine the most technical efficient performance. This problem can statistically be written as:

$$\begin{cases} \max u'q_i \\ v'x_i = 1 \\ u'q_i - v'x_i \leq 0 \\ u, v \geq 0 \end{cases}$$

The solution of this formula provides a theoretically best overall performance with respect to the importance of the indicators. Mathematically, DEA uses a comparison of the input and output ratios of the examined decision-making unit (DMU) and the peer, or best performing DMU.

$$\text{Relative technical efficiency} = \frac{DMU_x}{DMU_{peer}}$$

To conclude, the DEA let us assess the relative technical efficiency so that we can rank hospital departments based on effectiveness of their RCP policies(32).

### *MS Excel DEA SOLVER*

To determine the technical efficiency of the departments, the Excel application DEA Solver is used. DEA Solver is an application that finds the optimal solution for the DEA problem(34). A DEA of 1 indicates a 100% technical efficiency. Meaning that the department has a maximum combination of outcomes produced in proportion to the RCP input.

### *Assessing deceive factors for excelled performances*

Assessing differences of RCP implementation for the technical efficient and inefficient departments is done by using the independent t-test. The questionnaire distinguished implementation on the RCP-elements as well as the degree of completeness based on the PDCA-cycle. On both subjects an independent t-test was performed.

## 6. Results

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In this chapter the results of the research will be presented.

### 6.1. Performance indicator selection

An iteratively process was followed to select the performance indicators that were to be used to assess the performance of hospital departments. A first selection of indicators was made based on literature which was presented to experts who gave their opinion on the selection. Subsequently the expert's feedback was used to improve the indicator selection.

#### *First feedback round*

Based on the literature findings, a first concept selection of indicators was made (see Table 12). These indicators were presented to the experts during a capacity management meeting. In this meeting they gave their opinion on the first selection of indicators.

*Table 12: Presented indicators feedback round 1*

Nursing department	Radiology department
<ul style="list-style-type: none"><li>Percentage of wrong placed patients</li><li>Mean admissions days per bed</li><li>Mean admission days per nurse</li><li>Capacity utilization</li><li>Bed occupation</li><li>Staff turnover</li><li>Absences due to sickness</li><li>Revenue</li><li>Costs</li></ul>	<ul style="list-style-type: none"><li>Patient access time</li><li>Patient waiting time</li><li>Capacity Utilization (MRI, CT, Ultrasound)</li><li>Staff turnover</li><li>Absences due to sickness</li><li>Amount of scans</li><li>Revenue</li><li>Costs</li></ul>

General feedback of the experts pointed out that data needed for the research should all be available at the department. For example, the revenue that is achieved on a department level is in most cases not available. Another general feedback issue was that patient outcomes are seen as more important as the logistical outcomes. Table 13 provides an overview of feedback on specific indicators.

*Table 13: Experts feedback on indicators*

Indicator	Expert's feedback
Percentage of wrong placed patients	Make this indicator scalable
Mean admission days per bed	This indicator is depending on the patient type. Could better be measured by the difference between forecasted admission days (VOD) and actual admission days.
Mean admission day per nurse	Measure it per FTE, instead of Nurses
Capacity Utilization	Is mainly depending on two indicators above.
Revenue	Is not known on department level
Cost	Is not known on daily level

#### *Second feedback round*

Based on the feedback from the first round, a subsequent selection of indicators was made. Indicator were reformed based on the experts' feedback. Besides that, all indicators were more clearly defined in numerator and denominator. Indicator "Revenue" was excluded from the selection because, this data was not available on department level. In Table 14, an overview of all selected indicators and their definitions can be seen, which were presented to the experts in the second feedback round.

Table 14: Presented indicators feedback round 2

	<b>Indicator</b>	<b>Numerator</b>	<b>Denominator</b>
Nursing department	Percentage of wrong placed patients	The number of patients on the ward, which should actually be in a different department based on a clinical picture	The total number of patients on the ward
	Mean length of stay	The total number of occupied bed days in the ward	The total number of admissions per year on the ward
	Mean admission days per FTE	The total number of occupied bed days in the ward	Total number of medically acting FTEs per year
	Bed occupation	The total number of occupied bed days in the ward	The total number of available beds in the relevant department (including closed beds) multiplied by the number of days per year
	Staff absences due to sickness	The number of sickness reports for the relevant department multiplied by the number of working days per year	The number of employees for the relevant department multiplied by the number of working days per year
	Costs	Total costs per year made on the ward for using re-usable capacity (personnel, maintenance, etc.)	The total number of admissions per year on the ward
Radiology department	Patient access time	Duration between the first contact between patient and hospital to make an appointment and the moment the research takes place	
	Patient waiting time	Duration between the moment a patient is present on the clinic and starts his or her appointment. And the moment that she is actually helped	
	Equipment utilization (MRI, CT, Ultrasound)	Time that the research equipment is occupied for researching patients	Time that the research equipment is available for doing patient research
	Mean number of scans per FTE	Total number of scans divided by the number of devices per year	Total number of FTEs (only directly involved in the radiological examination) working in the relevant department per year
	Staff absences due to sickness	The number of sickness reports for the relevant department multiplied by the number of working days per year	The number of employees for the relevant department multiplied by the number of working days per year.
	Costs	Total costs per year made on the ward for using re-usable capacity (personnel, maintenance, etc.)	The total number of admissions per year on the ward

Five of the six experts gave feedback on the indicator selection. Two of them did not give feedback on the radiology department indicators. Most feedback focussed on the definition of indicators. Reasons for that were practical issues: Data was hard to gather or was not available. These issues were considered in defining the indicators. In Appendix 4 (Table 15), an overview of the expert's feedback can be found.

Expert's feedback from the second round was used to tighten definitions of indicators further. The indicator "equipment utilization" was narrowed down to only the utilization of MRI and CT equipment. This was done because other types of equipment have more variation of imaging quality and therefore scan duration. This will lead to more variation in results. In Table 16 an overview of the final selection indicators and definitions can be seen. This set was used to measure performance outcome.

Table 15: Definitive selection of indicator

	<b>Indicator</b>	<b>Numerator</b>	<b>Denominator</b>
Nursing department	Percentage of wrong placed patients	The number of patients on the ward, which should actually be in a different department based on a clinical picture	The total number of patients on the ward
	Mean number of admissions per bed	The total number of admissions on the ward per year divided by the total number days per year	Total number of available beds on the ward. (including closed beds)
	Mean admission days per FTE	The total number of occupied warm bed days (in hours) on the ward per year	Total number of medically FTEs acting (without using weight factors based on the level of experience) per year.  <i>Additional question</i> What percentage of the total FTE is assigned to: <ul style="list-style-type: none"><li>• HBO+ Nurses</li><li>• HBO Nurses</li><li>• MBO Nurses</li><li>• Other</li></ul>
	Bed occupation	The total number of occupied warm bed days in the ward	The total number of available beds in the relevant department (including closed beds) multiplied by the number of days per year
	Staff absences due to sickness	The number of sickness reports for the relevant department multiplied by the number of working days per year	The number of employees for the relevant department multiplied by the number of working days per year
	Mean costs per admission	Total costs per year made on the ward for using re-usable capacity (personnel, maintenance, etc.)	The total number of admissions per year on the ward
Radiology department	Equipment utilization <ul style="list-style-type: none"><li>• CT</li><li>• MRI</li></ul>	Time that the research equipment is occupied for researching patients.	Time that the research equipment is available for doing patient research
	Mean number of scans per FTE	Total number of scans divided by the number of devices per year	Total number of FTEs (only directly involved in the radiological examination, radiologic laboratory technician and assistant) working in the relevant department per year  <i>Additional question</i> What percentage of the total FTE is assigned to: <ul style="list-style-type: none"><li>• radiologic laboratory technician</li><li>• radiologic assistant</li><li>• other</li></ul>
	Staff absences due to sickness	The number of sickness reports for the relevant department multiplied by the number of working days per year	The number of employees for the relevant department multiplied by the number of working days per year
	Mean costs per admission	Total costs per year made on the ward for using re-usable capacity (personnel, maintenance, etc.)	<ul style="list-style-type: none"><li>• The total number of admissions per year on the ward</li></ul>

## 6.2. Correlation RCP and Performance indicators

The participating nursing departments had a mean bed capacity of 34 ( $SD=11.07$ ,  $range=19-58$ ) and a mean number of admissions of 2653 ( $SD=1129.87$ ,  $range=1016-4527$ ). Eight of the 12 nursing departments were dedicated departments with specializations on neurology (25.00%), internal medicine (25.00%), pulmonary medicine (12.50%), cardiology (12.50%), orthopedic medicine (12.50%) and urology (12.50%). The remainder four nursing departments were serving patients from two or more specialties with a mean of 4.00 specializations served per department ( $SD=2.65$ ,  $range=2-7$ ).

The radiologic departments had a mean MRI capacity of 2.40 scanners ( $SD=0.48$ ,  $range=2-3$ ), and a mean of 11675.00 MRI-scans per year ( $SD=1817.48$ ,  $range=10210-14329$ ). The mean CT capacity was 2.30 scanners ( $SD=0.50$ ,  $range=2-3$ ), and a mean of 19149.30 CT-scans per year ( $SD=4824.04$ ,  $range=13366-13494$ ).

### 6.2.1. Internal consistency

The internal consistency of the RCP questionnaire was assessed using the Cronbach's alpha. In general, an alpha of .7 or higher reflects a good reliability of for the assessed set of questions. For assessment of the RCP-questionnaire each RCP-element was analysed separately.

For the Nursing departments the Alpha was on all of the seven RCP-elements higher than .86. For the Radiologic departments the Alpha was even higher with a lower limit of .97 for all six RCP-elements. This suggested a good reliability of the questionnaire and was in line with earlier findings (5).

*Table 16: Internal consistency*

	Nursing department		Radiologic department	
	Alpha	Number of items	Alpha	Number of items
Capacity (re)allocation	.95	44	.99	44
Admission Control	.95	41	-	41
Bed Assignment	.86	24	-	24
Patient routing	.98	38	.98	38
Discharge planning	.93	32	-	32
Tactical staff schedule	.97	36	.99	36
Operational staff schedule	.90	22	.99	22
Access policy	-	-	.97	32
Ambulatory schedule	-	-	.97	40
Total RCP-questionnaire	.97	239	.99	219

### 6.2.2. Assessing construct of performance indicators

In order to use indicators as a construct, a high heterogeneity is preferred between the outcome indicators to avoid overlapping of outcome results. Therefore, it is important to avoid high correlations between the individual outcome indicators. For assessing the heterogeneity of the performance indicators, a Pearson correlation coefficient was used. A coefficient larger than -.3 and smaller than 0.3 was preferred to avoid moderate until strong correlations between the Indicators.

The analysis of the indicators showed high correlation coefficient (>0.3) for the indicator "Percentage of wrong placed patients" (Table 18). This indicated a moderate correlation between this indicator and three others what could affect the heterogeneity of the indicators. Although, none of the correlation was statistically significant. Indicator "Percentage of wrong placed patients" was excluded because of the suggestion of correlations and missing data for two out of 12 respondents.

Table 17: Correlation performance indicators nursing department

		Percentage of wrong placed patients	Mean admissions per bed	Mean FTE per bed	Bed occupation	Mean salary costs per admission
Percentage of wrong placed patients	Pearson Correlation		-.46	.39	-.02	.52
	Sig.		.18	.27	.96	.13
	N		10	10	10	10
Mean admissions per bed	Pearson Correlation	-.46		-.15	-.02	.13
	Sig.	.18		.64	.95	.70
	N	10		12	12	12
Mean FTE per bed	Pearson Correlation	.39	-.15		-.05	.06
	Sig.	.27	.64		.87	.86
	N	10	12		12	12
Bed occupation	Pearson Correlation	-.02	-.02	-.05		.01
	Sig.	.96	.95	.87		.98
	N	10	12	12		12
Mean salary costs per admission	Pearson Correlation	.52	.13	.06	.01	
	Sig.	.13	.70	.86	.98	
	N	10	12	12	12	

### 6.2.3. Regression analyses

Nursing departments of five different hospitals filled in the RCP-questionnaire. Departments from the same hospital showed high consistency in RCP implementation. This could indicate that RCP policies are implemented throughout the hole organisation. However, the differences of RCP policies between the various hospitals were larger (see Figure 3). Policies of hospitals 4 and 5 were only moderate present on all RCP-elements, whereas the policies of hospital 1 and 2 were on each RCP-element more than moderate present. Besides that, their policies were for at least two RCP-elements more than sufficient present.

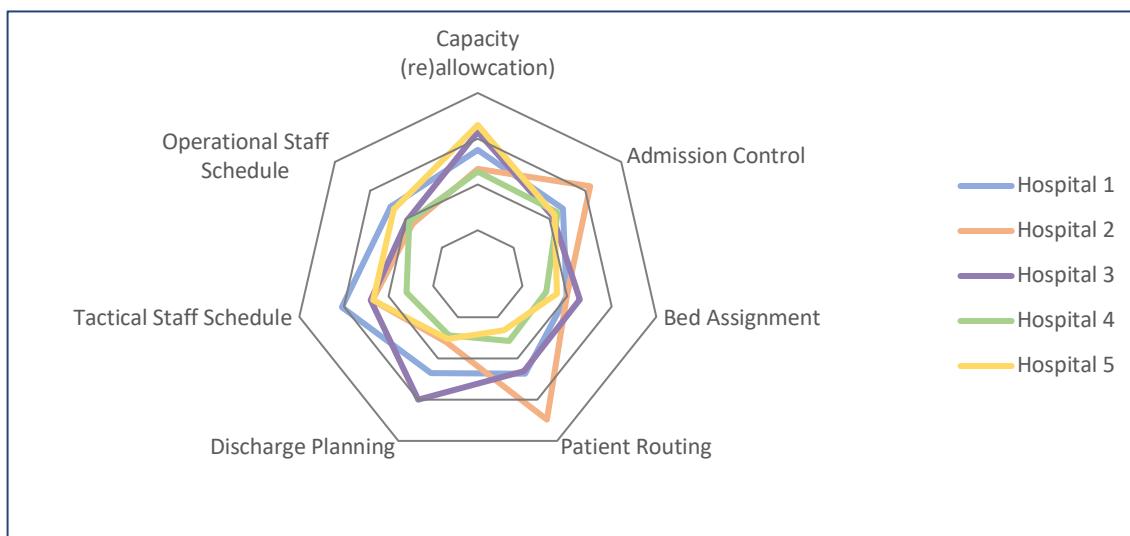


Figure 3: Level of RCP presence in nursing departments for each hospital

Radiologic departments of four hospitals filled in the RCP-questionnaire. Differences in policy presence between hospitals was substantially larger than for Nursing departments (see Figure 4). Hospital 4 showed an almost full presence of RCP policies on all elements, whereas hospital 2 showed for just one element RCP presences. This indicated a high variety of RCP implementation between hospitals.

