

Research report: Care Pathways

*Implementation of care pathways within the
University Clinic for Companion Animal
Health.*

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Abstract

Objective: A care pathway is a protocol in which the organization of care for a particular condition is described. By this methodology, it can be made sure that every patient gets the same care for one condition in an efficient manner within the possibilities of the clinic. The aim of this study is to create a format that can be used for the development and implementation of care pathways within the UKG. This format for the UKG is derived from a literature review on different formats for care pathways used in human medicine. The format can be applied for designing, implementing, evaluating, and adjusting a care pathway. This study specifies if this format can be a model for the development of other care pathways in the future. This is done by evaluating and reviewing the CPSS care pathway whether or not it has complied to the format of the UKG.

Review: Six articles discussing care pathways are used to evaluate different formats. The 7-phase method seems to be the best basis for developing a format for the UKG. The 7-phase method is a general model and further interpretation, adjustments, and elaboration need to be done by the organization itself. The 7-phase method is not a standing order that should be used from phase one to seven. It is a guideline with a self-regulatory and innovative character.

Methods: A schematic model is derived from the 7-phase method, but the 7-phase method remains the guiding principle. By analysis of the CPSS pathway documents, it is examined whether and to what extent each phase is applied in the CPSS care pathway. By defining the elements of the 7-phase method a care pathway for the UKG, the areas for improvement can be determined.

Results: There are development opportunities in the optimization of the CPSS care pathway by use of the CPSET, a feedback system, a reporting system, an evaluation model, a flowchart and visible scientific substantiation.

Conclusion: A format represents the overall outlines. Each institution will have to find its own method in the design, use and adjustment of a care pathway that suits its organization. The format provides a handle for systematically guiding the development, implementation, evaluation and continuous follow-up of a care pathway. Use of the format will lead to an improvement in the quality of the care process. To verify the format, further research is needed on applicability in the development and implementation of a new care pathway for the UKG.

Abbreviations

UKG	University Clinic for Companion Animal Health Utrecht
CPSS	Congenital Portosystemic Shunt
VUmc	VU University Medical Centre Amsterdam
IOZP	Integral oncologic care pathways
EPA	European Pathway Association
CPSET	Care Process Self Evaluation Tool
EBVM	Evidence-based veterinary medicine
QoL	Quality of Life

Introduction

Any company or organization wants to improve and differentiate themselves. An important principle for improvement is innovation. One has to innovate in order to create a new situation which may lead to an improvement. One of the possibilities are process innovations. This includes, for example, changes in production processes (like the automobile industry) or care processes (in hospitals). Innovation in clinical care is necessary. At the moment important innovations are made in human healthcare management. Progress is being made by the development of guidelines and so-called *care pathways*.

A care pathway is a protocol in which the organization of care for a particular condition is described. By this methodology, it can be made sure that every patient gets the same care for one condition in an efficient manner within the possibilities of the clinic. A definition of a care pathway is described by Vanhaecht et al.: “A care pathway is a complex intervention for the mutual decision making and organization of care processes for a well-defined group of patients during a well-defined period.”¹ The start of developing care pathways can be found in appendix 18.

A patient with a particular condition follows a step by step pathway through the clinic. This care process through the clinic consists of medical steps according to a guideline providing specific diagnostics and treatments. While moving along this pathway through the clinic the patient meets all sorts of staff and medical professionals who fulfill a medical step. Every step of this pathway provides a part of the medical care which is defined on beforehand. The care process for a patient with a particular condition is recorded in a care pathway, which provides a clear vision and walkthrough of the different phases in the clinic for that condition for both patient and organization. It supports a reduced risk of errors, a shortening of the processing time by e.g. reduced waiting times and lower costs by standardization of the processes.² The care pathway is established with a scientific basis so that any errors will be limited and the flow through is eased and faster. All those involved in the care pathway, including patients, should be well informed on beforehand. According to Huiskes and Schrijvers, the following elements or general characteristics belong to the standard of a care pathway:²

1. “A care pathway is disease-oriented and describes the path the patient will go through.
2. A care pathway is evidence-based.
3. There is standardization, tasks and responsibilities of medical professionals are explicitly written down, and target values for lead times are listed.
4. The records of each phase of the care pathway clarify how patients are involved in the decision making and what information and 'empowerment' patients receive at that phase.
5. Agreements have been made how professionals are monitored for conforming to the care pathway and how variance analyses are performed.”

Within each clinic there are certain pathways for particular conditions present, which are used regularly. Without a record of a care pathway, the specific care for a condition will not always be the same and not everyone involved will be aware of it. Defining and aligning with all those involved in a care pathway is essential. In human healthcare, it is realized in a number of hospitals for certain conditions in which each care pathway is unique. A care pathway is designed for a specific organization with its staff members and its techniques.

Therefore, in the development of a care pathway for a particular clinic, it is not feasible to duplicate a care pathway from another human clinic. Optional is using *a format* for the development of a care pathway in combination with the available scientific knowledge (evidence-based medicine), clinical experience, patient/client expectations and the capabilities and limitations of the own organization.⁴ A format can act as a guideline to collect information about a care process of a particular condition and thus to develop a care pathway for a clinic or a specific organization. A format is useful to clarify to the entire organization how to design and implement a care pathway within a clinic.

The purpose of a care pathway becomes more evident as reported by Sermeus et al.: "A clinical pathway implies more than just a piece of paper with a number of agreements reported. It is a total design with a comprehensive approach to a particular patient population for all those involved."⁴

Not only in human healthcare, but also in veterinary medicine innovation is important. At the University Clinic for Companion Animal Health (UKG), there are initiatives and ongoing developments to implement care pathways, as in human healthcare is performed. A care pathway is a complex formation that is not simply developed in a small amount of time and cannot just be incorporated. Its development and implementation depends on the flexibility of the organization with its employees and facilities. To see if it is possible to actually implement a care pathway in the UKG, research is needed. Therefore this project has been set up researching: 'How to implement a care pathway within the UKG?'

The aim of this study is to create a format that can be applied for the development and implementation of care pathways within the UKG. This format for the UKG will be based on a literature review of different formats for care pathways used in human medicine. In this review, a selection and analysis of different formats are made, followed by the conclusion and selection of one format that is appropriate for the UKG. This format can be applied for designing, implementing, evaluating and adjusting a care pathway.

At the UKG, a care pathway has been known for Congenital Portosystemic Shunt (CPSS) since January 2004. This care pathway is assessed using the format for the UKG. By this study, it is specified whether or not this format can be a model for the development of other care pathways in the future. The result of this assessment can serve as an example for the development of other care pathways and provides potential development opportunities.

When the UKG has managed to introduce a care pathway system, it will probably be the first veterinary clinic which operates according to such a system. The system used by the UKG may act as a foundation for other veterinary clinics to adopt and apply to their own organization.

Literature review

For the development and implementation of a care pathway within an organization, a certain system or format is required specific to the demanding organization. A format provides a systematic way to describe, analyze and materialize a care process into a feasible, active and verifiable care pathway.⁸ Thus it is clear to everyone involved in what way a care pathway is designed and introduced.⁴

An important side note is that a care pathway is developed over a longer period of time and is rarely set up at once. The development of a care pathway is often set up in sections, in which the various branches are added to the care pathway one by one. For example, the diagnostic section will be added first and the treatment section will be next.⁶ Also in the early phase, a care pathway will constantly be adjusted and improved by evaluation and feedback from both patients and staff members.¹⁰ Little information has been published about the length of time for developing and implementing care pathways in human healthcare. The VU University Medical Centre Amsterdam (VUmc) however, mentions a period of 9 to 12 months for the development and implementation of their first care pathway.¹⁰ Eventually, it will become clear whether this timeframe applies in other situations. The objective of this review is to determine which literature is useful for developing a format applicable for the UKG.

Search strategy

The literature has been searched for different systems to implement a care pathway. The following (English and Dutch) keywords were used:

- care/clinical pathway
- integrated care pathway
- zorgpaden
- opzet zorgpad(en)
- klinisch pad
- stappenplan zorgpad

These keywords have been applied in the following databases:

- Google Scholar
- PubMed
- Scopus
- Web of Science
- Google

Two people have been contacted who are known for their experience with care pathways. Inquiries were made about which documents they had available. The used keywords often showed the name of Prof. Dr. K. Vanhaecht with some highly relevant articles. An article¹⁷ was found with potentially relevant references. Unfortunately, they were not available over the internet. Therefore contact was made with Prof. Dr. K. Vanhaecht to request if he had these articles, and maybe other documents relating to the development of care pathways available. In response, several documents were received.

Also, Mrs. N. Huiskes was contacted, one of the authors of Het Zorgpadenboek.² Considering

this book created a motivation for this research, she was asked if she had any more literature available regarding care pathways and techniques for its design. A number of references were shared.

Selection of articles

After applying these keywords in the various databases it appears that the system used for the development and implementation of a care pathway is often structured as a roadmap. A format as defined in this research is described in the literature as a roadmap. It turned out there is only a limited number of articles available in which the application of a roadmap is discussed. All articles in which a roadmap or anything related to the design of a care pathway was described, were included in this review. Six relevant articles were found.

Noteworthy are the different articles each representing a different self-made roadmap to develop a care pathway. In the article by Vanhaecht and Sermeus, a roadmap with 30 steps is described based on the Deming cycle.⁵ Several years later this was transformed into a 7-phase method based on experience and research.³ By Panella et al. a roadmap of 9 steps is used.⁷ In the book of Hummel et al. a comprehensive roadmap of 10 steps is described.⁸ Campbell et al. indicates 13 steps that need to be taken for the development of a care pathway.⁹ The VUmc uses their own roadmap of 10 steps for developing their care pathways.¹⁰ The various roadmaps can be found in the appendices.