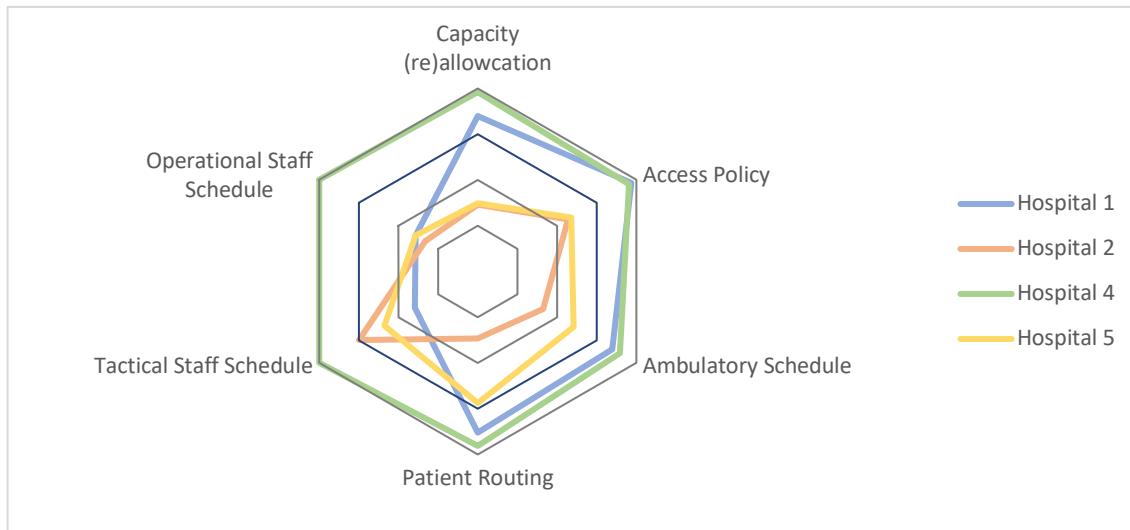


Figure 4: Level of RCP presence in radiologic departments for each hospital

The relationship between the score of the RCP-questionnaire and the performance indicators was assessed using linear regression analysis. As can be seen in Figure 5, the Nursing departments showed a statistically significant regression between the score of the RCP-questionnaire and the construct of the performance indicators ( $R^2=0.324, p=0.05$ ). The overall performance outcome of the Nursing departments was determined for almost 50% by the score of the RCP-questionnaire (table 19).

A similar regression emerged for the Radiologic departments ( $R^2=0.38, p=0.39$ ). Although, the regression was not statistically significant, it suggested that the questionnaire can predict performance outcome. As can be seen in Figure 5, a high level of RCP presence indicates better performance outcomes.

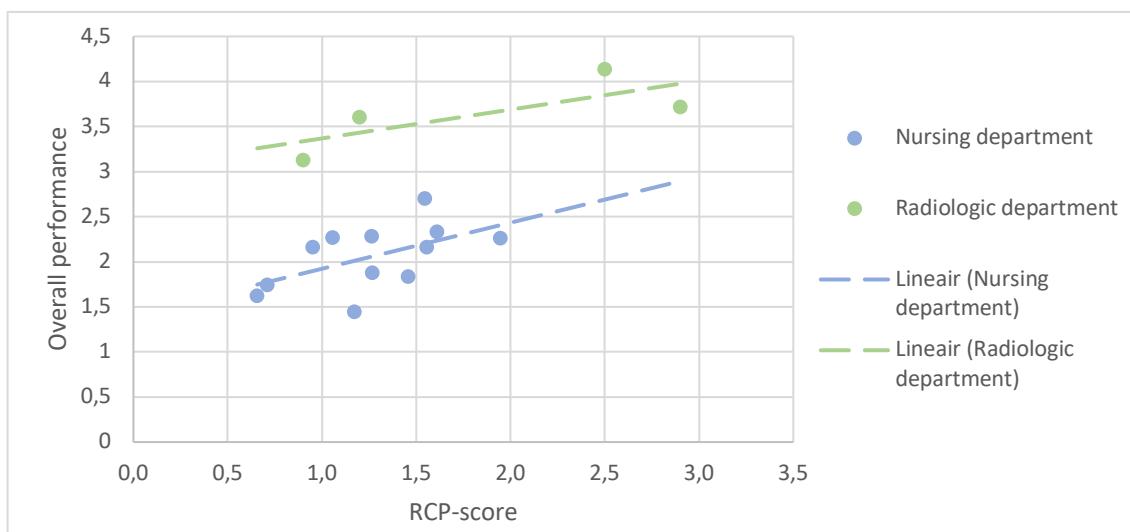


Figure 5: Correlation RCP-score and Performance outcome

### Regression between RCP-elements and overall performance score

For both types of departments, the regression of each RCP element was computed using single variable linear regression analysis. For Nursing departments, RCP-elements; capacity (re)allocation, tactical staff schedule and operational staff schedule, showed a strong correlation ( $R>.60$ ) to the performance indicators. All three correlations were statically significant ( $p<.05$ ). The goodness-of-fit, represented by R squared, for these correlations respectively .44, .57 and .49. This indicated a moderate until strong regression and therefore contribute to the overall regression. The remaining RCP-elements showed weak correlations which were not significant. The latter could be caused by coincidence that is possible due to the number of participants ( $n=12$ ).

*Table 18: Single variate regression analysis nursing department*

RCP-element	R	Sig.	R squared	Adjusted squared R	Unstandardized Beta	Sig.
Capacity (re) allocation	.66	.01	.44	.38	.34	.02
Admission control	-.17	.30	.03	-.07	-.09	.59
Bed assignment	.22	.25	.05	-.46	.16	.49
Patient routing	-.11	.37	.01	-.09	-.04	.74
Discharge planning	.22	.25	.05	-.05	.12	.50
Tactical staff schedule	.75	.00	.57	.53	.32	.01
Operational staff schedule	.70	.01	.49	.44	.58	.01
Overall	.57	.03	.32	.26	.59	.05

\* Dependent variable: Construct of performance indicators

Results of the regression analysis for the Radiological departments showed moderate until strong correlations for most of the RCP-elements. Only *Operational staff schedule* showed a weak correlation ( $R=.13, p=.44$ ). However, none of the findings were significant. This could be caused by the number of participants ( $n=4$ ). Though significance lacks, the findings were in line with the findings of the Nursing departments. It suggests that a higher presence of RCP produces higher performances.

*Table 19: Single variate regression analysis radiologic department*

Independent variable	R	Sig.	R squared	Adjusted squared R	Unstandardized Beta	Sig.
Capacity (re) allocation	.54	.23	.29	-.07	.18	.47
Patient routing	.83	.08	.70	.54	.35	.17
Access policy	.66	.17	.43	.15	.33	.34
Ambulatory schedule	.77	.11	.60	.40	.36	.23
Tactical staff schedule	-.52	.24	.27	-.09	-.22	.48
Operational staff schedule	.13	.44	.02	-.48	.04	.87
Overall	.61	.19	.38	.07	.27	.39

\* Dependent variable: Construct of Performance indicators

For both types of departments, the overall RCP-score showed a beneficial moderate regression with the (overall) performance of hospital departments. Only the finding for the Nursing department is statistically significant.

### Assessing possible improvements

Possibilities for improvements of the overall regression for both types of departments were assessed with a stepwise multiple linear regression analysis. Results showed an improvement of the regression in case of the Nursing departments with the use of only two elements, respectively *Tactical staff schedule* and *Operational staff schedule*. In case of the Radiologic departments no significant

improvement was found. Because of the low coverage of RCP by only the two elements (see paragraph 5.2.1) and the significance of the regression between the overall RCP-score and performance, the researchers preferred the use of the total questionnaire for measuring RCP.

#### 6.2.4. Correlation of RCP-elements and individual performances indicators

As aforementioned, not all hospital department pursued the exact same goal. And whereas the overall outcome will always be a trade-off between indicators, no policy will contribute to all performance indicators. To assess the effect of RCP-elements on the individual performance indicators a correlation analysis was performed.

As can be seen in Table 22, all performance indicators showed a significant correlation with one to three RCP-elements.

RCP-elements *Discharge planning*, *Tactical staff schedule* and *Operational staff schedule* showed a significant correlation to the *Number of admissions per bed*. Besides that, element *Bed assignment* showed a moderate correlation with the same performance indicator. However, this is not significant which suggests also a key role for this element. In order to gain more admission per bed these policies on these elements are needed.

Indicator *FTE's per bed* showed a strong and significant correlation with RCP-element *Capacity (re)allocation*. Elements *Operational staff schedule* and *Discharge planning* showed moderated non-significant correlations. This indicated that these RCP-elements are key for low FTE numbers per bed.

*Salary costs per admission* showed significant correlation with the RCP-elements *Capacity (re)allocation*, *Admission control* and *Bed assignment*. The following remark on these findings is essential; only the first two elements help lowering the costs per admission. This indicates that key factors for low costs per admission are RCP-elements *Capacity (re)allocation* and *Admission control*.

Results suggest that a higher *Bed occupation* is only gained by the RCP-elements *Capacity (re)allocation* and *Operational staff schedule*. However, both correlations were not significant. On the other hand, *Patient routing* did show a significant correlation, but a negative one. Thus, a high patient flow will lower *Bed occupation* because the RCP-element *Patient routing* focussed on patient flow.

Table 20: Correlations RCP-elements and individual performance indicators Nursing department

	Admissions per bed		FTE per bed		Bed occupation		Salary costs per admission		Percentage wrong-placed patients	
	R	p	R	p	R	p	R	p	R	p
<b>Capacity (re)allocation</b>	.25	.22	-.54	.04	.18	.29	-.52	.04	-.59	.04
<b>Admission control</b>	-.32	.16	.29	.18	-.30	.17	-.57	.03	-.09	.40
<b>Bed assignment</b>	.42	.09	-.21	.26	-.27	.20	.50	.05	-.15	.34
<b>Patient routing</b>	.07	.42	.18	.29	-.85	.00	-.36	.12	-.01	.49
<b>Discharge planning</b>	.61	.02	-.32	.16	-.46	.07	.06	.43	-.47	.08
<b>Tactical staff</b>	.74	.00	-.09	.39	-.12	.35	-.22	.25	-.38	.14
<b>Operational staff</b>	.51	.05	-.43	.08	.45	.07	-.06	.43	-.15	.34

Performance indicators of the Radiologic department did not show any significant correlations (see Table 23). However, there were suggestions of correlations found. The *amount of MRI scans per FTE* showed an almost significant correlation with the RCP-elements *Capacity (re)allocation* and *Operational staff schedule*. Both correlations showed a high R value ( $R > .90$ ) suggesting a strong correlation. For the *amount of CT scans per FTE* only the correlation with *Capacity (re)allocation* was comparable to the results of the MRI scans. Moreover, for the CT scans a suggestion of a correlation was found with RCP-element *Access policy* ( $R = .88$ .)

Also, for *Costs per CT Scan* one suggestion of a correlation was found with the RCP-element *Tactical staff schedule* ( $R=.85$ ,  $p=.15$ ). All other results did not show any reliable suggestions of correlations ( $p>.20$ ).

Table 21: Correlations RCP-elements and individual performance indicators Radiologic department

Capacity (re)allocation	Equipment occupation				Scans per FTE			
	MRI		CT		MRI		CT	
	R	p	R	p	R	p	R	p
Access policy	-.62	.38	-.04	.96	.85	.15	.88	.12
Ambulatory schedule	-.45	.55	.13	.87	.83	.17	.67	.33
Patient routing	-.27	.73	.29	.71	.73	.27	.48	.52
Tactical staff	-.60	.40	-.78	.23	.52	.48	-.03	.98
Operational staff	-.69	.31	-.45	.55	.90	.10	.37	.63
Capacity (re)allocation	Costs per scan				Scans per scanner			
	MRI		CT		MRI		CT	
	R	p	R	p	R	p	R	p
Access policy	.09	.91	-.27	.74	.14	.86	.42	.58
Ambulatory schedule	-.01	.99	-.46	.54	.31	.69	.58	.41
Patient routing	-.28	.73	-.30	.70	.44	.56	.37	.63
Tactical staff	.48	.52	.85	.15	-.77	.23	-.68	.32
Operational staff	.13	.87	-.45	.55	-.26	.74	-.30	.70

## 6.2.5. Effectiveness of RCP policies

The effectiveness of RCP-policies from the different departments was assessed using DEA. With DEA it is possible to calculate a technical efficiency (TE) score to differentiate departments based on effectiveness of the RCP. A TE-coefficient of 1 corresponds with perfect effective implemented RCP. Therefore, a TE of 1 (1=100% efficient) is preferred. Eight Nursing departments achieved 100% TE (see Figure 6). The remaining four Nursing departments had a mean TE of .70 and SD of .06. This indicated that these departments had a 30% less effective RCP-policy than their DMU.

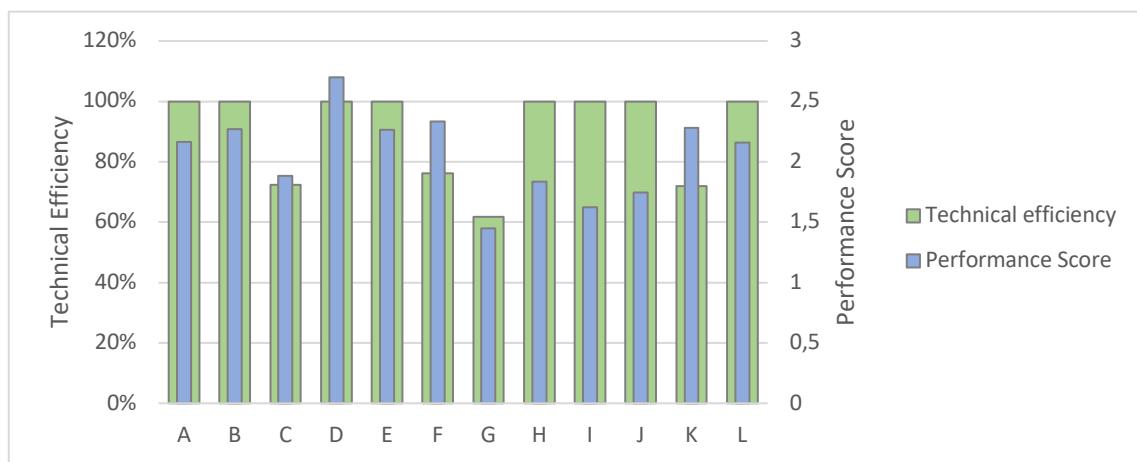


Figure 6: Technical efficiency nursing departments

For the Radiologic departments the same DEA method was used. All four participating Radiologic departments showed a 100% TE. Based on this result no differentiation could be made between departments with effective or in effective RCP. Therefore, no departments could be identified as a

department with effective policies. This result could have been caused by the combination of the amount of outcome indicators and the number of participating departments. A high number of outcome indicators would provide more possibilities of 100% TE, and a low number of participants would provide less comparison possibilities. This DEA result makes further analysis hard to accomplish.

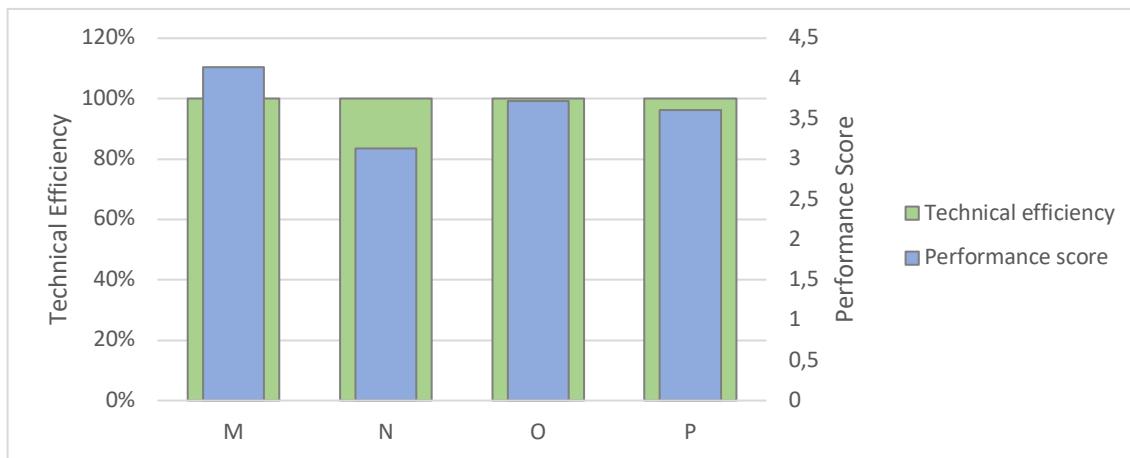


Figure 7: Technical efficiency radiologic departments

Departments with a high TE coefficient showed a lower overall mean RCP-score. Effective departments had a mean RCP-score of 1.19 against a mean of 1.48 ( $t=-1.33$ ,  $p=0.22$ ) for ineffective departments. Departments with a high TE had implemented RCP on less RCP-elements ( $t=-2.48$ ,  $p=.03$ ). This could explain the lower overall RCP-score for the efficient departments, because the overall RCP-score is a mean score of all individual RCP-element scores. This suggests that policies on some RCP-elements contributed little to the performance of the hospital departments.