Campbell (1998)	Vanhaecht en Sermeus (2002)	Panella (2003)	VUmc (2006)	Hummel (2009)	Vanhaecht (2011)
13 steps	30 steps	9 steps	10 steps	10 steps	7 phases
Appendix: 4	Appendix: 2	Appendix: 5	Appendix: 3	Appendix: 6	Appendix: 7

Table 1: Overview available roadmaps

Apparently, there are several different roadmaps, which are being used to develop a care pathway. At first sight, it seems that most parts in the various roadmaps are generally the same, but they differ obviously in comprehensiveness. What is described as a single step in one article, appears to be multiple steps in another article. In the literature, there is no consentient roadmap to be found that is being used by different clinics for developing care pathways. The question is whether there are significant differences in these roadmaps or that they mostly correspond with each other. The VUmc indicates that a care pathway describes a care process within a specific organization and therefore cannot simply be duplicated from another clinic or organization.¹⁰

The various roadmaps were judged on thoroughness, size, clarity, usefulness and applicability for the UKG, methodology and its substantiation such as evidence-based literature. Eventually, it is concluded which roadmap is most suitable for the development of a format for the UKG.

Analysis and evaluation of the articles

- *Panella, M. et al., (2003). Reducing clinical variations with clinical pathways: do pathways work?*⁷

The main topic is not about the development of care pathways. The objective of this study from 2003 is to evaluate the different care pathways to measure their performance in reducing the variations in the process and the outcomes of care processes. Just a small section is regarding to the development of care pathways itself. The article describes how they have connected evidence-based medicine tools with business process redesign technology to create a step by step action plan for developing care pathways (9 steps).⁷ However, there are no specific references that explain and substantiate each specific step. Descriptions of the different steps are very brief. In conclusion, the objective of this article is not in line with the objective of this study. So the value of this article appears to be less relevant.⁷

- *Campbell, H. et al., (1998). Integrated care pathways.*⁹

This article from 1998 defines care pathways, shows how they are developed and reviews the evidence of its efficiency. The article is not particularly focused on the description of a format. It is essentially an editorial about the concept of care pathways and also briefly explains what necessary steps to take in order to develop a care pathway.

Just like Panella et al., a simple roadmap of 13 steps is presented without further explanation and substantiation of the steps, also the steps are very shortly described. A brief overview is presented of some essential steps to develop a care pathway, but it offers no clear guidance for the organization of the UKG. The focus is not concentrated on the format or roadmap for the development of a care pathway.⁹

- *Hummel, H. et al., (2009). Integrale oncologische zorgpaden: van model naar 'daily practice'.*⁸

It is a handbook with explanations, a setup and examples of integral oncologic care pathways (IOZP) from 2009. It describes the elaboration of the IOZP model: practical tools to implement and update a tumor-specific pathway. It is a systematic method that can help in developing and implementing care pathways by running through five phases. The design of the implementation of an oncologic care pathway is in the form of a comprehensive roadmap of 10 steps. The 5 phases are interlaced in the roadmap.⁸ The procedure as indicated by the roadmap for the systematic introduction of care pathways is based on the 30 step method, developed by Vanhaecht and Sermeus in 2002.⁵

When compared to the 30 step method, there are many similarities in the design and procedure. However, this is the only reference from which the phase system and roadmap is derived. No research or other evidence like references is provided in the description of the roadmap. The preliminary development of the roadmap is unclear. Compared to other roadmaps this one appears to provide a comprehensive, clear and focused description on the design of an oncologic care pathway, but without clear substantiation. The roadmap is a general description for the organization to a certain extent, so it can be applied in every aspect

of oncology. This general format might be partially useful for the development of a format for the UKG.

- *Vanhaecht, K., & Sermeus, W. (2002). Draaiboek voor de ontwikkeling, implementatie en evaluatie van een klinisch pad. 30 stappenplan van het Netwerk Klinische Paden.⁵*

It is a Dutch/Belgian article from 2002 that discusses the 30 step method.⁵ It is mentioned that the development of the 30 step method is based on a literature study, pilot studies, international cooperation and close consultation with the hospitals of the Belgian-Dutch Clinical Pathway Network. The applied literature is hereby indicated. It was developed at the Centre for Health services and Nursing Research on the Catholic University Leuven.⁵

Primarily the 30 step method can be divided into 4 phases. The cycle of Deming is used for these 4 phases. It is called a circle of quality. This "Plan – Do – Study – Act cycle", which is processed in the roadmap, is a systematic and continuous process to achieve quality through gradual changes and phases.¹⁴ In the following years up to 2010, there have been more than 1250 care pathway projects that used the 30 step method.³

In the description of most steps and associated statements are substantiated. However not all statements are substantiated with references. The various steps are described in detail, although not every detail is clearly illustrated, making certain aspects in this 30 step method to remain unclear and superficial. For example the aspect 'critical indicators' in step 5 is not further explained in the article itself. It is necessary to read the used reference to be able to fully understand what is meant. Basically the 30 step method is not always straightforward when perused.

However, it is indicated that the roadmap serves as a guideline and is not a standing order. This implies the possibility to skip one or more steps or to follow them in a different order or even simultaneously because of preference or necessity.

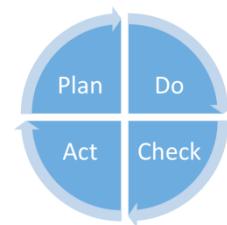


Figure 1: The Deming-cycle (1982)¹⁴

- *Vanhaecht, K. et al., (2011). 7-fasenmodel voor de ontwikkeling, implementatie, evaluatie en continue opvolging van zorgpaden.³*

In this article from 2011, the new methodology for the development, implementation, evaluation and continuous follow-up of care pathways is shown and explained.³ It is the 7 phase method, derived from the 30 steps method of Vanhaecht and Sermeus. Also Panella contributed to this article, whose brief roadmap is already discussed. The optimization and revision of the 30 step method is the result of the clinical experience within the Belgian-Dutch Clinical Pathway Network between 2002 and 2009, national and international research within the Network and also the cooperation with the European Pathway Association (EPA).^{15, 16} Several important reasons for the revision of the 30 step method to the 7 phase method are listed below:³

- An adjustment of the tied structure from the extensive 30 step method to a more self-directing and innovative model.
- Adding more freedom to the method in order to respond easier to local circumstances.

- The ability of integration of new tools and techniques from the general quality policy.
- More attention to the project start up by adding a 'screening phase'.
- Adapting to the new and enhanced definition of a care pathway as a 'complex intervention' with its characteristics instead of only 'process control method'.

The adjustments were made under the direction of the Belgian-Dutch Clinical Pathway Network and the organizations involved from Belgium and the Netherlands. Next, the 7 phase method was validated by three consensus meetings with contacts of the Clinical Pathway Network and representatives of the Netherlands Board of Health Policy, Catholic University Leuven and the EPA.³

Despite the conversion of the 30 step method to a 7 phase method, there is still a detailed description from the very first step for the design of a care pathway. In the different phases certain quality tools and techniques can be used. For example in the first phase, the screening phase, a certain possible tool for the quick scan is mentioned: The Care Process Self Evaluation Tool (CPSET)²⁰, see appendix 8. Multiple examples of tools are mentioned to leave organizations free in which technique or instrument they wish to use. This 7 phase method is not a standing order, because every organization is unique. So the interpretation of the content of the phases may be different. In this method, just as in the 30 step method, the Deming cycle is used¹⁴. However, each phase runs through the Deming cycle separately.³ Noteworthy is that the 5 phases of the roadmap by Hummel⁸ are similar in subject to this 7 phase method.

- *Vanhaecht, K. et al., (2006). Clinical pathway audit tools: a systematic review.*¹⁷

In this systematic review of Clinical pathway audit tools¹⁷ multiple evaluation tools are viewed and assessed by analysis of the content. The tools are assessed using 17 characteristics for care pathways. 7 tools were selected and one turned out to be the best tool. Unfortunately, this tool was not available through the internet for further research to see whether or not this might be useful in the development of a format. This required contact with Prof. Dr. Vanhaecht. Unfortunately, he had this document no longer available. However, his advice was to be reluctant with use of these audit tools, since its objectives may differ. The audit tools primarily evaluate documents of more than 10 years ago when there was hardly any 'outcome measurement' and 'value creation'. His advice was to look primarily at the 7 phase method and the CPSET, because this is a tool for the evaluation of the care process within the organization instead of the documents.

- *Programmagroep kwaliteit/VUmc, (2006). Zorgpadontwikkeling in het VUmc.*¹⁰

This roadmap was developed in 2006. The roadmap of the VUmc is based on the 30 step method of Vanhaecht and Sermeus, but this has been reduced and adjusted to the practice of the VUmc alone and ended up as a roadmap of 10 steps. The VUmc is a member of the Belgian-Dutch Network Clinical Pathway Network.¹⁰

The roadmap is straightforward. Because the roadmap is designed specifically for the VUmc, it resulted in more focused and more specific steps, but exclusively in favor of the VUmc. Also, in certain steps is referred to documents specific from the VUmc, such as a 'policy cost-

benefit analysis'. It seems that several steps appear more clearly than in the 30 step method, but not many components are applicable because of VUmc related references. It contains a clear and compact representation and certain components or steps could be useful for the format to be designed for the UKG.

Conclusion

The roadmaps of Panella and Campbell are too superficial and outdated in order to be a useful addition to a format for the UKG. The next roadmap developed in the subsequent period, is the 30 step method, in which more organization and research is dedicated to its development. It is a comprehensive elaboration which describes the design of a care pathway from start to finish. Also it is reported in 2011 that more than 1250 care pathway projects have used the 30 step method.³ This suggests that this roadmap may also provide a useful source for the UKG. The roadmaps of the IOZP and the VUmc are derived from the 30 step method⁵ from 2002. The steps are a representative for the associated organization and practice. It shows an example of how a format for the UKG can be represented. But these roadmaps do not directly provide a foundation for the UKG because they are based on a different type of organization. The 7 phase method is developed more recently by the same authors, which is derived from the 30 step method.³ Due to the more recent development and innovations introduced as indicated, this roadmap appears to provide the best foundation for further development of a format for the UKG.

The 7 phase method is a general model. It indicates the impossibility to present an exactly outlined roadmap for general use by different organizations, because every organization is unique. There is no 'standing order'. It also indicates why the roadmaps can only show the general outlines. The 7 phase method allows the organization to use proprietary tools and techniques, for example from the general quality policy. Overall the further implementation and elaboration of a roadmap will have to be done by the organization itself. A format for the UKG needs to be adjusted to the organization. The 7 phase method stimulates the executive organizations to decide for themselves what steps to take or not. It has a self-directing and innovative character.

Material and method

The various development opportunities in the literature for care pathways are reviewed and compared to each other. The information from these roadmaps is obtained to provide a foundation for a format within the UKG. For the development and implementation of a care pathway within the UKG several roadmaps from humane healthcare are reviewed. The conclusion was to use and follow the 7 phase method from 2011 for the design of a format for the UKG.³ Because of its open design it provides the opportunity to create a format that matches the interests of the UKG. As a result, a schematic derivative of the 7 phase method is created, but the 7 phase method still acts as the guiding principle. There has never been used a format for the implementation of a care pathway within the UKG before. The format could serve as a basic model for veterinary care pathways.

Material

The material consists of the CPSS care pathway. This contains the ‘Clinical Protocol CPSS’, the ‘Checklist Opname levershunt’, the ‘Checklist Controle levershunt’ and the ‘Information letter levershunt’ for the owner. These documents are used for comparison to the schematic format processed from the 7 phase method. The CPSS documents can be found in the appendices.

Method

The article of the 7 phase method has been extensively studied in each phase. From the article, all essential steps in each phase are rewritten in a schematic format. The created format is used for analysis and comparison of the CPSS care pathway. However, the article of the 7 phase method remains the guiding principle. Each phase comprises a number of components. Every component of each phase is evaluated and it was assessed whether it has been applied in the design CPSS care pathway and to what extent. Efforts have been made to distract and interpret information from the four CPSS care pathway documents as much as possible in order to perform an analysis in relation to the different components of all 7 phases. In the summarized results, the components are described which are missing in the care pathway or which are not been complied to sufficiently, as viewed from the 7 phase method. Conclusions can be made regarding the development and implementation of the CPSS care pathway. Thus the areas of improvement can be determined and the components of the 7 phase method that a care pathway within the UKG should comply to, can be identified. The created format from the 7 phase method together with the analysis and comparison of the CPSS care pathway will provide the results.

In addition to these results, different display systems of care pathways, are included. Considerations have been made to select the most suitable display. As a result, a flow chart is created from the four documents associated with de CPSS care pathway.

Results

Simplification of the 7 phase method

The 7 phase method is described in detail in the published article.³ The 7 phases are converted into a schematic overview of the different components of each phase. As a result, the 7 phase method can be represented clearly with reduced text size. This overview may serve as a format for the UKG. The format can be found in appendix 7 and is written in Dutch, because it is based on a Dutch article and it is intended for a Dutch organization. Straight answers for each component of the 7 phase method, obtained by analysis and comparison with the CPSS care pathway, can be found in the first section. In the second section, the results are described in more detail.

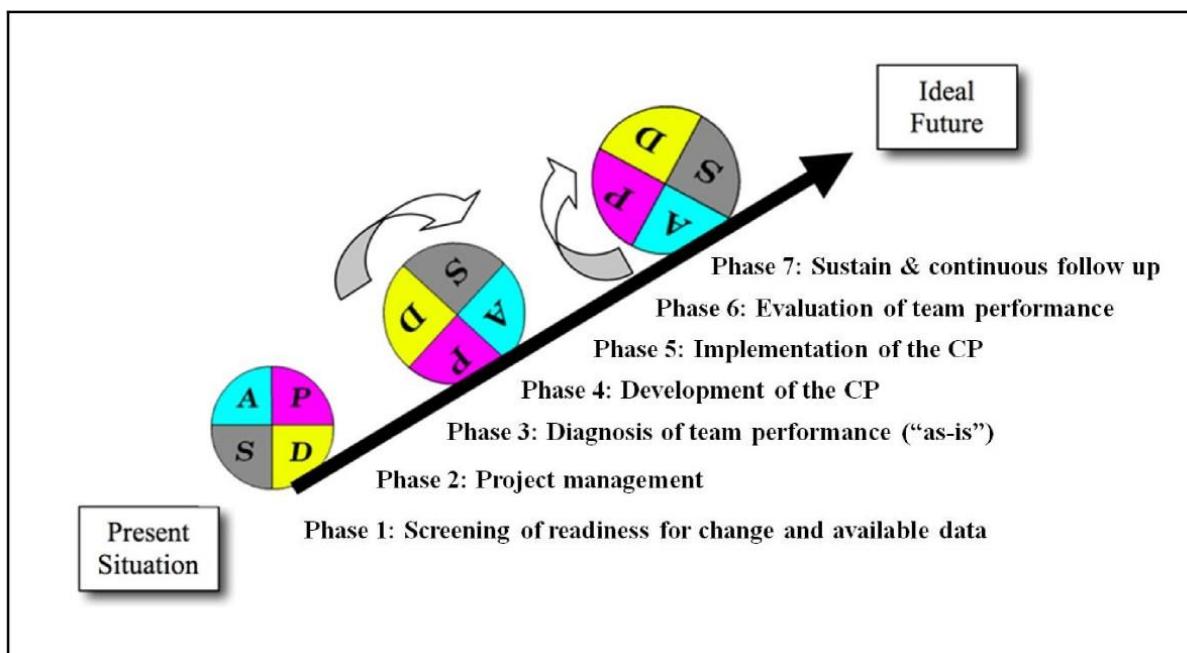


Figure 2: The 7-Phase method³

Format 7 phase method

Screening phase

- There is demand for a new care pathway or there is a need to adapt an existing pathway.
There was a demand for a system that clarifies for everyone involved what the standard procedure contains. When complying to this system, it creates a more efficient flow of patients with CPSS and reduces complications and mortality perioperative.
- Determining whether a care pathway is the appropriate method to meet the demand.
A care pathway determines the procedure of the care process. It may also provide more inflow of CPSS patients, because there is an efficient structure allowing to schedule more patients.
- Bringing together of information about the possible ownership of the project. Who made the demand for the (re)organization of the care process.
The surgery department, with the primary surgeon as owner and project manager.

- The strength and the willingness of the multidisciplinary team to change and innovate.
Methods:
 - Questionnaires regarding teamwork.
 - Interviews with managers and key players.²⁴
There has been consultation by the surgery department with the other departments involved such as the animal nursing, anesthesia, internal medicine department (hepatology), radiology and the intensive care unit (IZA).
- Insight into the existing organization and the results of the care process, through available information:
 - Performance indicators
Unknown
 - Financial feedback
Unknown
 - Key figures
Key figures are published in 2000 and 2004 regarding complications and mortality.^{26, 27} In 2014 on the European Veterinary Conference (EVC) Voorjaarsdagen key figures were published by a retrospective analysis of the results of the care process, such as mortality and complications.²⁸
- Collect new data if necessary via a quick scan such as:
 - CPSET²⁰ (see appendix 8), this validated instrument can help the team to score the existing organization of the care process
There was no quick scan available at the time of startup.
- Evaluating these information with the team whether a project actually should be started up.
- Can be explained whether starting up the project is a justified choice:
 - Is there a need for the revision of the care process?
In 2000 prior to the implementation the rate of complications and mortality was too high. In addition, there was insufficient communication between the departments of hepatology and surgery, and the surgery department and the IZA about the aftercare.
 - Is a care pathway suitable to achieve the desired outcomes?
Yes, the care process can now be clearly represented, including the determination of plain communication between certain departments.
 - Is the team willing to change?
Yes.

Project management phase

- Defining the care process for which the pathway is developed and put together the core team and the working group with agreements on the division of tasks and the project plan, including the timing.
Division of tasks is set between case-manager, surgeon, student, anesthesiologist, intensivist and hepatologist/internist. The surgeon and internist may be considered as core team and surgeon, internist, radiologist, anesthesiologist and intensivist as the working group.
- Inclusion- and exclusion criteria.
Suspected liver shunt
Ammonia and bile acids in blood tests + optionally NH3 tolerance test
Ultrasonography
- Time period.

1 day consultation hepatology

1 day consultation surgery

Next day surgical operation

2-3 days recovery at IZA

After 3 months checkup by consultation at hepatology

- The core team will prepare, develop and evaluate the entire project.
Is performed by the surgeon; evaluation is unknown.
- Informing of the core team and the working group on the goal of this particular initiative (concept and methodology of care pathways).
There is not a clear team division. There is a relative small group of involved people. The surgeon has a leading role. It is unknown if there has been an information session.
- Making agreements about the project leadership, the various roles and the responsibilities.
This is not directly linked to the available documents. The project is primarily set up by the primary surgeon of CPSS and is considered as the project manager.
- The project plan is practically developed by marking off the various tasks and assignments, carried out during the course of the project, on a timeline that allows to monitor the project and to make adjustments. Necessary resources can be calculated and monitored.
This was already done. A comprehensive planning of the project was not necessary. Protocols and checklists are made from the already existing procedures. An information letter for the owners of the patient is also made.
- The members of the multidisciplinary team need to be aware of the boundaries of the care process, the aim, the project approach and the desired outcomes.
These are clear, it is solely about CPSS. The care pathway is created, among other issues, for an improvement of the outcome and the need for processing and implementation of a current international study.
- At the end of this phase, the decision to carry out this project is reconfirmed.

Diagnostic- and objectification phase

- To evaluate objectively and critically the current care process to optimize the current organization of the care process in an objective and appropriate way.
No specific information was available on this subject at that time, but there is regular consultation with the involved specialists about the bottlenecks.
- It starts when the preparations for the project are made and one wants to start with the evaluation of the current practice.
- Evaluation from four different perspectives:
 - Own organization and team.
 - Determining the objectives of the care process, based on the CPSET²⁰, the clinical pathway compass²¹ or the 3-blackboard method^{22, 23}
Has not been used.
 - Analysis of bottlenecks.
Regular consultations take place.
 - Determining the necessary resources to be able to organize and optimize the care process qualitatively.
 - To make a diagnosis many analysis- and quality techniques can be used²⁴

A Quality of Life (QoL) questionnaire is used for patient owners preoperatively and postoperatively about their pet.²⁹ This information may tell something about the care process and its outcome, which can be used for evaluation and adjustment.

- Analysis of how the team is currently structured in terms of leadership, composition, allocation and coordination mechanisms

These points are performed in a simplified manner and are not described separately in the care pathway.