The differences of the RCP-scores between the effective and ineffective departments was assessed using an independent samples T-test. Departments with a high TE showed a lower mean score on most RCP-elements. Only on RCP-element *Operational staff schedule* effective departments had a higher RCP-score ( $t=1.70$ ,  $p=.12$ ). However, none of the differences in RCP scores on the RCP-elements were statistically significant. This indicated that there were no differences in RCP implementations, based on the different RCP-elements, between effective and ineffective departments.

Table 22: Differences in RCP-score for the RCP elements

	t	p	Mean Difference	Technical efficiency 100%		Technical efficiency < 100%	
				Mean	SD	Mean	SD
<b>Overall</b>	-1.33	.22	-.29	1.19	.37	1.48	.31
<b>Capacity (re)allocation</b>	-.48	.64	-.23	1.50	.75	1.73	.39
<b>Admission control</b>	-1.33	.21	-.58	1.22	.79	1.80	.36
<b>Bed assignment</b>	-.89	.39	-.29	.81	.59	1.10	.18
<b>Patient routing</b>	-1.72	.12	-.91	.94	.91	1.85	.38
<b>Discharge planning</b>	-1.21	.26	-.49	.84	.69	1.33	.29
<b>Tactical staff</b>	-.22	.98	-.01	1.51	.93	1.52	.48
<b>Operational staff</b>	1.70	.12	.44	1.33	.43	.90	.19

As aforementioned in paragraph 3.1, A well implemented RCP-policy includes all phases of the PDCA-cycle. To assess the effects of the PDCA-cycle on the effectiveness of the RCP an independent sample T-test was used.

Departments with a low TE showed a higher mean score of RCP in the *Plan* ( $t=-.53$ ,  $p=.60$ ) and *Do* ( $t=-2.46$ ,  $p=.39$ ) phases. For the *Check/Act* phase the highest mean score was shown for the high TE departments ( $t=.25$ ,  $p=.81$ ). This suggested that effective departments made more effective use of *check/act* phase. Although, none of these findings were statistically significant. This implied that checking and reforming policies is needed to maintain effectiveness of policies.

*Table 23: Differences of RCP-score for the PDCA-cycle*

	t	Sig. (2-tailed)	Mean Difference	Technical efficiency 100%		Technical efficiency <100%	
				Mean	SD	Mean	SD
<b>Mean score Plan phase</b>	-.53	.60	-.11	1.93	.26	2.04	.48
<b>Mean score Do phase</b>	-2.46	.39	-.22	2.00	.11	2.22	.13
<b>Mean score Check/act phase</b>	.25	.81	.08	1.94	.39	1.86	.65

## 7. Discussion

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Raising healthcare expenditures causes an increasing awareness of efficiency in healthcare processes. Due to fearsome competition, industry constructed several operational management (OM) concepts to improve value and efficiency of processes. These concepts are increasingly adopted by healthcare institutions. However, the differences between industry and healthcare often causes mismatches of the concepts. Although, it seems obvious that use of OM concepts and, thereby a higher presence of, RCP-policies will increase the performances of hospital departments. The factor which is key in improving performance or efficiency is not known.

The aim of this research was to determine if a correlation between RCP presence, measured with several RCP-elements, and the hospital performances exists; and what the key factors of RCP-policies are for a good performance of hospital departments. In this research, effects of the several RCP-elements and the implementation of PDCA-cycle in RCP-policies was assessed. To investigate this, there were 16 department managers from five different hospitals asked to fill in an RCP-questionnaire, to deliver performance indicators, and to fill in an importance ranking on the performance indicators.

The RCP-presence showed a significant regression with the performance indicators for Nursing departments. Around 55% of the overall performance outcome could be explained by the RCP-score. Radiologic departments showed similar results, only these results were not significant. The latter was probably due to a low sample size. Although the presence of RCP cannot guarantee maximum efficiency, it can be assumed that RCP has a beneficial effect on the performances with regard to Nursing departments. Also, it suggested that in Radiologic departments similar regression will be found.

Hospitals can apply a wide variety of policies to manage resources. However, not all policies will be similar effective. Therefore, a DEA was performed. The found relationship between RCP and performance made it possible to use the outcome of the RCP-questionnaire as an input for a DEA. Eight of 12 nursing department showed a 100% TE presence of RCP, and was used as distribution of department based on effectiveness. This distribution of departments was used to determine key factors of effective RCP.

Results showed that effective departments make use of less policies as ineffective departments. However, the difference is that effective departments apply policies only on certain RCP-elements thoroughly. The consistency of RCP presence for each RCP-element was low. Although it was m=not significant, only one RCP-element showed a higher RCP presence for effective departments: *Operational staff schedule*. This suggests that this element could be key for a high overall performance outcome. However, it is probably more important to note that there was no suggestion of a real combination of key RCP-elements for an overall high performance. This could be due to the fact that hospitals can have different goals with their policies. This hypothesis is supported by results of a correlation analysis on the effect of RCP-elements on the individual performance indicators. The results suggested that all performance indicators are supported by a different combination of RCP-elements and that the overall performance is a trade-off between all implemented RCP-policies.

In contrast with the results on the RCP-elements, there are indications of key factors based on the PDCA-cycle for an overall high performance. Departments with effective policies showed a more thoroughly implementation of the PDCA-cycle in their policies, showed by a higher mean score on the police presence in the *Do and Check/Act* phases. This suggested that implementing the PDCA-cycle in RCP-policies has a beneficial effect on the performances of departments.

Results might not be generalizable due to the relatively small sample size in this study. Although the group of participants had a nonselective nature, coincidence will have a greater effect on the results. Furthermore, the used questionnaire was textually extensive. Although no indication was found this affected the reliability. However, it is undesirable to exclude RCP-elements from the questionnaire because of the absence of an optimal RCP-solution.

Unlike most studies on OM in healthcare settings, this research focussed on the implementation of RCP on department level. Healthcare is a very diverse sector, remaining not one single RCP concept that fits perfect on every type of hospital department. The strength of this study is that it does not focus on a single solution, but on presence of policies in different elements of RCP. This is a more general focus and makes the findings more generalizable.

This study showed that RCP management has a beneficial effect on the performance of hospital departments, and can contribute to efficient and valuable processes in the healthcare sector. RCP policies should be arranged with performance goals of the hospitals departments in mind in order to achieve optimal performances. OM-concepts can be used as a guidance, but should always be adapted to the goals and characteristics of the hospital department.

## 8. Recommendations

### 8.1 Recommendations for further research

- In this research five general hospitals with 12 Nursing- and four Radiologic departments were included. This provided the possibility of a clear comparison, due to little variation in departments characteristics. For further research it would be interesting to assess if findings will hold for other type of hospitals, like academic- or private hospitals.
- In this research an open and general approach was used to assess the relationship between RCP and hospital performances. A positive correlation was found which indicates that RCP improves performances. Besides that, it is known that no single OM-solution could fit on all elements of RCP. For further research it would be interesting to assess key factors for implementation of RCP to obtain optimal results for each RCP element.
- It can be assumed that the healthcare outside the Netherlands is differently organized. Therefore, it would be interesting to assess what effect RCP will have on the performances and which key factor are important, outside the Netherlands. This insight could help to develop a more powerful tool to assess RCP in healthcare.

### 8.2 Advice regarding state of RCP to hospital departments

#### Hospital 1

Policies and guidelines essential for RCP is more than moderately present at Hospital 1. With an RCP mean overall score of 2.8 this is the hospital with the best RCP-score in the benchmark. The implementation of policies on RCP-elements showed consistency on all departments of the hospital though, interdepartmental variation was seen for departments B and D (see Figure 8).

Although absence of policies on departmental level will not imply insufficient use of healthcare processes, the results pointed out that cooperation with involved departments could be improved. Clear policies could support departmental cooperation.

#### Department A (Nursing)

Department A showed a relative overall performance of 80% in contrast with the best performing department (see Figure 8). Although, the Implemented RCP-policy had a 100% technical efficiency. Five of the seven elements have a sufficient policy presence (RCP-score >2), which was above average in this research (see Figure 9).

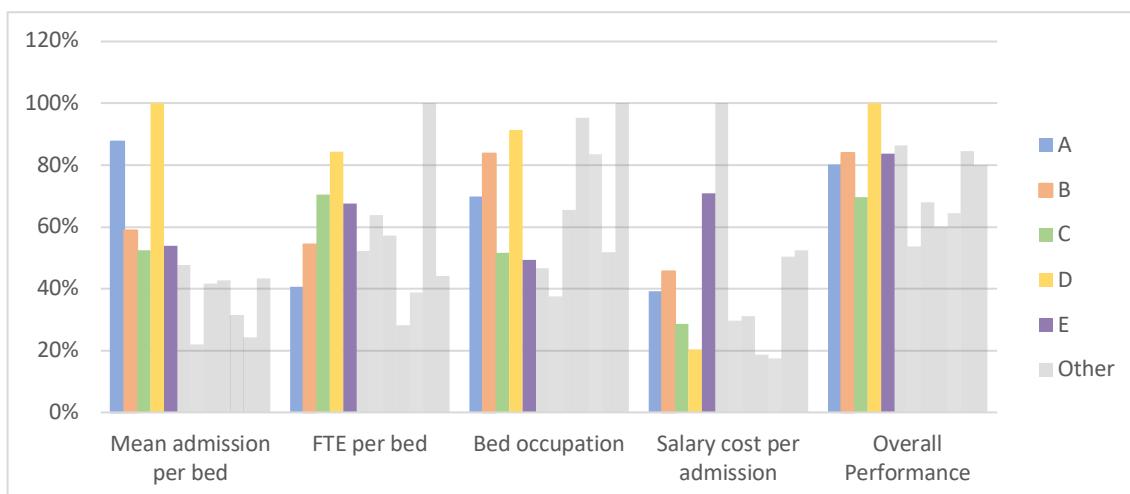


Figure 8: Relative performance scores Nursing departments

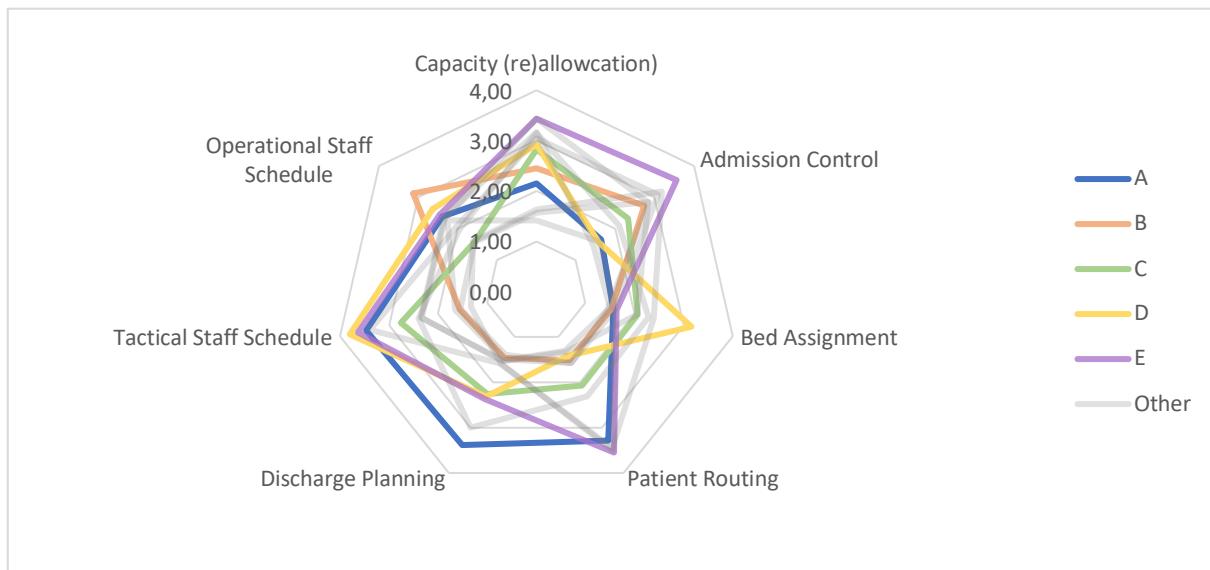


Figure 9: RCP-score Nursing departments

Two RCP-elements have a poor/moderate level of policy presence: *Admission control* and *Bed assignment*. From former research (5) is known that implementation of OM-concepts *Lean management* and *Theory of constraints* could be helpful to improve processes in both these RCP-elements. In Table 23 detailed results regarding policy absence are presented.

Table 24: Advice regarding RCP state of department A

RCP-element	Detailed results regarding policy absence	Advice
Admission Control	<ul style="list-style-type: none"> <li>Reduction of variations in healthcare process</li> <li>Use of calculations for reaching an optimum policy for achievement of goals</li> </ul>	<ul style="list-style-type: none"> <li>Evaluation of the issues and improvement of policies is needed in the cooperation with related departments</li> </ul>
Bed assignment	<ul style="list-style-type: none"> <li>Cooperation of OR department for allocation of beds</li> <li>Admission and discharge guideline to cope with work pressure</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of protocols for using calculation could provide more insight to optimize processes</li> <li>Implementation of Guidelines is needed. this will reduce variations in processes, what improve effectiveness</li> </ul>

### Department M (Radiologic)

Department M showed a relative overall performance of 89% in comparison to the best performing department (see Figure 10). On terms of policies, department M showed on four of the six RCP-elements a more than sufficient level of RCP presence (see Figure 9). Only RCP-elements *Tactical-* and *Operational staff schedule* scored a poor RCP presence.