- Vision of patient/client (and family).

- Organization of interviews or focus groups or by conducting surveys regarding client satisfaction, expectations and preferences.
- Or performing a walkthrough/shadowing → following a patient by a care provider through the care process.

Client satisfaction is taken into account by use of an information letter of livershunt. Patient assessment is applied by use of the QoL questionnaire.²⁹

- Available evidence and legislation.

- Key interventions (these are interventions with the most impact on patient outcomes) are to be supported by international standards, local protocols or clinical expertise.
- The same applies for the outcome indicators.
- Supporting pathways by guidelines and available lists of key interventions founded on 'Good Veterinary Practice' (GVP).
- The formulation of performance indicators.
- (Adjustment of care pathways to the current legislation)

The interventions are based on scientific research, expert opinions and organizational structure. This information was used to develop a protocol.

- Vision external partners?

- Evaluation and optimization by external partners using interviews and questionnaires.

A similar 'Clinical Protocol CPSS' is used by the RVC in London and the University of Zurich because of a joint investigation. The visions are exchanged between each other.

- Objective information needs to be delivered from each of the four perspectives. Based on this, the team can redesign and improve the care process.

This phase is handled less extensively than advised here. The purpose of this phase is an evaluation of the current care process with the aim of optimizing the new care pathway.

Development phase

- Starting when the necessary information from the last phase is available.
- The pathway is developed based on the objective information and the predetermined objectives.

Is done on the basis of scientific support and expert opinions. There is no clear information found from the previous phase.

- Checking whether the patient group and the time frame is achievable.

Yes, inclusion and exclusion criteria along with the time frame are clear.

- Marking the key interventions on a time scale.

Are textually displayed in a protocol. There is no flow chart or something similar available.

- Adjusting during the development phase by taking into account the feasibility based on the possibilities for the team and the available resources, diagnosed and objectified during the third phase.
Unknown.
- Practical development of the care pathway.
Consists of the protocol and the checklists.
- Arrangements concerning the organization of the care process are standardized as part of the patient record.
There is a permanent anesthesia application form and consultation report form in the patient record system Vetware. This is currently sufficient to be able to follow the CPSS care pathway. Although it appears that separate checklists are necessary.
- The goals and key interventions are specified.
Specific goals are not listed. The interventions are indicated in the protocol and checklists.
- The roles and the sequence of the activities are coordinated.
These are divided and coordinated by the protocol and checklists.
- The results and deviation from the key interventions are documented, monitored and evaluated.
It is unknown whether this is applied and whether a systematically approach is designed. However, the results of the outcomes of the care pathway were reported in 2014 by a retrospective analysis.²⁸
- Positive evaluation if the pathway is multidisciplinary prepared and is designed for a specific patient group during a defined time frame, for example in the form of a time-task matrix with a clear starting point and end point.
Positive evaluation: the path is described for the different disciplines (internal department, surgery consultation, anesthesia, surgical operation, IZA recovery). The path applies only to patients with CPSS going for surgery as method of treatment. The whole process is defined in a specific period of time.
- The final and intermediate objectives are clear and the key interventions supported by evidence as long as possible.
Described interventions and techniques are based on scientific research, expert opinions and the organizational structure. This information was used to develop a protocol. However, the supported evidence is not explicitly stated.
- Approval by the core team after consulting the working group.
There is only one group in the CPSS care pathway. The care pathway is presumably discussed with all team members, but the final approval is given by the primary surgeon.
- Developing a patient version of the pathway in order to involve the client.
Is done by the information letter of livershunt for patient owners.

Implementation phase

- Commencing implementation when the pathway is fully developed.
The care pathway is quite similar to the way the care process was already being executed, but there are a number of new elements in the protocol. The care pathway is now defined and described in detail.
- Informing all team members to test the pathway for a predetermined period.
The members who were involved with the therapy of CPSS, were already familiar with the different key interventions. Now it is determined and recorded. As a result, new

members are directly informed. There is no mention of a certain testing period, only an introduction of the care pathway.

- Drawing up an implementation plan → division of roles, contact person in case of problems, central monitoring of feedback.

A division is made of the different roles. A contact person in case of problems is mentioned in the checklists. Mainly this will be the primary surgeon or the case manager as to planning issues. Feedback moments on practical usability and communication problems are unknown.

- Organizing of information sessions for all team members before testing the pathway about why this pathway was developed, the main changes, how the pathway is used and what the communication lines are.

There are a number of (small) changes. These are communicated by the protocol, checklist and information letter for the client. The lines of communication are not clearly stated anywhere, but communication will mainly be done through the patient record Vetware with the associated forms, verbally and via email contact.

Communication about issues or feedback is unknown, but comes down to addressing the primary surgeon, which is stated in the checklists. It appears that a consultation is scheduled when new bottlenecks are identified.

- Testing the care pathway on a limited group of patients.

Does not apply because of the earlier mentioned reasons. Due to little difference of the care pathway compared to the already existing care process, the care pathway is introduced and implemented at once.

- Based on initial experiences, the pathway is adjusted where necessary. Feedback is included in a report.

It is not exactly indicated how feedback is processed. But if bottlenecks or problems are identified, a consultation is scheduled in which feedback can be processed.

- Evaluation of the test phase based on feedback from team members.

There was no true test phase of the care pathway itself. However, there has been a test phase for the QoL questionnaires intended for patient owners.

- Positive evaluation if the pathway was explained and tested and if, after consultation within the core team, it was decided whether or not to use the pathway in daily practice.

The path is directly introduced because only small changes in the care process were made. By the determination of the actions and key interventions the care process is now clear to everyone. For every patient the actions and key interventions of the care pathway are registered.

Evaluation phase

- Investigation whether the bottlenecks, present before the implementation, are eliminated.

When a bottleneck is identified, a consultation will be scheduled. Yet no reports of consultations are available. Complications and mortality have been reviewed again in the care pathway. As a result these turned out being decreased. Also, the communication lines between the departments are now partially defined in the Clinical Protocol CPSS and the checklists.

- Evaluation of the usability.

This is not officially carried out and it is unknown how feedback is processed. There will be, however, evaluation of the protocol by the surgeon and considerations will be made for furthermore adjustments.

- The compliance with respect to the key interventions (process indicators) and the intermediate and final outcomes of care (outcome indicators) are examined.
- Performing of this first thorough assessment two to three months after the implementation.

There was no specific moment of evaluation in this organization, but there is always the possibility to indicate the concerns. Adjustments will be made in the protocol or the checklists if necessary.

- As in the diagnostic and objectification phase, analyses are made from four perspectives, with optionally use of the same techniques like de CPSET.²⁰
See diagnostic and objectification phase.
- Variance tracking and analysis: For each key intervention is monitored in what percentage of patients this key intervention was carried out according to plan.
It is always the same group of people in the care pathway that perform the interventions. The number of people involved is small and it is therefore to be expected that the interventions always run according to the plan. However, this is not specifically verified, but this is possible individually by patient through Vetware.
- Follow-up and monitoring results, for instance through dashboards, runcharts or statistical process control.²⁴
No systematically approach is defined. There is a retrospective analysis in 2014 of the results.²⁸ Also the QoL questionnaires provide information about the outcomes of the care pathway.²⁹
- Using the CPSET to see how the team feels about the new organization of care.
Is not been used, could be applied by the organization if necessary.
- The evaluation phase passed off positively if an evaluation was conducted from four perspectives and if objective data are available that can be statistically verified.
No objective data is determined to statistically assess.
- The difference between the results from the diagnostic and objectification phase and the evaluation phase may be useful.
The care pathway was already developed before the 7 phase method could be applied.
- Based on these results, the decision is made to continue using the pathway or to make specific adjustments.
It may be necessary to design a clear evaluation model for the CPSS care pathway to reveal any necessary adjustments more easily, for example by using the previously mentioned CPSET.²⁰

Continuous follow-up phase

- It is needed to continuously follow-up its use and results. the pathway must be kept alive and adjusted where necessary.
It is not defined how this should be done. This would require an evaluation model.
- Agreements must be made on who or which team will take this task on. The role of the team members depends on the organizational structure and the available resources.
This is not determined, It would possibly be a task for the primary surgeon or case-manager or optionally someone from outside the care pathway. For now, the primary surgeon will be the first contact to address feedback to, who may also determine any adjustments.
- Continuous evaluation through variance analysis and monitoring process and outcome indicators (at least once a year, for example through an electronic system/ICT).

Is not specifically performed at the moment. This phase could also be processed in the evaluation model; the model could also include the variance analysis. It allows to analyze each key intervention.

- Reconsidering the pathway every six months, investigating whether the key interventions in the pathway are still applicable.
Same as the previous step, continuous evaluation.
- Based on the results it can at any time be decided to adjust the pathway concerning its contents where necessary, to start up a project to further optimize the results or to (re)define the indicators to be monitored.

Summarized results

The documentation of this care pathway mainly consists of 4 documents: a protocol description, two checklists and an information letter for the patient owner.

There is no documentation available or retrievable on the application of the components of *the screening phase* during the development of the CPSS care pathway. There is little factual information available on the screening phase. But a number of assumptions can be done according to the different components of the screening phase in the 7 phase method. For instance, the reason for the design of the care pathway is clear. Numbers are available about the complications and mortality prior to the implementation of the care pathway, although no further insight is available on the existing organization at that moment. Information about the team, the willingness of the team to change, performance indicators, financial figures or any quick scans are unclear. The recommended CPSET²⁰ quick scan could be performed at present in the evaluation phase to regain insight into the existing organization after introducing the care pathway.

Regarding *the project management phase*, such a small group of people is involved in the CPSS care pathway, it is difficult to determine a separate core team and working group. The organization concerning the CPSS care pathway is not as large as you would expect in human healthcare. The concerning organization of the CPSS care pathway is initiated by the primary surgeon. The division of tasks regarding the care supply is clear and transparent. Also, the inclusion and exclusion criteria along with the time frame are clear and straight. But the division of tasks regarding the organizational component for the design of the care pathway is not described. The majority will be regulated by the involved primary surgeon. The leadership and the responsibilities are not explicitly mentioned throughout the documents. The boundaries of the care process, the why, the project approach and the desired outcomes could be determined easily, because of the clear diagnosis of CPSS with a clear surgical therapy. A true comprehensive planning of the project in advance of the development and implementation was not applied. A protocol and checklists were made using the already existing procedures of the care process in order to design the CPSS care pathway.