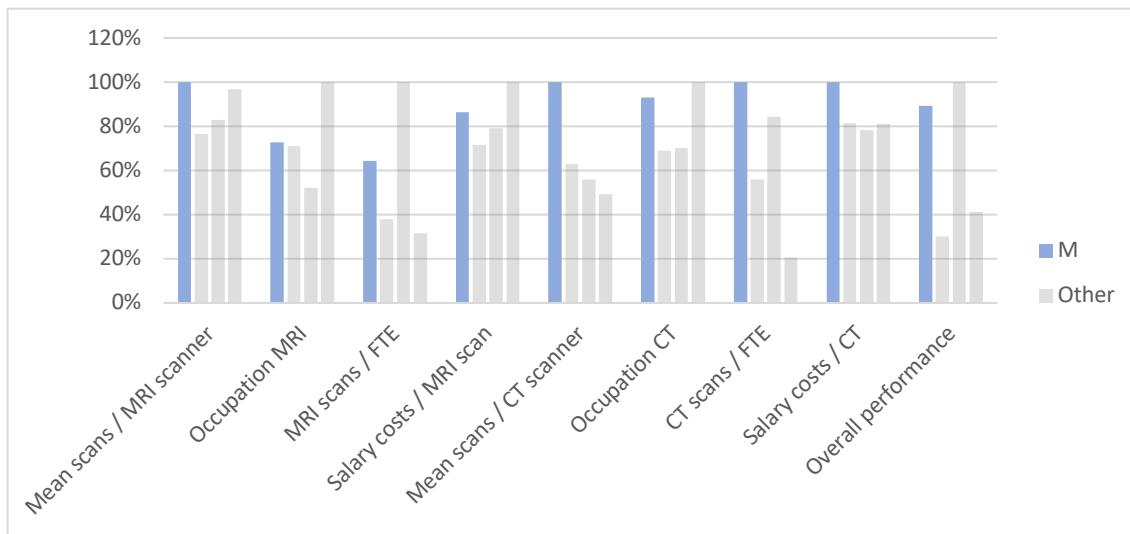


Figure 10: Relative performance scores Radiologic departments

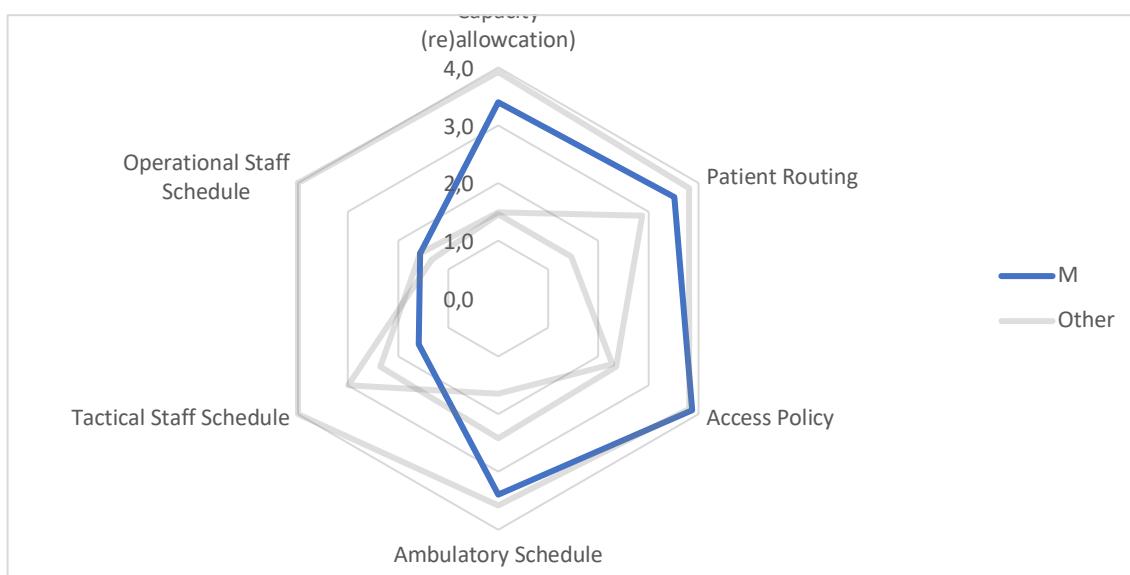


Figure 11: RCP-score Radiologic departments

From former research (5) it is known that implementation of OM-concept *Total quality management* could be helpful to improve staff planning processes. In Table 24 detailed results regarding to policy absence are presented. In Table 24 detailed results regarding policy absence are presented.

Table 25: Advice regarding RCP state of department M

RCP-element	Detailed results regarding policy absence	Advice
Tactical staff schedule	<ul style="list-style-type: none"> <li>Cooperation with relate departments</li> </ul>	<ul style="list-style-type: none"> <li>Evaluation of the issues and improvement of policies is needed in the cooperation with related departments</li> </ul>
Bed assignment	<ul style="list-style-type: none"> <li>Use of a flex pool in case of underemployment</li> <li>Cooperation with relate departments</li> </ul>	<ul style="list-style-type: none"> <li>The use of a pool of coworkers could provide more certainty to act on variations in demand</li> </ul>

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## Appendix 1 Search matrix

Literature search: PubMed			
Search term:	Results	Selected	Comments
((((((((access policy) OR waiting list management) OR walk-in service) OR advanced access) OR same-day scheduling) OR open access) AND hospital) AND department) AND planning) AND resource capacity) AND indicators	0	0	
((((((((access policy) OR waiting list management) OR walk-in service) OR advanced access) OR same-day scheduling) OR open access) AND hospital) AND department) AND planning) AND resource capacity	6	0	Initial search resulted in 16 papers from which 10 were published before 01-01-2015
((((((((access policy) OR waiting list management) OR walk-in service) OR advanced access) OR same-day scheduling) OR open access) AND hospital) AND department) AND planning))	201	0	Initial search resulted in 495 papers from which 199 were published before 01-01-2015
Literature search: BSE			
Search term:	Results	Selected	Comments
((((((((access policy) OR waiting list management) OR walk-in service) OR advanced access) OR same-day scheduling) OR open access) AND hospital) AND department) AND planning) AND resource capacity) AND indicators Filter: 2015 -2018	0	0	
((((((((access policy) OR waiting list management) OR walk-in service) OR advanced access) OR same-day scheduling) OR open access) AND hospital) AND department) AND planning) AND resource capacity Filter: 2015 -2018	0	0	
((((((((access policy) OR waiting list management) OR walk-in service) OR advanced access) OR same-day scheduling) OR open access) AND hospital) AND department) AND planning)) Filter: 2015 -2018	5	0	Initial search resulted in 495 papers from which 199 were published before 01-01-2015
Literature search: PubMed			
Search term:	Results	Selected	Comments
(((((admission control) OR static bed reservation) OR dynamic bed reservation) OR overflow rules) AND hospital) AND department) AND resource capacity) AND indicators	0	0	
(((((admission control) OR static bed reservation) OR dynamic bed reservation) OR overflow rules) AND hospital) AND department) AND resource capacity)	6	0	no relevant papers To broad, including filter for search fields (title & abstract) results: 0
(((((admission control) OR static bed reservation) OR dynamic bed reservation) OR overflow rules) AND hospital) AND department)	3178	0	
Literature search: BSE			
Search term:	Results	Selected	Comments
(((((admission control) OR static bed reservation) OR dynamic bed reservation) OR overflow rules) AND hospital) AND department) AND resource capacity) AND indicators	0	0	
(((((admission control) OR static bed reservation) OR dynamic bed reservation) OR overflow rules) AND hospital) AND department) AND resource capacity)	0	0	

(((((admission control) OR static bed reservation) OR dynamic bed reservation) OR overflow rules) AND hospital) AND department)	7	0	No relevant publications
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#### Literature search: PubMed

Search term:	Results	Selected	Comments
((((((inpatient appointment scheduling) OR patient appointment scheduling) OR admission scheduling) OR bed assignment) OR admission scheduling) AND hospital) AND department) AND planning) AND resource capacity) AND indicators	0	0	
((((((inpatient appointment scheduling) OR patient appointment scheduling) OR admission scheduling) OR bed assignment) OR admission scheduling) AND hospital) AND department) AND planning) AND resource capacity	1	0	
(((((admission control) OR static bed reservation) OR dynamic bed reservation) OR overflow rules) AND hospital) AND department) AND Planning)	63	0	No relevant publications

#### Literature search: BSE

Search term:	Results	Selected	Comments
((((((inpatient appointment scheduling) OR patient appointment scheduling) OR admission scheduling) OR bed assignment) OR admission scheduling) AND hospital) AND department) AND planning) AND resource capacity) AND indicators	0	0	
(((((admission control) OR static bed reservation) OR dynamic bed reservation) OR overflow rules) AND hospital) AND department) AND resource capacity)	0	0	
(((((admission control) OR static bed reservation) OR dynamic bed reservation) OR overflow rules) AND hospital) AND department)	7	0	No relevant publications

#### Literature search: PubMed

Search term:	Results	Selected	Comments
((((((("Hospital Bed Capacity") OR "capacity planning") OR "Resource allocation") OR "Capacity requirements planning") OR "capacity management") OR "capacity scheduling") AND Hospital) AND department) AND planning) AND resource capacity planning) AND indicators)	0	0	
((((((("Hospital Bed Capacity") OR "capacity planning") OR "Resource allocation") OR "Capacity requirements planning") OR "capacity management") OR "capacity scheduling") AND Hospital) AND department) AND planning) AND resource capacity planning)	17	0	

#### Literature search: BSE

Search term:	Results	Selected	Comments
((((((("Hospital Bed Capacity") OR "capacity planning") OR "Resource allocation") OR "Capacity requirements planning") OR "capacity management") OR "capacity scheduling") AND Hospital) AND department) AND planning) AND resource capacity planning) AND indicators)	0	0	
((((((("Hospital Bed Capacity") OR "capacity planning") OR "Resource allocation") OR "Capacity requirements planning") OR "capacity management") OR "capacity scheduling") AND Hospital) AND department) AND planning) AND resource capacity planning)	2	0	

Literature search: PubMed			
Search term:	Results	Selected	Comments
(((((discharge planning) OR patient discharge) AND hospital) AND department) AND planning) AND resource capacity) AND indicators	0	0	
(((((discharge planning) OR patient discharge) AND hospital) AND department) AND planning) AND resource capacity	2	0	
(((((discharge planning) OR patient discharge) AND hospital) AND department) AND planning)	579	0	Too broad, filter on search field (Title Abstract). Results: 1, but not relevant.

Literature search: BSE			
Search term:	Results	Selected	Comments
(((((discharge planning) OR patient discharge) AND hospital) AND department) AND planning) AND resource capacity) AND indicators	0	0	
(((((discharge planning) OR patient discharge) AND hospital) AND department) AND planning) AND resource capacity	0	0	
(((((discharge planning) OR patient discharge) AND hospital) AND department) AND planning)	19	0	

Literature search: PubMed			
Search term:	Results	Selected	Comments
(((("Patient Routing") OR "Patient stages") OR "workflow") OR "patient flow") AND hospital) AND department) AND planning) AND resource capacity) AND indicators	0	0	
(((("Patient Routing") OR "Patient stages") OR "workflow") OR "patient flow") AND hospital) AND department) AND planning) AND resource capacity	4	0	
(((("Patient Routing") OR "Patient stages") OR "workflow") OR "patient flow") AND hospital) AND department) AND planning)	284	0	Too broad, filter on search field (Title Abstract). Results: 1, but not relevant.

Literature search: BSE			
Search term:	Results	Selected	Comments
(((("Patient Routing") OR "Patient stages") OR "workflow") OR "patient flow") AND hospital) AND department) AND planning) AND resource capacity) AND indicators	0	0	
(((("Patient Routing") OR "Patient stages") OR "workflow") OR "patient flow") AND hospital) AND department) AND planning) AND resource capacity	0	0	
(((("Patient Routing") OR "Patient stages") OR "workflow") OR "patient flow") AND hospital) AND department) AND planning)	9	0	

Literature search: PubMed			
Search term:	Results	Selected	Comments
((((((("surgical process") OR "surgical patient stages") OR "surgical stages") OR "operative stages") OR "preoperative" "perioperative" "postoperative") OR "surgical patient route") AND hospital) AND department) AND planning) AND resource capacity) AND indicators	0	0	
((((((("surgical process") OR "surgical patient stages") OR "surgical stages") OR "operative stages") OR "preoperative" "perioperative" "postoperative") OR "surgical patient route") AND hospital) AND department) AND planning)	90	0	Too broad, filter on search field (Title Abstract). Results: 0.

Literature search: BSE	Results	Selected	Comments
Search term:			
((((((("surgical process") OR "surgical patient stages") OR "surgical stages") OR "operative stages") OR "preoperative" "perioperative" "postoperative") OR "surgical patient route") AND hospital) AND department) AND planning) AND resource capacity) AND indicators	0	0	
((((((("surgical process") OR "surgical patient stages") OR "surgical stages") OR "operative stages") OR "preoperative" "perioperative" "postoperative") OR "surgical patient route")	2	0	Not relevant results
Literature search: PubMed	Results	Selected	Comments
Search term:			
((((((("Ambulatory AND workflow")) OR "processing of outpatient") OR "patient flow") OR "parallel processing") OR "patient route") AND ("outpatient" OR "ambulatory") AND hospital) AND department) AND planning) AND resource capacity) AND indicators	0	0	
((((((("Ambulatory AND workflow")) OR "processing of outpatient") OR "patient flow") OR "parallel processing") OR "patient route") AND ("outpatient" OR "ambulatory") AND hospital) AND department) AND planning) AND resource capacity	0	0	No relevant results
((((((("Ambulatory AND workflow")) OR "processing of outpatient") OR "patient flow") OR "parallel processing") OR "patient route") AND ("outpatient" OR "ambulatory") AND hospital) AND department) AND planning)	2	0	
Literature search: BSE	Results	Selected	Comments
Search term:			
((((((("Ambulatory AND workflow")) OR "processing of outpatient") OR "patient flow") OR "parallel processing") OR "patient route") AND ("outpatient" OR "ambulatory") AND hospital) AND department) AND planning) AND resource capacity) AND indicators	0	0	
((((((("Ambulatory AND workflow")) OR "processing of outpatient") OR "patient flow") OR "parallel processing") OR "patient route") AND ("outpatient" OR "ambulatory") AND hospital) AND department) AND planning) AND resource capacity) AND indicators	0	0	
((((((("Ambulatory AND workflow")) OR "processing of outpatient") OR "patient flow") OR "parallel processing") OR "patient route") AND ("outpatient" OR "ambulatory") AND hospital) AND department) AND planning) AND resource capacity	0	0	
((((((("Ambulatory AND workflow")) OR "processing of outpatient") OR "patient flow") OR "parallel processing") OR "patient route") AND ("outpatient" OR "ambulatory") AND hospital) AND department) AND planning) AND resource capacity	0	0	
((((((("Ambulatory AND workflow")) OR "processing of outpatient") OR "patient flow") OR "parallel processing") OR "patient route") AND ("outpatient" OR "ambulatory") AND hospital) AND department) AND planning)	1	0	
Literature search: PubMed	Results	Selected	Comments
Search term:			
((((((("staff shift scheduling) OR nurse to patient ratio) OR nurse scheduling) OR midterm scheduling) OR nurse rostering) OR staffing levels) OR staff scheduling) OR staffing policy) AND hospital) AND	0	0	

department) AND planning) AND resource capacity) AND indicators (((((((((staff shift scheduling) OR nurse to patient ratio) OR nurse scheduling) OR midterm scheduling) OR nurse rostering) OR staff scheduling) OR staffing policy) AND hospital) AND department) AND planning) AND resource capacity)	2	0
((((((("Ambulatory AND workflow")) OR "processing of outpatient") OR "patient flow") OR "parallel processing") OR "patient route") AND ("outpatient" OR "ambulatory") AND hospital) AND department) AND planning)	59	0
((((staffing levels) AND hospital) AND department) AND planning) AND resource capacity) AND indicators	0	0
((((staffing levels) AND hospital) AND department) AND planning) AND resource capacity)	1	0

#### Literature search: BSE

Search term:	Results	Selected	Comments
(((((((((((staff shift scheduling) OR nurse to patient ratio) OR nurse scheduling) OR midterm scheduling) OR nurse rostering) OR staffing levels) OR staff scheduling) OR staffing policy) AND hospital) AND department) AND planning) AND resource capacity) AND indicators	0	0	
(((((((((((staff shift scheduling) OR nurse to patient ratio) OR nurse scheduling) OR midterm scheduling) OR nurse rostering) OR staffing levels) OR staff scheduling) OR staffing policy) AND hospital) AND department) AND planning) AND resource capacity)	0	0	
(((((((((((staff shift scheduling) OR nurse to patient ratio) OR nurse scheduling) OR midterm scheduling) OR nurse rostering) OR staffing levels) OR staff scheduling) OR staffing policy) AND hospital) AND department) AND planning)	12	0	Cheng, 2016

#### Literature search: PubMed

Search term:	Results	Selected	Comments
(((((((((((("temporary capacity change") OR demand fluctuation) OR "dividing additional capacity") OR "response to demand fluctuation") OR "prevent superfluous staffing") OR "overflow scheduling") OR "cutting hospital resources") OR "reducing delay healthcare delivery") OR "temporary capacity expansion") OR "tactical increases capacity") AND hospital) AND department) AND planning) AND resource capacity) AND indicators	0	0	
(((((((((((("temporary capacity change") OR demand fluctuation) OR "dividing additional capacity") OR "response to demand fluctuation") OR "prevent superfluous staffing") OR "overflow scheduling") OR "cutting hospital resources") OR "reducing delay healthcare delivery") OR "temporary capacity expansion") OR "tactical increases capacity") AND hospital) AND department) AND planning) AND resource capacity)	0	0	
(((((((((((("temporary capacity change") OR demand fluctuation) OR "dividing additional capacity") OR "response to demand fluctuation") OR "prevent superfluous staffing") OR "overflow scheduling") OR "cutting hospital resources") OR	0	0	No relevant results
2	0		