The diagnostic- and objectification phase concerns the evaluation of the existing care process at the time from four different perspectives to be able to optimize the care process by implementing the care pathway. This evaluation in the 7 phase method is very comprehensive and is not applied in such a comprehensive way in the design of the CPSS care pathway. No external methods were used to determine the objectives of the care process, such as the CPSET²⁰ or the 3-blackboard method^{22, 23}. A clear presentation of objectives is missing. Also, no analysis- and quality techniques²⁴ were used to make a diagnosis regarding the own organization, which is advised in this phase. Furthermore, an analysis of how the team is currently structured in terms of leadership, composition, allocation and coordination mechanisms is absent. The information letter for clients indicates that clients are involved in the care process and client satisfaction is taken into account. It suggests that research among clients is done to develop and to assess an information letter. QoL questionnaires are taken

from clients preoperatively and postoperatively, enabling to gather information about the effect of treatment and, therefore about the CPSS care pathway.²⁹ The key interventions in the previous and new care process after the development of the care pathway are evidence-based as turned out after consultation with the surgeon of the team. However, there are no clear references listed in the description of the care pathway with the corresponding evidence or sources. The phase method also advises supporting the care pathway with guidelines and in this case with available documentation on GVP. However, these are not yet available specifically for CPSS from the veterinary branch for example. Also aligning the care pathway with the legislation is discussed, but regardless of the law on animals, there is no legislation in the veterinary medicine focused on care pathways or any organization of care. The organization should be evaluated from the vision of the external partners. In this case, there has been an exchange of visions between the several international universities where collective research is done regarding CPSS. Apart from the veterinary referrals, no external partners are involved, so this section does not really apply for the UKG. Although, there is an opportunity for the primary first line veterinarian to provide feedback on the progress of their referred patient to the UKG at a later stage after treatment.

Conclusively, no information is available about an evaluation of the care process prior to the development of the care pathway. To compare this phase with the documents of the CPSS care pathway is very difficult.

In *the development phase*, the care pathway development in the 7 phase method is based on the objective information and the predetermined objectives from the previous phases.

However, nothing concrete is available about predetermined objectives. The CPSS care pathway development is based on scientific information and expert opinions which also determined the key interventions. Evidence-based veterinary medicine (EBVM) provided the foundation for the development of the Clinical Protocol CPSS. Again, the related references are not explicitly stated.

There is a marked practical elaboration of the care pathway with clear inclusion and exclusion criteria and a clear time frame because of the clear limits of the condition CPSS. The protocol and checklists provide clarity with their representation of the key interventions and division of roles. Involvement of the client is taken into account by the development of an information letter for the client. The system that manages the patient records (Vetware) uses specific standardized forms, for example anesthesia requests. There are even more possibilities for further processing the care pathway in Vetware itself. Documents like the external paper checklists could be processed into Vetware.

The checklists provide a division of roles and in both the checklists as well as the Clinical Protocol CPSS the sequence of the activities is coordinated. Although the protocol does not specify a clear division of roles. The checklists and the protocol provide an overview of the care pathway with its boundaries and time frame with a clear starting point and end point. However, these documents solely consist of pieces of text which may cause an unclear view of the process. A visual display such as a flow chart of the care pathway would offer a solution. What else seems to be missing is a clear reporting system to follow-up results, feasibility, problems or deviations. At the moment this information is scattered per patient in

the patient record system Vetware. This information is already once used in a retrospective analysis performed on the results of the care pathway, which is reported in 2014.²⁸ Because a core team and working group are not officially defined and only a limited number of people are involved in the development, other ways might be possible to ensure an approval of a care pathway instead of the comprehensive system of approval by the core team after officially consulting the working group.

Following the development, the care pathway needs to be *implemented*. The vast majority of the current care process in 2004 was retained, which was an advantage in the implementation of the CPSS care pathway in 2004. Only now the different interventions are determined in a protocol. As a consequence, all team members are already largely aware of the contents of the care pathway. A test period of the care pathway is indicated in the implementation phase. However, such a period within the UKG is not identified.

A contact person for issues is listed in the checklists. For example, feedback on the practical usability and communication problems must be followed-up centrally according to the 7 phase method. However, there is no record describing the way feedback is processed. Just like the reporting system the description of a feedback system is lacking. Although, when new bottlenecks are identified, a consultation is scheduled. The phase method also indicates an information session prior to the implementation, but it is unclear whether this occurred. Although the interventions and work method were already clear, an information session will still be valuable to the team for explaining the development and implementation of the care pathway, together with the major changes. It ensures the team is informed about the application of the pathway and the conduction of the communication within the care pathway. There is no explicit record in the different documents of the care pathway in what way the communication system needs to be performed. On the other hand, a contact person is indicated in case any problems occur.

A test phase is explicitly mentioned in the implementation phase to be able to decide whether to continue using or adjusting the care pathway based on the first experiences. The feedback from the test phase would have to be processed by a certain specified system to be able to adjust the care pathway if needed. However, the CPSS care pathway is introduced without a testing phase, because no drastic changes were necessary. By defining and recording the interventions, the representation and execution of the care process is immediately clear for everyone involved. The different interventions will be performed consistently every time.

A first *evaluation* is recommended 2 to 3 months after implementation. No evaluation reports are available. It does not imply that no evaluations were done, but apparently, there are no records documented. Because no clear feedback system and reporting system for results and deviations is present, it is difficult to evaluate the CPSS care pathway. This makes it hard to determine whether bottlenecks of the care process before the implementation of the care pathway have been eliminated. There is no standard follow-up of results, for example, by the use of dashboards or runcharts.²⁴ For this reason, apart from the retrospective analysis from 2014²⁸ no objective data is determined for (statistical) analysis. The evaluation phase also utilizes the four perspectives of the diagnostic- and objectification phase and its techniques so the same statements indicated in this previous phase applies to the evaluation phase.

At the moment the usability will be evaluated mainly by the primary surgeon. Positive aspects and necessary adjustments will be determined based on consultations after identifying bottlenecks by members. Also, the phase method indicates the variance analysis in which each key intervention is monitored for the percentage of patients which went according to the plan. The key interventions are performed by only a small number of people involved in the care pathway. As a result, most interventions are expected to be performed as indicated in the protocol. At the moment it is not possible to specifically monitor these interventions. Several key interventions can be tracked for patients individually through the patient records in Vetware. However, this will be a time-consuming activity. At last, the team's experiences with the care pathway are not documented anywhere. For instance, the CPSET may provide a solution.

There is no possibility to look objectively at the difference between the results of the diagnostic- and objectification phase and the evaluation phase to decide, whether the care pathway is correct or specific adjustments are necessary to eliminate bottlenecks. The development of an evaluation model with the use of the CPSET may contribute to performing adjustments and eliminating bottlenecks to optimize the CPSS care pathway.

The last phase is the *continuous follow-up phase*. This concerns a continuous evaluation of the performance, application and results of the care pathway. An evaluation model and a division of tasks are missing in the care pathway. There is no clear record of who is responsible for the follow-up, but this will be performed by the primary surgeon. Also, the variance analysis along with the monitoring of process and outcome indicators remains important. The analysis should be performed one or two times a year according to the phase method, but together with the evaluation model, there is no actual indication of something similar taking place.

However, with the current number of patients at the UKG with this condition, it is unrealistic to perform a variance analysis as frequent as mentioned. In the 7 phase method, the possibility of using an electronic system or other ICT system is discussed to continuous follow-up (a limited number of) patient records to have a continuous variance analysis. Thus deviations can be determined at any time and the care pathway can be adjusted where necessary. At the moment there is no description of the process of implementing adjustments in response to deviations.

Discussion

A major point of discussion is the sequence of actions performed. The CPSS care pathway is designed and developed before this research and no tools were used such as the 7 phase method. The objective of this research is to create a format to structurally develop and implement a care pathway within the UKG. However, the CPSS care pathway is analyzed to the format, while it would be more obvious to analyze the format. But at this stage of research, there is no option to perform a thorough analysis of the format. By this reverse construction it is examined whether the format is effective for the implementation of a care pathway based on the already existing CPSS pathway. The pathway is currently used satisfactorily which turned out after consulting the primary surgeon of CPSS. As a consequence, this construction has an illogical order of analysis and comparison. Just with this research the 7 phase method was introduced as format and used to assess the current CPSS care pathway. This format was unknown to the UKG before the start of this research. A number of phases of the 7 phase method explicitly describe the design and development of a care pathway. However, the only information available is about the CPSS care pathway itself and not specifically about its design and development. Therefore it is examined to what extent the screening phase is applied by deriving and interpreting all available information. The analysis of the design of the CPSS care pathway cannot be performed completely, because information is missing when using the different phases of the format as a guideline.

Clear references to sources for an evidence-based representation of the pathway would result in a more professional care pathway for the UKG. The different key interventions are not explicitly stated with literature references or other scientific evidence. EBVM provided the foundation for the development of the Clinical Protocol CPSS, because EBVM is one of the objectives in the strategic plan of the Faculty of Veterinary Medicine in Utrecht.¹⁸ Several articles stated that one of the characteristics of a care pathway is that the goals and key interventions are based on evidence.^{3, 12, 19}

It appears that three things need to be developed: a feedback system, a reporting system and an evaluation model.

Along with the implementation phase arises the need to follow-up feedback on the care pathway. However, a direct description of the conduction of communication about feedback is missing. It is possible to address the primary surgeon and scheduling a consultation, but it is unclear whether this option is being used. After consulting the primary surgeon, it appears that feedback is currently provided by email and occasional by telephone. It is not defined how feedback is recorded and documented to provide an easy follow-up.

A feedback system with the associated contact persons should be defined to clarify the feedback delivery by staff members and other people involved with the CPSS care pathway. An option is to determine that feedback should be delivered to the primary surgeon on paper, digitally or verbally. The feedback should be documented to process later on during an evaluation to provide a response, enabling to perform any adjustments to the care pathway.