"reducing delay healthcare delivery") OR "temporary capacity expansion") OR "tactical increases capacity") AND hospital) AND department) AND planning)

**Literature search: BSE**

**Search term:**

	<b>Results</b>	<b>Selected</b>	<b>Comments</b>
((((((((("temporary capacity change") OR demand fluctuation) OR "dividing additional capacity") OR "response to demand fluctuation") OR "prevent superfluous staffing") OR "overflow scheduling") OR "cutting hospital resources") OR "reducing delay healthcare delivery") OR "temporary capacity expansion") OR "tactical increases capacity") AND hospital) AND department) AND planning) AND resource capacity) AND indicators	0	0	
((((((((("temporary capacity change") OR demand fluctuation) OR "dividing additional capacity") OR "response to demand fluctuation") OR "prevent superfluous staffing") OR "overflow scheduling") OR "cutting hospital resources") OR "reducing delay healthcare delivery") OR "temporary capacity expansion") OR "tactical increases capacity") AND hospital) AND department) AND planning) AND resource capacity	0	0	
((((((((("temporary capacity change") OR demand fluctuation) OR "dividing additional capacity") OR "response to demand fluctuation") OR "prevent superfluous staffing") OR "overflow scheduling") OR "cutting hospital resources") OR "reducing delay healthcare delivery") OR "temporary capacity expansion") OR "tactical increases capacity") AND hospital) AND department) AND planning)	0	0	
((((((((("temporary capacity change") OR demand fluctuation) OR "dividing additional capacity") OR "response to demand fluctuation") OR "prevent superfluous staffing") OR "overflow scheduling") OR "cutting hospital resources") OR "reducing delay healthcare delivery") OR "temporary capacity expansion") OR "tactical increases capacity") AND hospital) AND department)	105	0	No relevant results

## Appendix 2 Search matrix

Literature search: PubMed			
Search term:	Results	Selected	Comments
((((((("Health Planning/organization and administration") OR "Hospital Administration") OR "Hospital Planning") OR "Health Resources") OR "Resource Allocation") OR "Quality Indicators") OR "Health Care") OR "Health Care Surveys") AND ("Models") OR "Frameworks" OR "questionnaire") AND ("Hospitals departments")	0		Filter: published after 01-01-02015
Search (((((("HOSPITAL administration") OR ("HOSPITAL surveys") OR ("OPERATIONS management") OR ("Capacity planning") OR ("Hospital planning") OR ("Planning") AND ("Framework") OR ("models") OR ("questionnaire") AND ("hospital departments") OR "hospitals") AND ("resource capacity planning")) Filters: Publication date from 2015/01/01	0		Filter: published after 01-01-02015
((((((("HOSPITAL administration") OR ("HOSPITAL surveys") OR ("OPERATIONS management") OR ("Capacity planning") OR ("Hospital planning") OR ("Planning") AND ("Framework") OR ("models") OR ("questionnaire") AND ("hospital departments") OR "hospitals") AND ("resource capacity planning")))) Filters: Publication date from 2015/01/01	48		Filter: published after 01-01-02015. Hupert, 2015
Literature search: BSE			
Search term:	Results	Selected	Comments
hospital administration OR hospital surveys OR operations management OR capacity planning OR Hospital planning OR planning AND framework OR model OR questionnaire AND hospital departments OR Hospitals AND resource capacity planning	163909	0	Too broad result range
hospital administration OR hospital surveys OR operations management OR capacity planning OR Hospital planning AND questionnaire AND hospital departments AND Hospitals AND resource capacity planning AND KW Hospital AND KW capacity planning	5607	0	
((((((("HOSPITAL administration") OR ("HOSPITAL surveys") OR ("OPERATIONS management") OR ("Capacity planning") OR ("Hospital planning") OR ("Planning") AND ("Framework") OR ("models") OR ("questionnaire") AND ("hospital departments") AND ("hospitals") AND ("resource capacity planning")))	62165	0	
TI (((((("HOSPITAL administration") OR ("HOSPITAL surveys") OR ("OPERATIONS management") OR ("Capacity planning") OR ("Hospital planning") OR ("Planning") AND ("Framework") OR ("models") OR ("questionnaire") AND ("hospital departments") AND ("hospitals") AND ("resource capacity planning")))	7753	0	

<p>("Hospital planning") OR ("Planning") AND ("Framework") OR ("models") OR ("questionnaire") AND ("hospital departments") AND ("hospitals") AND ("resource capacity planning")</p> <p>((((((("HOSPITAL administration") OR ("HOSPITAL surveys") OR ("OPERATIONS management") OR ("Capacity planning") OR ("Hospital planning") OR ("Planning") AND ("Framework") OR ("models") OR ("questionnaire") AND ("hospital departments") AND ("hospitals") AND ("resource capacity planning"))))</p> <p>AND KW Hospitals AND KW capacity planning</p>	2	1 Dellaert, 2016
<b>Literature search: ScienceDirect</b>		
Search term:	Results	Selected
Resource capacity planning AND Hospital department	35	Search field: Title, Abstract or Keywords. <b>Burdett, 2017; Burdett, 2016</b>
Resource capacity planning AND Hospital department	4	Search field: Title, Abstract or Keywords
Resource capacity planning AND Questionnaire	11	Search field: Title, Abstract or Keywords
Capacity planning AND Questionnaire	11	Search field: Title, Abstract or Keywords
Capacity planning AND Hospital Questionnaire	10	Search field: Title, Abstract or Keywords
"Capacity planning" AND "Hospitals"	98	Search field: Title, Abstract or Keywords.
Resource Capacity Hospitals AND Planning	19	Search field: Title, Abstract or Keywords.
measuring resources AND Hospitals	353	0

## Appendix 3 search matrix

Search terms	Results	Selected	Comments
((hospital [Title/Abstract]) OR hospital departments [Title/Abstract]) AND key performance indicators [Title/Abstract]	106	2	Hassanain, 2016; Sheng-Li, 2017; Hübner-Bloder, 2009
(efficiency [Title/Abstract]) AND key performance indicators [Title/Abstract]	46	1	Ningxuan Kang, 2017
(((efficiency [Title/Abstract]) AND key performance indicators [Title/Abstract])) AND hospital [Title/Abstract]	13	0	
(key performance indicators [Title/Abstract]) AND Hospital departments [Title/Abstract]	0	0	
((((((key performance indicators [Title/Abstract]) OR Quality indicators [Title/Abstract]) OR Performance indicators [Title/Abstract]) OR performance measures [Title/Abstract]) AND Hospitals [Title/Abstract]) OR Hospital departments [Title/Abstract])) AND Efficiency [Title/Abstract]	139	3	Ryan, 2017; Van Innerved, 2015; Simou 2014
((((((key performance indicators [Title/Abstract]) OR Quality indicators [Title/Abstract]) OR Performance indicators [Title/Abstract]) OR performance measures [Title/Abstract]) AND Hospitals [Title/Abstract]) OR Hospital departments [Title/Abstract])) AND Productivity [Title/Abstract]	36	0	
((performance assessment [Title/Abstract] AND hospitals [Title/Abstract])) AND Dashboard [Title/Abstract]	1	1	Veillard, 2005
Search (((((Healthcare)[Title/Abstract] OR Hospital) [Title/Abstract] OR Hospital department) [Title/Abstract] OR Hospital sector)) AND Benchmarking [Title/Abstract]	44	0	
(performance evaluation [Title/Abstract]) AND (((Healthcare)[Title/Abstract] OR Hospital) [Title/Abstract] OR Hospital department) [Title/Abstract] OR Hospital sector)	4	0	
Search terms	Results	Selected	Comments
Key performance indicators AND Hospital OR hospital departments	9891	0	Too broad search
AB Key performance indicators AND AB Hospital OR AB hospital departments	790	1	Yuwei, 2015
AB Key performance indicators AND AB performance measures AND AB Hospital OR AN Hospital department	10	0	

<b>Search terms</b>	<b>Results</b>	<b>Selected</b>	<b>Comments</b>
AB performance indicators AND AB performance measures AND AB Hospital OR AB Hospital department	2021		
AB performance indicators AND AB performance measures AND AB Hospital OR AB Hospital department AND evaluating	32		
AB performance indicators AND AB performance measures AND AB Hospital OR AB Hospital department AND evaluating AND efficiency	18		
AB performance indicators AND AB performance measurement AND AB Hospital OR AB Hospital department AND AB evaluating AND AB efficiency	7		
AB quality indicators OR AB performance indicators OR AB performance measurement AND AB efficiency OR AB productivity AND AB assessing AND AB hospital OR AB hospital departments AND AB quality control	9771		
AB quality indicators OR AB performance indicators AND AB performance measurement AND AB efficiency OR AB productivity AND AB assessing AND AB hospital AND AB hospital departments AND AB quality control	1994		
AB quality indicators AND AB performance indicators AND AB performance measurement AND AB efficiency OR AB productivity AND AB assessing AND AB hospital AND AB hospital departments AND AB quality control	2		
quality indicators in healthcare	41		
quality indicators in healthcare AND efficiency	3		
AB quality indicators AND AB efficiency AND hospital	13		
AB performance indicators AND AB hospital AND AB efficiency	19		
AB measuring performance AND AB efficiency AND AB hospital	7		
AB assessing performance AND AB efficiency AND AB hospital	1		
AB measuring AND AB hospital AND AB performance	89		
AB measuring AND AB hospital AND AB performance criteria	3		

TITLE-ABSTR-KEY (Key performance indicators) and TITLE-ABSTR-KEY (Hospital)	138	1	
TITLE-ABSTR-KEY (Performance indicator) and TITLE-ABSTR-KEY(Hospital).	526	0	
TITLE-ABSTR-KEY (Performance Measurement) and TITLE-ABSTR-KEY(Hospital).	809	1	Grigorouidis, 2011
TITLE-ABSTR-KEY (Performance Measures) and TITLE-ABSTR-KEY(Hospital).	13838	0	Too broad
TITLE-ABSTR-KEY (quality indicator) and TITLE-ABSTR-KEY(Hospital).	1310	0	
KEYWORDS (Performance indicator) and TITLE-ABSTR-KEY(Hospital).	51	0	
KEYWORDS(Hospital) and TITLE-ABSTR-KEY (efficiency) and TITLE-ABSTR-KEY(Indicator).	27	0	
KEYWORDS(Hospital) and TITLE-ABSTR-KEY (performance) and TITLE-ABSTR-KEY(Indicator) and TITLE-ABSTR-KEY (evaluation)	10		

## Appendix 4 Expert's feedback on Indicator selections

Table 26: Experts feedback on indicators

Indicator	Expert's feedback
Percentage of wrong placed patients	Make this indicator scalable
Mean admission days per bed	This indicator is depending on the patient type. Could better be measured by the difference between forecasted admission days (VOD) and actual admission days.
Mean admission day per nurse	Measure it per FTE, instead of Nurses
Capacity Utilization	Is mainly depending on two indicators above.
Revenue	Is not known on department level
Cost	Is not known on daily level

Table 27: Overview of expert's feedback on the indicators selected in the second feedback round

	Indicator	Feedback
Nursing department	Percentage of wrong placed patients	The amount of specialization of a department can influence the performance of this indicator. More specialist departments will be smaller and will bring more wrong placed patients. Other way round, if you never have wrong placed patients, you may have (too?) Large departments and thus (too?) High costs, because (too) low bed occupancy
	Mean length of stay	<ul style="list-style-type: none"> <li>There are many factors that affect the average length of stay and not just OM. Besides that, the definition must be more specific, how to deal with patients who are transferred to another department, and the definition of a hospital day (is it about hours or finite beds)</li> <li>How to compare the mean length of stay for departments with a difference in patient population.</li> </ul>
	Mean admission days per FTE	How are the FTEs calculated? Not all nurses have the same level of experience, and there are pupils working in the department
	Bed occupation	The definition of bed days must be more concrete. Is it about Hours or financial bed days? Bed occupancy is a result of a choice with regard to the trade-off between the chance of refusal and costs
	Staff absences due to sickness	<ul style="list-style-type: none"> <li>Application of OM does not lead to an increase in absenteeism</li> <li>OM has an influence on work-related absenteeism, but not on work-related absenteeism</li> </ul>
	Costs	<ul style="list-style-type: none"> <li>Good indicator but the link is not yet made with OM within the hospital</li> <li>Difficult to collect data about this</li> <li>Low costs do not have to be a good indication for a good OM</li> </ul>
Radiology department	Patient access time	Operations management is about determining the balance between acceptable access time for the patient and economical use of a good OM
	Patient waiting time	Utilization is a result of the consideration of acceptable waiting time or refusal chance in relation to the costs
	Equipment utilization (MRI, CT, Ultrasound)	How to deal with the difference of image quality
	Mean number of scans per FTE	How are the FTEs calculated? And how to deal with the difference of image quality.
	Staff absences due to sickness	<ul style="list-style-type: none"> <li>Application of OM does not lead to an increase in absenteeism</li> <li>OM has an influence on work-related absenteeism, but not on work-related absenteeism</li> </ul>
	Costs	<ul style="list-style-type: none"> <li>Good indicator but the link is not yet made with OM within the hospital</li> <li>Difficult to collect data about this</li> <li>Low costs do not have to be a good indication for a good OM</li> </ul>

## Appendix 5 RCP-Questionnaire

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### Start of Block: Introduction

Beste Heer/Mevrouw,

Deze vragenlijst bestaat uit vijf tot zes onderwerpen met betrekking op de toepassing van Operations Management. Voor elk onderwerp zijn stellingen opgesteld die bepalen in welke mate beleid voor het desbetreffende onderwerp aanwezig is en/of uitgevoerd wordt binnen de ziekenhuisafdeling. U wordt gevraagd voor elke stelling aan te geven in welke mate deze voor uw afdeling geldt. Dit gebeurt met een 4 puntenschaal. In deze schaal loopt van "Geen beleid aanwezig" tot en met "Beleid is duidelijk aanwezig". Hieronder staat een uitgebreide uitleg over verschillende niveaus van de schaal.

Interpretatie	Geen beleid aanwezig	Beleid is gedeeltelijk aanwezig	Beleid is aanwezig	Beleid is duidelijk aanwezig	Weet ik niet
Definitie	Geen overeenstemming over beleid. Beleid is niet geïmplementeerd. Geen draagvlak van het personeel.	Overeenstemming over het beleid, maar dit is niet schriftelijk vastgelegd. Beleid is gedeeltelijk geïmplementeerd. Matig draagvlak van het personeel.	Beleid is schriftelijk vastgelegd. Beleid is geïmplementeerd en wordt over het algemeen toegepast. Gemiddeld draagvlak van het personeel.	Beleid is schriftelijk vastgelegd en betrokkenen zijn er mee kennen het beleid. Beleid is geïmplementeerd en toegepast in vrijwel alle gevallen. Boven gemiddeld draagvlak van het personeel.	Geen informatie bekend.

Als laatste wordt u gevraagd naar de prestaties van uw afdeling. Eerst zal u gevraagd worden naar klein aantal prestatie-indicatoren. Daarna wordt uw mening gevraagd ten aanzien van de relevantie van de indicatoren. In geval van vragen en/of opmerkingen met betrekking tot deze vragenlijst kunt u contact opnemen met de onderzoeker, via [BJvanSchaik@rijnstate.nl](mailto:BJvanSchaik@rijnstate.nl)

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Q36 Wat is de naam van het ziekenhuis waar uw afdeling onderdeel van is?

---

Q37 Wat is de naam van uw afdeling waarvoor u de vragenlijst invult?

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Q1 Welke type ziekenhuisafdeling past het beste bij de afdeling waarvoor u deze vragenlijst invult?

Verpleegafdeling

Radiologie afdeling

End of Block: Introduction

Start of Block: Capacity (re)allocation PLAN



Q2

Capaciteitsverdeling - ontwikkelen en plannen  
De volgende stellingen hebben betrekking op het verdelen van de beschikbare zorgcapaciteit over verschillende patiëntengroepen voor de kortere termijn. Het gaat hierbij om het verkrijgen van een optimale balans tussen een effectief gebruik van de beschikbare capaciteit en het minimaliseren van de toegangstijden voor patiënten.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
De totale capaciteit voor electieve zorg (geen spoed) is bekend.					
De toekomstige capaciteit voor electieve zorg is nauwkeurig berekend.					
De totale vraag naar electieve zorg (geen spoed) is bekend.					
Toekomstige vraag naar electieve zorg (geen spoed) is nauwkeurig voorspeld/geschat.					
Totale vraag naar zorg per patiëntgroep is bekend.					
Er zijn prestatiedoelstellingen vastgesteld voor de benuttingsgraad van de capaciteit op de afdeling.					
Er zijn prestatiedoelstellingen vastgesteld voor het reguleren van bezettingsgraad op de afdeling.					
Er zijn prestatiedoelstellingen vastgesteld voor de winstgevendheid van de afdeling.					
Er is beleid aanwezig voor de wachttijd van verschillende patiëntengroepen.					
Er zijn prestatiedoelstellingen vastgesteld per patiëntgroep en gebaseerd op de karakteristieken van de groep.					
Er zijn prestatiedoelstellingen vastgesteld voor het gebruik van de capaciteit op de afdeling. Deze is gebaseerd op de karakteristieken van de gebruiker.					
Beschikbare capaciteit wordt toegewezen aan verschillende patiëntengroepen.					

De capaciteit op de afdeling wordt toegewezen op basis van berekeningen om prestatiedoelstellingen te behalen.

Het beleid voor de toewijzing van capaciteit is gebaseerd op de toekomstige capaciteit voor zorg.

In het beleid voor verdeling van capaciteit op de afdeling wordt rekening gehouden met veranderingen in de vraag naar zorg als gevolg van seizoen veranderingen.

In het beleid voor de verdeling van capaciteit is er rekening gehouden met spoedgevallen.

Bij herverdeling van capaciteit wordt rekening gehouden met patiëntgroepen die lang op de wachttlijst zijn geweest.

Er is beleid aanwezig voor de herverdeling van capaciteit bij een te lage benutting.

In het beleid over herverdeling van middelen zijn heldere regels opgenomen.

De gestelde doelen voor toewijzing van capaciteit zijn tot stand gekomen door samenwerking met andere betrokken afdelingen.

Het beleid voor toewijzing van capaciteit is tot stand gekomen door samenwerking met betrokken afdelingen.

End of Block: Capacity (re)allocation PLAN

Start of Block: Capacity (re)allocation DO

X→

Q3

#### Capaciteitsverdeling

De volgende stellingen hebben betrekking op het verdelen van de beschikbare zorgcapaciteit over verschillende patiëntengroepen voor de kortere termijn. Het gaat hierbij om het verkrijgen van een optimale balans tussen een effectief gebruik van de beschikbare capaciteit en het minimaliseren van de toegangstijden voor patiënten.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Er is besluitvorming over de (her)verdeling van capaciteit.					
Informatiesystemen worden gebruikt bij het maken van besluiten over capaciteitsverdeling.					
Informatiesystemen maken gebruik van real-time informatie.					
Het is vastgesteld welke afdelingen voorrang krijgen in de verdeling van capaciteit.					
Informatiesystemen leveren capaciteitsplanners suggesties voor optimale capaciteitsverdelingen.					
Het capaciteitsbeleid is geïmplementeerd in samenwerking met alle betrokken afdelingen.					
Prestatiegegevens worden onderling gedeeld met alle betrokken afdelingen.					
Besluitvorming over capaciteitsverdeling wordt centraal uitgevoerd.					
Centrale besluitvorming wordt door alle betrokken afdelingen gerespecteerd.					
Gegevens over actuele capaciteit voor electieve zorg wordt verzameld.					

End of Block: Capacity (re)allocation DO

Start of Block: Capacity (re)allocation Check/Act

Q4

Capaciteitsverdeling - controleren en bijsturen  
 De volgende stellingen hebben betrekking op het verdelen van de beschikbare zorgcapaciteit over verschillende patiëntengroepen voor de kortere termijn. Het gaat hierbij om het verkrijgen van een optimale balans tussen een effectief gebruik van de beschikbare capaciteit en het minimaliseren van de toegangstijden voor patiënten.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Het wordt gecontroleerd of doelstellingen, met betrekking op de verdeling van capaciteit, zijn behaald.					
Verwachte benodigde capaciteit wordt vergeleken met de werkelijk benodigde capaciteit.					
De verwachte zorgvraag wordt vergeleken met de werkelijke zorgvraag.					
De toepasbaarheid van de (her)verdelingsregels van capaciteit worden gecontroleerd.					
Prestaties op capaciteitsbezetting worden geanalyseerd.					
Prestaties in toegangstijden van patiënten worden geanalyseerd.					
Variaties in capaciteitsbezettingen worden geanalyseerd.					
Variaties in toegangstijden van patiënten worden geanalyseerd.					
Berekeningsmethoden voor de capaciteitsverdeling worden geanalyseerd.					
Richtlijnen voor de capaciteitsverdeling worden gecontroleerd op toepasbaarheid.					
Verdeling van patiëntengroepen wordt gecontroleerd op toepasbaarheid.					
Doelstellingen voor de capaciteitsverdeling worden structureel met alle betrokken afdelingen geëvalueerd.					
Samenwerking met andere afdelingen wordt structureel geëvalueerd.					

End of Block: Capacity (re)allocation Check/Act

Start of Block: Admission control Plan

X→

Q8 Opnamebeleid - ontwikkelen en plannen  
De volgende stellingen hebben betrekking op het opnamebeleid voor patiënten. Hiermee wordt het beleid bedoeld wat helpt bepalen volgens welke wijze, en hoeveel patiënten kunnen worden opgenomen. Met als doel een effectief gebruik van capaciteit, lage toegangstijden voor spoed patiënten en een gelijkmatig verdeelde patiënten instroom.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Wachtlijsten worden gebruikt op de afdeling om de vraag naar opname in de hand te houden.					
Er zijn duidelijke regels gesteld over wanneer een spoed patiënt voorrang heeft op een niet-spoed patiënt.					
In het beleid zijn verschillende gradaties van spoed patiënten opgenomen.					
In het opnamebeleid is vastgesteld welke niet-spoed patiënt van de wachtlst opgenomen wordt op de afdeling.					
In het opnamebeleid zijn doelen vastgesteld voor maximale aantal annuleringen.					
In het opnamebeleid zijn doelen vastgesteld voor maximale toegangstijd.					
In het opnamebeleid zijn doelen vastgesteld voor de benutting van capaciteit.					
Het verminderen van variatie in de vraag naar zorg is opgenomen in het opnamebeleid.					
In het beleid is het maximumaantal opnames van patiënten opgenomen om ruimte over te houden voor spoed patiënten.					
Regels voor overboeken zijn vastgesteld.					

In het beleid zijn regels opgenomen om patiënten op te roepen (call-in).

In het beleid zijn regels vastgesteld rondom overname van patiënten van andere ziekenhuisafdelingen.

Opnameregels vastgesteld met als doel om doorstroom van patiënten tussen verschillende afdelingen te verbeteren.

Berekeningen worden gebruikt om de doelen rondom optimaal beleid te behalen.

Doelen voor opnamebeleid zijn tot stand gekomen door samenwerking met gerelateerde afdelingen.

Opnameregels zijn tot stand gekomen in samenwerking met gerelateerde afdelingen.

End of Block: Admission control Plan

Start of Block: Admission control Do



Q9 Opnamebeleid - uitvoering De volgende stellingen hebben betrekking op het opnamebeleid voor patiënten. Hiermee wordt het beleid bedoelt wat helpt bepalen volgens welke wijze, en hoeveel patiënten kunnen worden opgenomen. Met als doel een effectief gebruik van capaciteit, lage toegangstijden voor spoed patiënten en een gelijkmatig verdeelde patiënten instroom.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Opnamerichtlijnen worden actief toegepast.					
Opnamebesluiten worden genomen door centrale coördinatoren.					
Informatiesystemen worden gebruikt bij het maken van opnamebesluiten.					
Informatiesystemen bevatten real-time informatie.					

Gegevens over toegangstijden van patiënten worden verzameld.

Gegevens over wachttijden van patiënten worden verzameld.

Gegevens over benutting van de opnamecapaciteit worden verzameld.

Gegevens over annuleringen als gevolg van bedblokkades worden verzameld.

Gegevens over hoge variaties in de capaciteitsbezetting worden verzameld.

Gegevens worden verzameld over wanneer en waarom personeel regels heeft genegeerd.

Informatiesystemen leveren opnameplanners optimale opnamen oplossingen.

Opnamenbeleid is geïmplementeerd in samenwerking met alle betrokken afdelingen.

Gegevens over de prestaties van alle betrokken afdelingen worden onderling gedeeld.

Besluitvorming over opnamebeleid wordt centraal uitgevoerd.

Centrale besluitvorming wordt door alle betrokken afdelingen gerespecteerd.

End of Block: Admission control Do

Start of Block: Admission control Check/Act



Q10 Opnamebeleid - controleren en bijsturenDe volgende stellingen hebben betrekking op het opnamebeleid voor patiënten. Hiermee wordt het beleid bedoelt wat helpt bepalen volgens welke wijze, en hoeveel patiënten kunnen worden opgenomen. Met als doel een effectief gebruik van capaciteit, lage toegangstijden voor spoed patiënten en een gelijkmatig verdeelde patiënten instroom.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Opnamerichtlijnen worden structureel geanalyseerd om ze te verbeteren.					
Gegevens over toegangstijden van patiënten worden geanalyseerd.					
Gegevens over wachttijden van patiënten worden geanalyseerd.					
Gegevens over de benutting van opnamen capaciteit worden geanalyseerd.					
Gegevens over annuleringen als gevolg van bedblokkades worden geanalyseerd.					
Gegevens over hoge variaties in de capaciteitsbezetting worden geanalyseerd.					
Gegevens over wanneer en waarom personeel regels negeert, worden geanalyseerd.					
Toepasbaarheid van de opnamerichtlijnen worden geanalyseerd.					
Doelstellingen van de opnameplanning worden structureel geëvalueerd met alle betrokken afdelingen.					
Samenwerking met andere afdelingen wordt structureel geëvalueerd.					

End of Block: Admission control Check/Act

Start of Block: Bed assignment Plan



Q14 Bed toewijzing - ontwikkelen en plannen  
De volgende stellingen hebben betrekking op de toewijzing van ziekenhuisbedden. Hiermee wordt het beleid bedoeld dat de toewijzing van een specifiek bed aan een specifieke patiënt beschrijft. Met als doel een optimale balans tussen het gebruik van de capaciteit en een lage

weiger- of annuleringscijfers voor patiënten.  
Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Er zijn vastgesteld quota's voor maximale bedbezetting om ruimte te houden voor spoed patiënten.					
Bij het toewijzen van patiënten aan bedden wordt rekening gehouden met de werkdruk op de verschillende afdelingen.					
In klinische richtlijnen is vastgesteld wanneer een patiënt een specifiek type bed nodig heeft.					
Patiënten voorkeuren voor specifieke kamers worden meegenomen in het beleid (operationeel niveau)					
In het beleid zijn regels opgesteld voor tijdelijk gebruiken van capaciteit op andere afdelingen in het geval van variatie in de zorgvraag (operationeel niveau).					
In het beleid zijn regels vastgesteld wanneer patiënten eerder ontslagen worden in het geval een bed vrij gemaakt moet worden.					
Bedplanning is gecoördineerd via operatiekamerplanning.					
In het beleid is operatiekamerplanning leidend over bedplanning.					
De gestelde doelen voor bedplanning zijn tot stand gekomen door samenwerking met andere gerelateerde afdelingen.					
Beleid voor bedplanning is tot stand gekomen in samenwerking met gerelateerde afdelingen.					

End of Block: Bed assignment Plan

Start of Block: Bed assignment Do



**Q15 Bed toewijzing - uitvoering** De volgende stellingen hebben betrekking op de toewijzing van ziekenhuisbedden. Hiermee wordt het beleid bedoelt dat de toewijzing van een specifiek bed aan een specifieke patiënt beschrijft. Met als doel een optimale balans tussen het gebruik van de capaciteit en een lage weiger- of annuleringscijfers voor patiënten. Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Bedplanners worden voorzien van een geautomatiseerd planningssysteem dat helpt de bedden optimaal te verdelen.					
Real-time informatie over de bedbezetting is beschikbaar in het planningssysteem.					
Het planningssysteem genereert optimale planningsvoorstellen op basis van de prestatiedoelen.					
Beleid is geïmplementeerd in samenwerking met alle betrokken afdelingen.					
Gegevens over de prestaties van alle betrokken afdelingen worden onderling gedeeld.					
Besluitvorming over het toewijzen van bedden wordt centraal gecoördineerd.					
Centrale besluitvorming wordt door alle betrokken afdelingen gerespecteerd.					

End of Block: Bed assignment Do

Start of Block: Bed assignment Check/Act



**Q16 Bed toewijzing - controleren en bijsturen** De volgende stellingen hebben betrekking op de toewijzing van ziekenhuisbedden. Hiermee wordt het beleid bedoelt dat de toewijzing van een specifiek bed aan een specifieke patiënt beschrijft. Met als doel een optimale balans tussen het gebruik van de capaciteit en een lage weiger- of annuleringscijfers voor patiënten.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
<p>Prestaties van de bedplanning worden geanalyseerd met als doel deze te verbeteren.</p> <p>Bedbezetting wordt geanalyseerd.</p> <p>Annuleringen als gevolg van bedden tekort worden geanalyseerd.</p> <p>Hoge variaties in bedbezettingen worden geanalyseerd.</p> <p>Bed-planningsmethodes worden geanalyseerd om deze te verbeteren wanneer dat nodig is.</p> <p>Toepasbaarheid van het bedplanningsbeleid wordt geëvalueerd.</p> <p>Het bereiken van planningsdoelstellingen wordt structureel geëvalueerd met alle betrokken afdelingen.</p> <p>Samenwerking met andere afdelingen wordt structureel geëvalueerd.</p>					

End of Block: Bed assignment Check/Act

Start of Block: Patient routing Plan



Q11 Patiënten doorstroom - ontwikkelen en plannen De volgende stellingen hebben betrekking op het gebruik van zorgpaden. Hiermee wordt de optimalisatie van de volgorde en verdeling van taken in de behandeling (zorgpaden) van de patiënten bedoeld. Met als doel dat aan alle medische vereisten wordt voldaan en er effectief en efficiënt gebruik wordt gemaakt van de capaciteit. Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
<p>Het merendeel van de zorgpaden zijn grafisch in kaart gebracht.</p>					

De zorg van de meeste patiëntengroepen (>70%) is ondergebracht in zorgpaden.

Activiteiten en taken in zorgpaden zijn vastgesteld.

Doelen zijn vastgesteld voor toegangstijd van patiëntengroepen. Deze doelen zijn onderdeel van het beleid.

Doelen zijn vastgesteld voor wachttijden in een zorgpad. Deze doelen zijn onderdeel van het beleid.

Doelen voor bezetting zijn opgenomen in het beleid.

Zorgpaden worden continu geoptimaliseerd om de gestelde doelen te behalen.

Mogelijkheden om activiteiten parallel te laten plaatsvinden, zijn onderzocht.

Het structureel weghalen van mogelijke blokkades in de zorgpaden (bottlenecks) is in het beleid opgenomen.

Nauwkeurige berekeningen zijn gebruikt om optimale zorgpaden te organiseren.

Doelen voor het organiseren van zorgpaden zijn tot stand gekomen door samenwerking met gerelateerde afdelingen.