Regarding the possibilities, a message system by email or paper or even a comment space in the patient record in Vetware could be considered.

No reporting system is available to document and follow-up results, feasibility, problems or deviations regarding the key interventions. Such a system would be useful in both the development phase, the evaluation phase and continuous follow-up phase. This documentation could provide insight in results and problems. It creates the possibility to make progress and improve the quality of care every time. The information provided by the reporting system can be used for the evaluation after which adjustments can be made. As mentioned before, the 7 phase method provides three examples to use as reporting system: through dashboards, runcharts or statistical process control.²⁴ The patient records from Vetware have already been used in 2014 for a one-time retrospective analysis of the results.²⁸ In the case of the UKG Vetware is an obvious option for processing a reporting system in which the different results and deviations can be collected in a single overview. The variance analysis mentioned earlier in the 7 phase method could also be applied and processed in Vetware if considered important. As a result, percentages of correct performances per key intervention could be presented. However, due to the small scale of the CPSS care pathway with a limited number of patients, a variance analysis might not always be valuable. An option is to perform such an analysis after a minimum number of patients.

It is unknown whether the care process is optimized. There is no information available about an objective and critical evaluation of the care process prior to the development of the CPSS care pathway. This is necessary to optimize the existing organization in an objective and responsible way. As mentioned before, the CPSET (appendix 8) might be a useful instrument to perform the evaluation.³ The CPSET is especially focused on measuring the current organization of the care process instead of the documentation or instrumental quality of the care process. The main objective is to determine the most important characteristics of the care process that have an impact on the organization of the care process. It attempts to facilitate an evaluation of the impact of the care pathway on the results of the care process.²⁰ This tool was evaluated later in 2013 on its psychometric properties, concluding that the CPSET is a valid and reliable instrument in healthcare to measure how a care process is organized as it is experienced by the team.²⁵

Due to the evaluation, bottlenecks and objectives become clear in order to specifically adjust the design of the care pathway. As a result when using a care pathway, it actually improves the quality of the care process, which can again be substantiated with this evaluation method. In the 7 phase method, the CPSET is mentioned both in the screening phase as in the diagnostic phase with a corresponding purpose. It will probably be more efficient to combine the use of the CPSET in the diagnostic- and objectification phase.

After the implementation phase, again an evaluation will have to be performed. An evaluation model might be valuable here, as this is not yet defined. In the 7 phase method, a comprehensive evaluation phase is described. Although, the question raises to what extent such a comprehensive evaluation is required for such a select team within the UKG compared to human healthcare. Again, applying the CPSET as part of the evaluation model covers most

components in the evaluation phase. At the same time it provides the opportunity for the team members to express their opinion. The evaluation model can also be applied to the continuous follow-up phase. Also, the information required to perform the evaluation model should be achieved from the feedback and reporting system. What seems to be missing is a questionnaire for clients enabling to evaluate the client satisfaction. This information may currently be achieved partially from the QoL questionnaires²⁹, although the questions are focused on the condition of the patient rather than on the current organization of the UKG. All information together will have to be processed and assessed after which any necessary adjustments in the care pathway may be performed. Furthermore, it will have to be determined which members of the care pathway will work out this evaluation. The final decisions for applying adjustments could be made by the manager (primary surgeon) of the care pathway.

Several times the incorporation of components and functions of the CPSS care pathway in Vetware is mentioned as a possibility. Such ICT solutions are often difficult to achieve due to the complex programming involved. Experienced ICT staff is needed with a close cooperation with the members of the care pathway. An adequate motivation is necessary in order to transform the components and functions of the care pathway into an electronic system like Vetware. Regarding the different components and functions to transform, it could include the following:

- Processing of the ‘checklists Opname and Controle levershunt’ in Vetware along with the other key interventions of the CPSS care pathway.
- The reporting system for results, feasibility, problems or deviations, for continuous monitoring of patient data.
- The variance analysis.
- The continuous follow-up of patient records.

A flow chart can be designed to show a clear display of the key interventions from the Clinical Protocol CPSS and the checklists. A visual representation will also be able to show a time indication of the care pathway. It creates clarity for the team, and deviations can be more easily indicated and followed-up. Additional discussion can be found in the section ‘Display of care pathways’.

Conclusion

The definition and objectives of a care pathway are clear. The obtained literature includes substantial information, but the exact method to design a care pathway remains unclear. The different formats only represent the global outlines. Further interpretation and elaboration of a format is required for the applying organization itself in order to develop and implement a care pathway. Each institution will have to find its own method in the design, use, and adjustment of a care pathway that specifically suits their organization. The organization will have to apply a format to their own method using the provided components and instruments. A format is required because it offers a protocol for designing a care pathway. The research shows that it provides a handle to systematically guide the development, implementation, evaluation and continuous follow-up of a care pathway. A permanent structure is maintained and essential organizational actions will not be missed, such as the division of roles and tasks, determination of objectives, documentation, analysis of bottlenecks, defining the patient group and time frame, determination of key interventions, and so on. Use of the format may lead to an improvement in the quality of the care process.

In the analysis and comparison of the CPSS care pathway to the format, several issues have been revealed that are important when implementing a care pathway. There are in particular development opportunities in the optimization of the care process by use of the CPSET, a feedback system, a reporting system, an evaluation model, a flow chart and visible scientific substantiation. Documentation of the different processes of the format during the design of a care pathway will show more clarity in the development of other pathways in the future, as previous experiences are documented. It is important to keep in mind that the format is derived from the 7 phase method which is designed for human hospitals with a larger organization, staff, and number of patients than the UKG. Because of this difference in size, the various processes of the format are performed at a different level when applying within the UKG. Due to the smaller scale of this organization, it will not be profitable to use the same amount of energy in all processes of the format as done in human healthcare because of another distribution in capacity.

The CPSS care pathway analyzed in this research was developed before the introduction of the format to the UKG itself. It raises questions whether this format will be applicable and can support the organization when developing a new care pathway. To verify the format further research is needed on applicability in the development and implementation of a completely new care pathway for the UKG.

Display of care pathways

In most care pathways a visual representation is used. Examples are included in the appendices. A visual representation allows appointments, task divisions and protocols to be recorded in an overview for all staff members. These schemes are able to turn the care pathway into a clear and accessible representation for all concerned. The compliance of the members will be increased. A scheme represents the time frame, the sequence of actions and key interventions and the division of tasks. The scheme may focus on a particular group or discipline, such as the specialists, nurses or patient owners, or just on a part of the care pathway.

The following methods are commonly used:

- Decision tree / Flow Chart (appendix 9)
- Flow chart configured in a trajectory description (appendix 10)
- Protocol ⇔ Checklist (appendix 11)
- Time-task matrix (appendix 12)

Flow charts are being used in care pathways of human healthcare (appendix 9). With this overview it can be easily checked which actions should be taken by answering the questions on the flow chart before proceeding to the next step. Generally, these are yes or no questions. The flow chart may become very large when representing an extensive care pathway, making the representation of the care pathway less clear. A flow chart can ensure a clear care pathway while using words as few as possible. An individual step can show insufficient information, which can be a disadvantage.

No ‘yes or no questions’ are answered with the trajectory description, instead a path or trajectory is described (appendix 10). The path is represented in one way with no other options. Such a trajectory description is only possible if one path can be followed. For instance, it can be used in a smaller straightforward care pathway or to describe only a section of a care pathway.

A checklist or protocol is not exactly a visual representation, but more of a textual representation (appendix 11). It can still provide a clear view of a care pathway if designed correctly. The protocol is intended to include all parts or components from the care pathway so making faults can be excluded. When dealing with a more extensive care pathway it may become a large listing and description of steps, resulting in a wide cluttered text, which should be avoided. Optionally, the checklist or protocol description could be combined with a flow chart or trajectory description. It may result in a clear visual representation of the care pathway while still being a complete description in order to prevent mistakes.

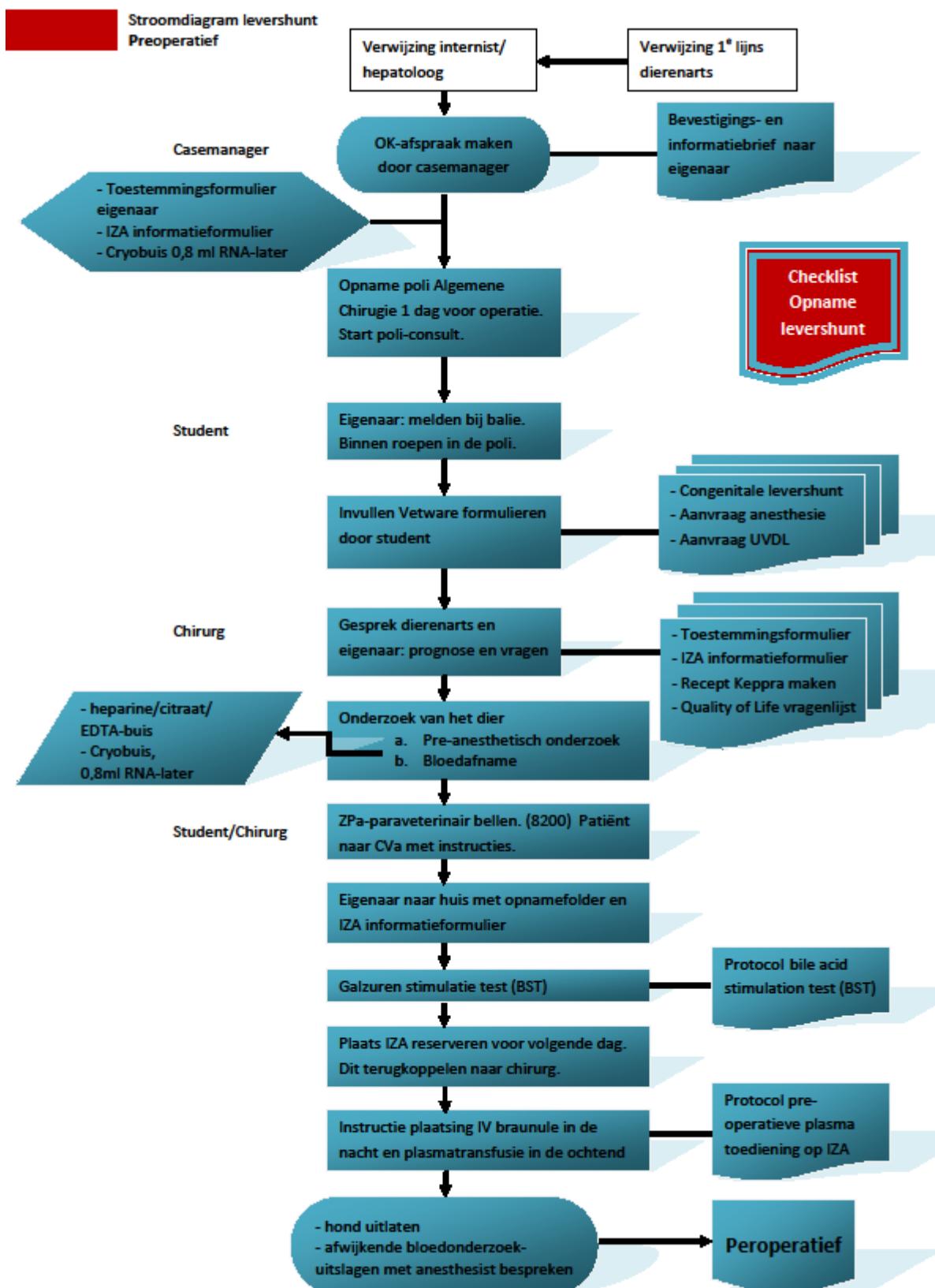
A time-task matrix is a table (appendix 12). It can be constructed in several ways, but the most common is as follows:

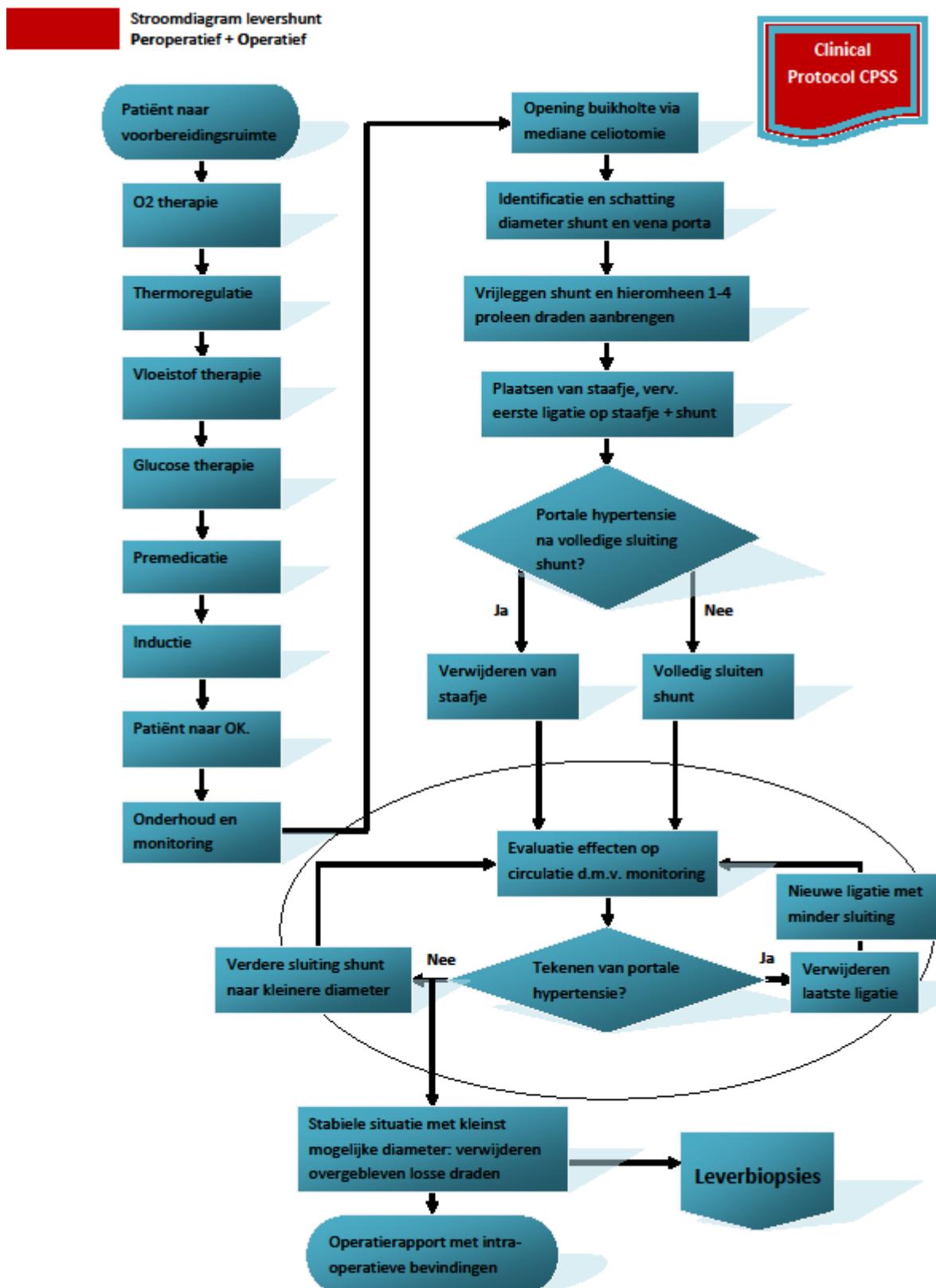
- In the top row, the time is displayed.
- In the first column, the person who performs the action is displayed (or sometimes the location instead).
- Furthermore the table shows the actions to perform.
- Potentially the duration of the action can be added by the extension of the cell.

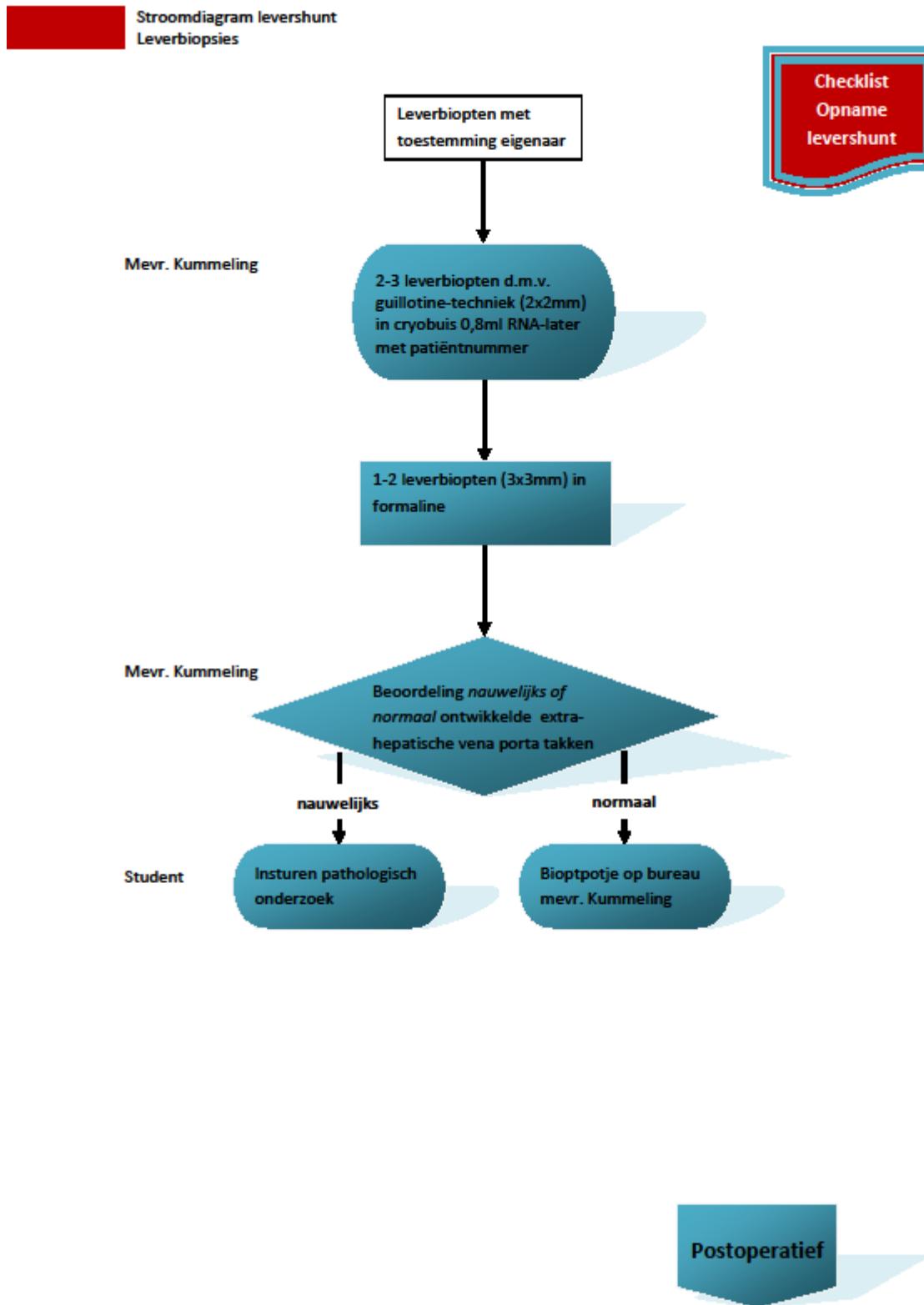
A time-task matrix can be a tool to clearly represent different parts of a care pathway distributed over a period of time. It is often a simple scheme, making it less suitable to represent an extensive care pathway. A time-task matrix can be useful, for example, to provide a direct overview for the client.