Beleid is tot stand gekomen in samenwerking met gerelateerde afdelingen.

End of Block: Patient routing Plan

Start of Block: Patient routing Do

X→

**Q12 Patiënten doorstroom - uitvoering** De volgende stellingen hebben betrekking op het gebruik van zorgpaden. Hiermee wordt de optimalisatie van de volgorde en verdeling van taken in de behandeling (zorgpaden) van de patiënten bedoeld. Met als doel dat aan alle medische vereisten wordt voldaan en er effectief en efficiënt gebruik wordt gemaakt van de capaciteit.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Vastgelegde zorgpaden zijn geïmplementeerd.					
Gegevens over de doorlooptijd van de patiënt worden verzameld.					
Gegevens over toegangstijden van patiënten worden verzameld.					
Gegevens over wachttijden van patiënten worden verzameld.					
Gegevens over productieantallen worden verzameld.					
Gegevens over de gemaakte overuren door het personeel worden verzameld.					
Gegevens over de capaciteitsbezetting worden verzameld.					
Gegevens over blokkades in het zorgtraject binnen de afdeling worden verzameld.					
Gegevens over blokkades in het zorgtraject veroorzaakt door ander afdelingen worden verzameld.					
Gegevens over variaties in de werkbelasting die worden veroorzaakt door upstream-fases of afdelingen worden verzameld.					
Gegevens over variaties in de werkbelasting die worden veroorzaakt door downstream-fases of afdelingen worden verzameld.					
Beleid is geïmplementeerd in samenwerking met alle betrokken afdelingen.					

Gegevens over de prestaties van alle betrokken afdelingen worden onderling gedeeld.

Besluitvorming over zorgpaden wordt centraal gecoördineerd.

Centrale besluitvorming wordt door alle betrokken afdelingen gerespecteerd.

End of Block: Patient routing Do

Start of Block: Patient routing Check/Act



Q13 Patiënten doorstroom - controleren en bijsturenDe volgende stellingen hebben betrekking op het gebruik van zorgpaden. Hiermee wordt de optimalisatie van de volgorde en verdeling van taken in de behandeling (zorgpaden) van de patiënten bedoelt. Met als doel dat aan alle medische vereisten wordt voldaan en er effectief en efficiënt gebruik wordt gemaakt van de capaciteit.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Zorgpaden worden structureel geanalyseerd met het doel deze te verbeteren.					
Prestaties op toegangstijden van patiënten worden geanalyseerd.					
Prestaties op wachttijden van patiënten worden geanalyseerd.					
Prestaties op productieantallen worden geanalyseerd.					
Prestaties op gemaakte overuren worden geanalyseerd.					
Prestaties op capaciteitsbezetting worden geanalyseerd.					
Mogelijkheden om variaties in werkbelasting te verminderen, worden geanalyseerd.					

Oorzaken van blokkades binnen zorgpaden worden geanalyseerd.

Analyses worden gebruikt om zorgpaden te herzien wanneer dat nodig is.

Doelstellingen van de planning worden structureel geëvalueerd met alle betrokken afdelingen.

Samenwerking met andere afdelingen wordt structureel geëvalueerd.

End of Block: Patient routing Check/Act

Start of Block: Discharge planning Plan



Q17

Ontslag beleid - ontwikkelen en plannen  
De volgende stellingen hebben betrekking op het beleid dat ervoor zorgt dat individuele patiënten worden ontslagen als ze klinisch in staat zijn om het ziekenhuis te verlaten. Met als doel onnodige bed blokkades te voorkomen en heropnames te minimaliseren.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Het vooraf bepalen van een ontslagdatum voor elke patiënt is opgenomen in het beleid.					
In klinische richtlijnen is vastgesteld wanneer een patiënt ontslagen mag worden.					
Bij het vaststellen van de verwachte ontslagdatum wordt rekening gehouden met symptomen van de patiënt.					
Bij het vaststellen van de verwachte ontslagdatum wordt rekening gehouden met de leeftijd van de patiënt.					

Bij het vaststellen van de verwachte ontslagdatum wordt rekening gehouden met het geslacht van de patiënt.

Bij het vaststellen van de verwachte ontslagdatum wordt rekening gehouden met het gewicht van de patiënt.

Doelstellingen zijn vastgesteld voor maximaal aantal heropnames.

Doelstellingen zijn vastgesteld voor maximum aantal bed blokkades.

Één persoon binnen de afdeling is verantwoordelijk voor de coördinatie van het ontslag van de patiënt.

De huisarts van de patiënt is betrokken bij de ontslag van de patiënt (indien nodig).

De apotheker van de patiënt is betrokken bij de ontslag van de patiënt (indien nodig).

De familie van de patiënt is betrokken bij de ontslag van de patiënt (indien nodig).

De patiënt zelf is betrokken bij zijn/haar ontslag.

Checklists zijn opgenomen in de ontslagplanning.

Zorg na ziekenhuisopname wordt tijdig aangevraagd om verkeerde beddagen te kunnen voorkomen.

Ontslagdata worden structureel gereviseerd om te garanderen dat de data juist zijn.

Doelen voor het ontslagbeleid zijn tot stand gekomen door samenwerking met gerelateerde afdelingen.

Beleid is tot stand gekomen in samenwerking met gerelateerde afdelingen.

End of Block: Discharge planning Plan

Start of Block: Discharge planning Do

X→

Q18

Ontslag beleid - uitvoering  
De volgende stellingen hebben betrekking op het beleid dat ervoor zorgt dat individuele patiënten worden ontslagen als ze klinisch in staat zijn om het ziekenhuis te verlaten. Met als doel onnodige bed blokkades te voorkomen en heropnames te minimaliseren.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid aanwezig duidelijk	Weet ik niet
Het aantal heropnames binnen een termijn van drie dagen wordt gemeten.					
Het aantal bedblokkades wordt gemeten.					
Beleid is geïmplementeerd in samenwerking met alle betrokken afdelingen.					
Informatie over de prestaties van de betrokken afdelingen wordt onderling gedeeld.					
Besluitvorming over ontslagbeleid wordt centraal gecoördineerd.					
Centrale besluitvorming wordt door alle betrokken afdelingen gerespecteerd.					

End of Block: Discharge planning Do

Start of Block: Discharge planning Check/Act

X→

Q19

Ontslag beleid - controleren en bijsturen De volgende stellingen hebben betrekking op het beleid dat ervoor zorgt dat individuele patiënten worden ontslagen als ze klinisch in staat zijn om het ziekenhuis te verlaten. Met als doel onnodige bed blokkades te voorkomen en

heropnames te minimaliseren.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Ontslagplanning wordt structureel geanalyseerd met als doel het ontslagbeleid te verbeteren.					
Prestaties op doelstellingen van het aantal heropnames worden geanalyseerd.					
Prestaties op doelstellingen van het aantal bedblokkades worden geanalyseerd.					
Communicatie tussen alle betrokkenen bij het patientontslag wordt geëvalueerd.					
De volledigheid van de checklist voor de ontslagplanning wordt geëvalueerd.					
Toepasbaarheid van regels over de ontslagplanning worden geëvalueerd.					
Het bereiken van planningsdoelstelling wordt structureel geëvalueerd met alle betrokken afdelingen.					
Samenwerking met andere afdelingen wordt structureel geëvalueerd.					

End of Block: Discharge planning Check/Act

Start of Block: Tactical Staff scheduling Plan



Q23 Tactische personeelsplanning - ontwikkelen en plannen De volgende stellingen hebben betrekking op de personeelsplanning op tactisch niveau. Hiermee wordt het beleid bedoeld dat tot een half jaar vooruit wordt toegepast om de personeelsplanning te laten aansluiten op de verwachte zorgvraag. Met als doel een goede balans te vinden tussen kosten, patiënt- en personeelsuitkomsten en wetgeving. Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Totale capaciteit van verpleegkundig personeel is bekend.					
In het beleid is een specifieke ratio van het aantal patiënten per verpleegkundigen vastgesteld.					
Er zijn gegevens beschikbaar over de vaardighedsmix van het verpleegkundig personeel.					
De toekomstige vraag naar personeel is nauwkeurig voorspeld.					
Bij het vaststellen van de benodigde capaciteit van het personeel wordt rekening gehouden met de benodigde vaardighedsmix van het personeel.					
Flexibiliteit van personeel wordt gebruikt om rekening te houden met variatie in de vraag.					
In het beleid wordt rekening gehouden met de huidige personeelscontracten.					
In het beleid is rekening gehouden met de wet- en regelgeving.					
De benodigde inwerkijd voor het opleiden van het personeel is vastgesteld.					
De benodigde vraag naar personeel is gebaseerd op de verwachte zorgbehoefte van de diverse patiëntengroepen van de afdeling.					
Het standaard dienstrooster is gebaseerd op de verwachte vraag naar zorg.					
Het standaard dienstrooster is gebaseerd op de verwachte behoefte aan bepaalde vaardigheden van medewerkers.					
Tevredenheid van personeel is opgenomen in het beleid voor personeelsplanning.					

In het beleid zijn doelstellingen geformuleerd om onder- en overbezetting te minimaliseren.

Doelen zijn vastgesteld voor personeelskosten.

De gestelde doelen voor personeelsplanning zijn tot stand gekomen door samenwerking met andere gerelateerde afdelingen.

Personeelsbeleid is tot stand gekomen in samenwerking met gerelateerde afdelingen.

End of Block: Tactical Staff scheduling Plan

Start of Block: Tactical Staff scheduling Do

X→

Q24

Tactische personeelsplanning - uitvoering De volgende stellingen hebben betrekking op de personeelsplanning op tactisch niveau. Hiermee wordt het beleid bedoelt dat tot een half jaar vooruit wordt toegepast om de personeelsplanning te laten aansluiten op de verwachte zorgvraag. Met als doel een goede balans te vinden tussen kosten, patiënt- en personeelsuitkomsten en wetgeving.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Informatie over de prestaties van de personeelsplanning wordt verzameld.					
Informatie over de door het personeel gemaakte overuren wordt verzameld.					
Informatie omtrent de over- en onderbezetting van het personeel wordt verzameld.					
Informatie over de gemaakte personeelskosten wordt verzameld.					
Informatie over de actuele bezettingsbehoefte wordt verzameld.					

Beleid is geïmplementeerd in samenwerking met alle betrokken afdelingen.

informatie over de prestaties van de betrokken afdelingen wordt onderling gedeeld.

Besluitvorming over personeelsplanning wordt centraal gecoördineerd.

Centrale beleidsvorming wordt door alle betrokken afdelingen gerespecteerd.

End of Block: Tactical Staff scheduling Do

Start of Block: Tactical Staff scheduling Check/Act



Q25

Tactische personeelsplanning - controleren en bijsturen De volgende stellingen hebben betrekking op de personeelsplanning op tactisch niveau. Hiermee wordt het beleid bedoelt dat tot een half jaar vooruit wordt toegepast om de personeelsplanning te laten aansluiten op de verwachte zorgvraag.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Het beleid voor de personeelsplanning wordt structureel geëvalueerd met als doel het te verbeteren.					
Evaluatie van het beleid vindt (tenminste) op jaarlijkse basis plaats.					
Prestaties op de gemaakte personeelskosten worden geanalyseerd.					
Prestaties op de door het personeel gemaakte overuren worden geanalyseerd.					
Hoge variaties in de gemaakte overuren worden geanalyseerd.					

Onder- en/of overbezetting van het personeel wordt geanalyseerd.

Verschil tussen verwachte en werkelijk personeelsbehoefte wordt geanalyseerd.

De uitkomsten van evaluaties worden gebruikt om planningsmethodes te herzien wanneer dat nodig is.

Het bereiken van planningsdoelstellingen wordt structureel geëvalueerd met alle betrokken afdelingen.

Samenwerking met andere afdelingen wordt structureel geëvalueerd.

End of Block: Tactical Staff scheduling Check/Act

Start of Block: Operational Staff scheduling Plan



Q26 Operationele personeelsplanning - ontwikkelen en plannen De volgende stellingen hebben betrekking op de personeelsplanning op operationeel niveau. Hiermee wordt het beleid bedoeld dat wordt toegepast om een actuele personeelsplanning (voor de aankomende week) te laten aansluiten op de verwachte zorgvraag.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Er is beleid/regels geformuleerd om verpleegkundigen te plannen voor specifieke diensten.					
Er is beleid/regels geformuleerd om verpleegkundigen de kans te geven om diensten te kiezen op basis van hun eigen voorkeur.					
In het beleid wordt op operationeel niveau rekening gehouden met wet- en regelgeving.					
Er is beleid geformuleerd om minimaal eens per zes weken een nieuwe rooster te maken (operationeel niveau)					

In het beleid zijn regels geformuleerd om te anticiperen op de afwezigheid van het personeel.

Van het personeel is bekend wie breder inzetbaar is en op verschillende afdelingen kan werken.

Er is een poule van verpleegkundigen aanwezig in geval van onderbezetting.

In het beleid is personeelstevredenheid vastgesteld (operationeel niveau).

Er zijn doelen vastgesteld voor een balans tussen de capaciteit van personeel en patiënt uitkomsten (operationeel niveau).

De gestelde doelen voor personeelsplanning zijn tot stand gekomen door samenwerking met andere gerelateerde afdelingen.

End of Block: Operational Staff scheduling Plan

Start of Block: Operational Staff scheduling Do



Q27

Operationele personeelsplanning - uitvoering  
De volgende stellingen hebben betrekking op de personeelsplanning op operationeel niveau.  
Hiermee wordt het beleid bedoeld dat wordt toegepast om een actuele personeelsplanning (voor de aankomende week) te laten aansluiten op de verwachte zorgvraag.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Planningsbeleid is vastgesteld in samenspraak met alle betrokken afdelingen.					
Personenplanning wordt centraal binnen de organisatie gecoördineerd.					
Planners hebben een geautomatiseerd					

ondersteuningssysteem tot hun beschikking.

Planningssysteem maakt gebruik van real-time informatie.

Dit systeem genereert een optimale planningsoplossingen.

Beleid is geïmplementeerd in samenwerking met alle betrokken afdelingen.

Gegevens over de prestaties van alle betrokken afdelingen wordt onderling gedeeld.

Besluitvorming voor de personeelsplanning op operationeel niveau wordt centraal gecoördineerd.

Centrale beleidsvorming wordt door alle betrokken afdelingen gerespecteerd.

End of Block: Operational Staff scheduling Do

Start of Block: Operational Staff scheduling Check/Act



Q28 Operationele personeelsplanning - controleren en bijsturen  
De volgende stellingen hebben betrekking op de personeelsplanning op operationeel niveau. Hiermee wordt het beleid bedoeld dat wordt toegepast om een actuele personeelsplanning (voor de aankomende week) te laten aansluiten op de verwachte zorgvraag.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

		Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Personelstevredenheid onderzocht.	wordt					

De gemeten personeelstevredenheid wordt gebruikt om het planningsbeleid te verbeteren.

Het bereiken van planningsdoelstellingen wordt structureel geëvalueerd met alle betrokken afdelingen.

Samenwerking met andere afdelingen wordt structureel geëvalueerd.

End of Block: Operational Staff scheduling Check/Act

Start of Block: Indicators Nursing

Q29 Gemiddeld aantal opnames per bed  
Definitie van een patient opnamenKlinische opname: een verblijf waarvoor één of meer verpleegdagen worden geregistreerd of  
Dagverpleging: Een aantal uren durende vorm van verpleging op een voor dagverpleging ingerichte afdeling

Totaal aantal opgenomen patiënten op uw afdeling in financieel jaar 2017. \_\_\_\_\_

Het maximale aantal bedden dat in financieel jaar 2017, beschikbaar is geweest op de afdeling.

Q30 Percentage vreemd liggers op de ziekenhuis afdeling

Totaal aantal patiënten opgenomen op de afdeling, die op basis van hun diagnose op ander afdeling zouden moeten zijn opgenomen.

Q31 Gemiddelde bedbezetting

Het totaal aantal geleverde beddagen (Finclie beddagen) op de ziekenhuis afdeling.

Q32 Gemiddeld aantal opnames per FTE

Totaal aantal Fte's van Hbo-plus opgeleide verpleegkundig personeel ingezet op afdeling in financieel jaar 2017.

Totaal aantal Fte's van Hbo opgeleid verpleegkundig personeel ingezet op afdeling in financieel jaar 2017.

Totaal aantal Fte's van Mbo opgeleid verpleegkundig personeel ingezet op afdeling in financieel jaar 2017.

Totaal aantal Fte's van anders opgeleid verpleegkundig personeel ingezet op afdeling in financieel jaar 2017.

Q33                      Gemiddelde                      kosten                      per                      patiëntopname

Totale gemaakte personeelskosten in financieel jaar 2017. \_\_\_\_\_

Q49                      Ziekteverzuim

Totaal aantal ziektedagen gemaakt door verpleegkundige personeel op de afdeling in financieel jaar 2017  
\_\_\_\_\_

End of Block: Indicators Nursing

Start of Block: Importance ranking indicator Nursing

Q35 Geef aan, op een schaal van 0 tot en met 100, in welke mate een indicator het effect van Operations Management op de prestaties van de ziekenhuisafdeling representeert.

Hierbij staat een score van 100 punten voor een sterke representatie en 0 punten voor een zwakke representatie.

\_\_\_\_\_ Percentage vreemdliggers op de ziekenhuis afdeling

\_\_\_\_\_ Gemiddeld aantal opnames per dag

\_\_\_\_\_ Gemiddeld aantal opnames per FTE

\_\_\_\_\_ Gemiddelde bedbezetting

\_\_\_\_\_ Gemiddelde kosten per opnamen

End of Block: Importance ranking indicator Nursing

Start of Block: Access policy Plan



Q5                      Toegangsbeleid                      ontwikkelen                      en                      plannen

De volgende stellingen hebben betrekking op de toegangsbeleid. Hiermee wordt het beleid bedoeld dat betrekking heeft op de manieren waarop patiënten toegang kunnen krijgen tot de faciliteit om de zorg te ontvangen. Met als doel een goede balans tussen capaciteitsbezettingen, toegangs- en wachttijden en lage variabiliteit in patiënten aanbod.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Er is beleid aanwezig voor toegang van de patiënt tot de afdeling.					
Er zijn doelen vastgesteld voor de wachttijden op de afdeling.					

Er zijn doelen vastgesteld voor benutting van de capaciteit op de afdeling.

Er zijn doelen vastgesteld voor patiënttevredenheid op de afdeling.

Er zijn doelen vastgesteld voor overwerk op de afdeling.

Beleid met betrekking tot volledige inloop is opgenomen in toegangsbeleid.

Er wordt rekening gehouden met de balans tussen de vraag en aanbod in het toegangsbeleid.

Er is rekening gehouden met werkdruk van personeel bij het opzetten van toegangsbeleid.

Er is rekening gehouden met wachttijd tussen twee opeenvolgende patiënten bij het opzetten van toegangsbeleid.

De benodigde flexibiliteit van personeel en overwerk is meegenomen in het toegangsbeleid.

Patiënt voorkeuren wat betreft doorlooptijden zijn opgenomen in het toegangsbeleid.

Er wordt rekening gehouden met het no show percentage in het toegangsbeleid.

De medische behoefte voor geplande afspraken is opgenomen in het toegangsbeleid.

Berekeningen worden gebruikt om de doelen rondom toegangsbeleid te behalen.

Doelen voor toegangsbeleid zijn tot stand gekomen door samenwerking met betrokken afdelingen.

End of Block: Access policy Plan

Start of Block: Access policy Do

X

Q6

Toegangsbeleid - uitvoering De volgende stellingen hebben betrekking op de toegangsbeleid. Hiermee wordt het beleid bedoelt dat betrekking heeft op de manieren waarop patiënten toegang kunnen krijgen tot de faciliteit om de zorg te ontvangen. Met als doel een goede balans tussen capaciteitsbezettingen, toegangs- en wachttijden en lage variabiliteit in patiënten aanbod.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Het toegangsbeleid wordt actief gebruikt.					
Gegevens over hoge variaties in de bezettingen (veroorzaakt door beleid) worden verzameld.					
Gegevens over toegangstijden van patiënten worden verzameld.					
Gegevens over wachttijden van patiënten worden verzameld.					
Gegevens over de capaciteitsbezetting worden verzameld.					
Gegevens over overuren worden verzameld.					
Beleid wordt geïmplementeerd in samenwerking met alle betrokken afdelingen.					
Gegevens over de prestaties van alle betrokken afdelingen wordt onderling gedeeld.					
Besluitvorming is centraal gecoördineerd.					
Centrale besluitvorming wordt door alle betrokken afdelingen gerespecteerd.					

End of Block: Access policy Do

Start of Block: Access policy Check/Act

X→

Q7

Toegangsbeleid - controleren en bijsturen De volgende stellingen hebben betrekking op de toegangsbeleid. Hiermee wordt het beleid bedoeld dat betrekking heeft op de manieren waarop patiënten toegang kunnen krijgen tot de faciliteit om de zorg te ontvangen. Met als doel een goede balans tussen capaciteitsbezettingen, toegangs- en wachttijden en lage variabiliteit in patiënten aanbod.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Toepasbaarheid van toegangsbeleid wordt geanalyseerd.					
Patiënten wordt gevraagd naar hun tevredenheid over het toegangsbeleid.					
Medewerkers wordt gevraagd naar hun tevredenheid over het toegangsbeleid.					
Prestaties op capaciteitsbezetting worden geanalyseerd.					
Hoge variaties in capaciteitsbezetting worden geanalyseerd.					
Prestaties op het gebied van toegangstijden van patiënten worden geanalyseerd.					
Prestaties op het gebied van wachttijden van patiënten worden geanalyseerd.					
Prestaties op het gebied van gemaakte overuren worden geanalyseerd.					
Berekeningsmethodes toegepast bij de bepaling van beleid wordt geanalyseerd.					
Doelstellingen van de planning worden structureel geëvalueerd met alle betrokken afdelingen.					
Samenwerking met andere afdelingen wordt structureel geëvalueerd.					

End of Block: Access policy Check/Act

Start of Block: Ambulatory scheduling Plan

X→

**Q20 Ambulante patiënten planning - ontwikkelen en plannen**

De volgende stellingen hebben betrekking op de patiënten planning voor ambulante zorg. Hiermee wordt het beleid bedoelt dat als doel heeft een optimale patiënten planning voor ambulante zorg te realiseren op een operationeel niveau. Waarbij toegangstijden van patiënten en voor het personeel werkloze tijd en overwerk in beschouwing wordt genomen.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Beleid is gebaseerd op van te voren bepaalde tijdseenheden.					
Beleid is tot stand gekomen na het overwegen van verschillende afspraakplanning-methoden.					
Overboeken is mogelijk gemaakt in het beleid.					
De mogelijkheid voor Baily-Welch afspraakplanning is overwogen.					
In het beleid zijn regels vastgesteld om overboekingen te beperken.					
In het beleid zijn regels vastgesteld voor de volgorde waarin de afspraken plaatsvinden.					
De mogelijkheid voor het samenvoegen van wachtrijen is opgenomen in het beleid.					
Er is capaciteit gereserveerd voor spoed patiënten.					
Het afvlakken van de pieken in de vraag naar zorg is opgenomen in het beleid.					
Het beleid is gebaseerd op nauwkeurige berekeningen.					

De gemiddelde duur van afspraken is gebaseerd op metingen.

Het beleid houdt rekening met de wachttijden van de patiënten.

In het beleid zijn doelen gesteld gericht om inactiviteit te beperken.

Het beleid is gericht om overwerk te minimaliseren.

De gestelde doelen voor planning zijn tot stand gekomen door samenwerking met andere gerelateerde afdelingen.

Beleid is tot stand gekomen in samenwerking met gerelateerde afdelingen.

End of Block: Ambulatory scheduling Plan

Start of Block: Ambulatory scheduling Do

X→

Q21

Ambulante patiënt planning - uitvoering De volgende stellingen hebben betrekking op de patiënt planning voor ambulante zorg. Hiermee wordt het beleid bedoelt dat als doel heeft een optimale patiënt planning voor ambulante zorg te realiseren op een operationeel niveau. Waarbij toegangstijden van patiënten en voor het personeel werkloze tijd en overwerk in beschouwing wordt genomen.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
De patiënt planning wordt centraal gemaakt.					
Alle betrokken houden zich aan de centraal gemaakte planning.					
Planners worden voorzien van een geautomatiseerd planningssysteem dat het maken van planningsbeslissingen ondersteunt.					

Real-time gegevens die nodig zijn voor het maken van de planning zijn beschikbaar in het planningssysteem.

Het planningssysteem biedt optimale voorstellen op basis van de gestelde prestatiedoelen.

Informatie over planningsprestaties wordt verzameld.

Informatie over capaciteitsbezetting wordt verzameld.

Informatie over gemaakte overuren door het personeel wordt verzameld.

Informatie over de wachttijden van patiënten wordt verzameld.

Informatie over de toegangstijden van patiënten wordt verzameld.

Informatie over de werkelijke afspraakduur wordt verzameld.

Informatie over inactieve tijd van de capaciteit wordt verzameld.

Beleid is geïmplementeerd in samenwerking met alle betrokken afdelingen.

Gegevens over de prestaties van alle betrokken afdelingen wordt onderling gedeeld.

Besluitvorming over het planningsbeleid van patiënten wordt centraal gecoördineerd.

Centrale beleidsvorming wordt door alle betrokken afdelingen gerespecteerd.

End of Block: Ambulatory scheduling Do

Start of Block: Ambulatory scheduling Check/Act



Q22

Ambulante patiënten planning - controleren en bijsturen De volgende stellingen hebben betrekking op de patiënten planning voor ambulante zorg. Hiermee wordt het beleid bedoelt dat als doel heeft een optimale patiënten planning voor ambulante zorg te realiseren op een operationeel niveau. Waarbij toegangstijden van patiënten en voor het personeel werkloze tijd en overwerk in beschouwing wordt genomen.

Geef voor de volgende stellingen aan in welke mate deze voor u van toepassing zijn.

	Geen beleid aanwezig	Beleid gedeeltelijk aanwezig	Beleid aanwezig	Beleid duidelijk aanwezig	Weet ik niet
Prestaties van de patiënt planning worden geanalyseerd met als doel het beleid te verbeteren.					
Gegevens over de capaciteitsbezetting worden geanalyseerd.					
Gegevens over inactieve tijd van de capaciteit worden geanalyseerd.					
Gegevens over gemaakte overuren door het personeel worden geanalyseerd.					
Gegevens over wachttijden voor patiënten worden geanalyseerd.					
Verschillen tussen werkelijke en voorspelde afspraakduur worden geanalyseerd.					
Mate waarin de zorgvraag kan worden verspreid wordt geanalyseerd.					
De geschiktheid van het planningsbeleid wordt geëvalueerd.					
Het bereiken van de planningsdoelstellingen wordt structureel geëvalueerd met alle betrokken afdelingen.					
Samenwerking met andere afdelingen wordt structureel geëvalueerd.					

End of Block: Ambulatory scheduling Check/Act

Start of Block: Indicators Radiology

Q39                  Gemiddelde                  toegangstijd                  en                  wachttijd                  MRI-Scanner

Totaal aantal uitgevoerde MRI-scans in financieel jaar 2017. \_\_\_\_\_

Totale som van de duur voor alle MRI-scans in financieel jaar 2017 (in dagen) tussen het eerste contact moment (patiënt of via interne/externe verwijzer) en het eerst mogelijke afspraakmoment. \_\_\_\_\_

Totale som van de duur voor alle MRI-scans in financieel jaar 2017 (in minuten) tussen de geplande startmoment van de afspraak en het werkelijke startmoment van de afspraak \_\_\_\_\_

Q40                  Gemiddelde                  toegangstijd                  en                  wachttijd                  CT-scanner

Totaal aantal uitgevoerde CT-scans in financieel jaar 2017. \_\_\_\_\_

Totale som van de duur voor alle CT-scans in financieel jaar 2017 (in dagen) tussen het eerste contact moment (patiënt of via interne/externe verwijzer) en het eerst mogelijke afspraakmoment. \_\_\_\_\_

Totale som van de duur voor alle CT-scans in financieel jaar 2017 (in minuten) tussen de geplande startmoment van de afspraak en het werkelijke startmoment van de afspraak \_\_\_\_\_

Q41                  Bezetting                  van                  de                  MRI-scanner

Het maximale aantal MRI-scanners in gebruik, in financieel jaar 2017. \_\_\_\_\_

Gemiddelde onderzoek duur (totale tijd die een patiënt de ruimte van de MRI-scanner bezet houdt) in financieel jaar 2017.

Gemiddelde scan duur (tijd dat daadwerkelijk gescand wordt) in financieel jaar 2017.

Gemiddelde openingstijden per dag (openingstijd tot eindtijd van de laatste patient) in financieel jaar 2017

Q42                  Bezetting                  van                  de                  CT-scanners

Het maximale aantal CT-scanners in gebruik, in financieel jaar 2017. \_\_\_\_\_

Gemiddelde onderzoek duur (totale tijd die een patiënt de ruimte van de MRI-scanner bezet houdt) in financieel jaar 2017.

Gemiddelde scan duur (tijd dat daadwerkelijk gescand wordt) in financieel jaar 2017.

Gemiddelde openingstijden per dag(openingstijd tot eindtijd van de laatste patient) in financieel jaar 2017

Q43                  Gemiddeld                  aantal                  MRI-scans                  gemaakt                  per                  FTE

Totaal aantal Fte's van Hbo-plus of HBO met extra aanvullende opleidingen (MRI-apparaat specifiek) opgeleid radiologische personeel ingezet op afdeling in financieel jaar 2017. \_\_\_\_\_

Totaal aantal Fte's van Hbo opgeleid radiologisch personeel zonder aanvullende opleidingen ingezet op afdeling in financieel jaar 2017.

Totaal aantal Fte's van Mbo opgeleid radiologisch personeel ingezet op afdeling in financieel jaar 2017.

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Q45 Gemiddeld aantal CT-scans gemaakt per FTE

Totaal aantal Fte's van HBO met extra aanvullende opleidingen (MRI-apparaat specifiek) opgeleid radiologische personeel ingezet op afdeling in financieel jaar 2017.

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Totaal aantal Fte's van HBO opgeleid radiologisch personeel zonder aanvullende opleidingen ingezet op afdeling in financieel jaar 2017.

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Totaal aantal Fte's van HBO opgeleid radiologisch personeel ingezet op afdeling in financieel jaar 2017.

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Q46 Gemiddelde kosten per MRI-scan

Totale personeelskosten in financieel jaar 2017, voor het uitvoeren van MRI-scans.

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Q47 Gemiddelde kosten per CT-scan

Totale personeelskosten in financieel jaar 2017, voor het uitvoeren van CT-scans.

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Q50 Ziekteverzuim

Totaal aantal ziekdedagen gemaakt door verpleegkundige personeel op de afdeling in financieel jaar 2017

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End of Block: Indicators Radiology

Start of Block: Importance ranking indicator Radiology

Q48 Geef aan, op een schaal van 0 tot en met 100, in welke mate een indicator het effect van Operations Management op de prestaties van de ziekenhuisafdeling representeert.

Hierbij staat een score van 100 punten voor een sterke representatie en 0 punten voor een zwakke representatie.

Toegangstijd patiënten

Wachttijd patiënten

Bezetting van de MRI-scanner

Bezetting van de CT-scanners

Gemiddeld aantal MRI-scans gemaakt per FTE

Gemiddeld aantal CT-scans gemaakt per FTE

Gemiddelde kosten per MRI-scan

Gemiddelde kosten per CT-scan

End of Block: Importance ranking indicator Radiology

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