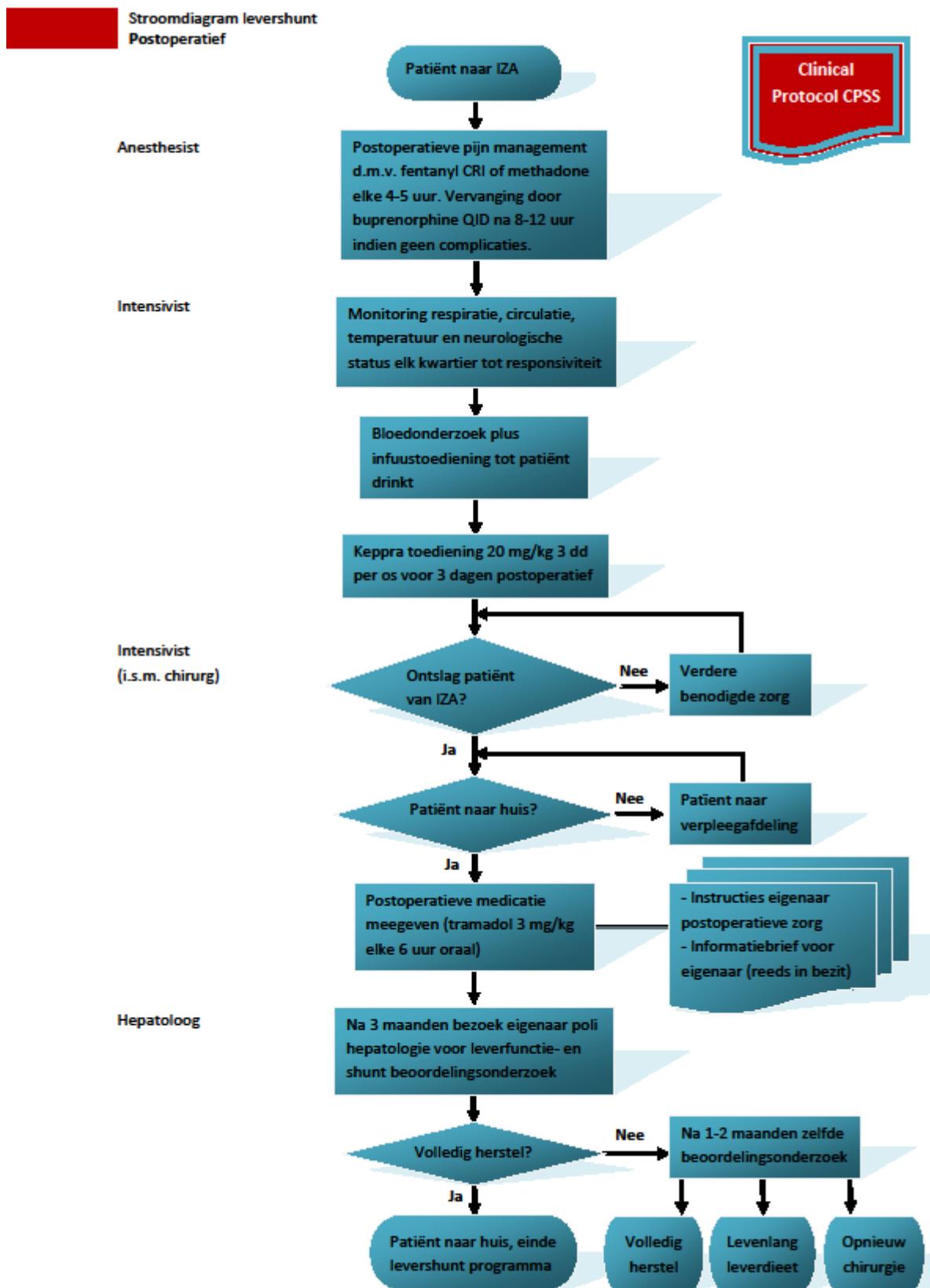
Display of the care pathway Congenital Portosystemic Shunt

The Clinical Protocol CPSS for the CPSS care pathway is a textual protocol that comprehensively describes all steps and components of the care pathway. Such a protocol is required within the UKG in order to have the complete care pathway defined on paper. However, it is not always a practical tool for the staff members in their daily activity. Another display system, like a flow chart, may provide a solution. A flow chart for the CPSS care pathway within the UKG is created. The scheme is a combination of a flow chart and a trajectory description. The purpose is to provide a clear visual display of the complete CPSS care pathway in addition to the textual protocol. The essential components of the flow chart are extracted from the comprehensive protocol. The flow chart provides a direct, practical and effective system for the organization and members involved. It is a clear visual document and can be viewed by the staff members to verify the sequential steps on beforehand or at the time of application of the CPSS care pathway. However, the Clinical Protocol CPSS is still recommended for the exact description and explanation of the CPSS care pathway. The flow chart is designed because of its characteristics to provide a complete, direct and clear guidance to all staff members and other persons related to the CPSS care pathway. The flow chart represents a complete display of the CPSS care pathway (see appendix 13) and is adjustable. The evaluation can be combined with the CPSS care pathway.









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Appendix 1: Aims and outcome of clinical pathways¹²

Subcategory*	k*	Example terms
1. Efficiency of care	10	<ul style="list-style-type: none"> • Reducing the costs • Cost-effectiveness <ul style="list-style-type: none"> • Improved efficiency of care • Less costly care • Optimize resource utilization • Reducing the time • Minimizing delays, omissions and cancellations
2. Evaluation	8	<ul style="list-style-type: none"> • Evaluation of outcomes <ul style="list-style-type: none"> • Used as tools for process and outcome audits • More critically evaluate patient care, outcomes • Audit • Highlighting differences between expected and actual outcomes • Clinical evaluations
3. Quality of care	7	<ul style="list-style-type: none"> • Continuous quality improvement in clinical practice <ul style="list-style-type: none"> • Best possible care • To ensure the best standard of practice • Lead to high quality • Minimizing variation • Diminish process and outcome variation among physicians
4. Decreasing variance	5	<ul style="list-style-type: none"> • Used to standardize the care process throughout a treatment course <ul style="list-style-type: none"> • Achieve realistic goals for clinical progress • Minimize clinical risk • The patient's expected clinical course
5. Clinical outcome	5	<ul style="list-style-type: none"> • Expected patient response to treatment
6. Change of processes	2	<ul style="list-style-type: none"> • Promoting change in practice <ul style="list-style-type: none"> • Resulting in reduced fragmentation of health care
7. Improving compliance	2	<ul style="list-style-type: none"> • Increase compliance <ul style="list-style-type: none"> • Maximize compliance
8. Effects on patient satisfaction	1	<ul style="list-style-type: none"> • Patient satisfaction
9. Improving data collection	1	<ul style="list-style-type: none"> • Improving systematic collection of data
10. Improving best practice	1	<ul style="list-style-type: none"> • Help to optimize care
11. Accountability	1	<ul style="list-style-type: none"> • Define a medico legal standard of care
12. Not specified**	22	<ul style="list-style-type: none"> • Achieve a given outcome <ul style="list-style-type: none"> • Desired outcomes • May pursue several goals • Identifiable outcomes • Patient outcome • Expected goals • Expected outcomes • Optimizing • The restoration of a desired outcome

*Characteristics were classified into 12 different subcategories.

k* represents the number of different terms belonging to each subcategory.

**Could not arrive at a consensus.

Appendix 2: Roadmap of 30 steps by Vanhaecht en Sermeus (2002)⁵

PLAN FASE

In de plan fase (stap 1-6) gaat het om de populatie af te bakenen en het team samenstellen en starten met de eerste versie opbouwen van een zorgpad.

Stap 1 : eerste contact

Waarom wordt gedacht aan de methodiek van een klinisch pad om het probleem op te lossen. En wie vraagt het pad aan? Wie is verantwoordelijk?

Stap 2 : impactanalyse

Naast volume, kosten en risico is voorspelbaarheid van de zorg de meest belangrijke parameter. Hoe meer voorspelbaar hoe beter de populatie zich leent voor een pad.

Stap 3 : samenstelling interdisciplinaire werkgroep

Kernteam moet interdisciplinair zijn en uit 5-7 personen bestaan.

Verantwoordelijke is de verantwoordelijke arts.

Coördinator faciliteert. De klinische expertise wordt geleverd door het team zelf.

Stap 4 : afbakening van de patiëntenpopulatie

Pad wordt ontwikkeld voor een specifieke patiëntenpopulatie.

Bepalen van tijdsvenster.

Stap 5 : bepalen van de doelstellingen van het klinisch pad, het operationaliseren van de doelstellingen in meetbare indicatoren en bepalen van de sleutelinterventies

Doelstellingen voor zowel patiënt als hulpverlener.

Bepalen van meerbare indicatoren.

Bepalen van sleutelinterventies en omzetten in kritische indicatoren.

Er wordt aangeraden om een tiental sleutelinterventies in een pad te bepalen en de varianties op deze interventies nauwgezet te volgen.

Stap 6 : eerste versie van het klinisch pad (huidige werking)

Time-task matrix van Sermeus en Vanhaecht, 2002, wie doet wat wanneer en met welk doel.

Eerst doelstellingen bepalen en dan de acties hiervoor plannen.

Aan de hand van 3 borden: één rechts doelstellingen voor de populatie,
één midden met time-task matrix,
één links met knelpunten en onduidelijkheden/ discussiepunten

DO FASE

De do fase (stap 7-13) gaat om het verzamelen van gegevens voor de huidige werkwijze en best practice.

Stap 7 : dossieranalyse

Aan de hand van een retrospectieve analyse van een twintigtal dossiers wordt de huidige werking in kaart gebracht. Er wordt vooral gekeken naar haalbaarheid van de eerste versie van het pad, de doorlooptijd en de knelpunten. Uittekenen van de eerste versie helpt bij een gerichte en doeltreffende dossieranalyse.

Stap 8 : voormeting aan de hand van Klinisch pad Kompas

Uitvoeren van een prospectieve kwaliteit- en efficiëntiemeting. Gebruik makend van de vijf indicatoren volgens het Klinisch Pad Kompas.

De voormeting (nulmeting) wordt als een van de belangrijkste stappen in het stappenplan gezien, is namelijk essentieel om de impact van het pad te kunnen evalueren.

Stap 9 : patiënt surveys

Hierdoor zijn een tiental patiënten aan het woord over het proces van het zorgprogramma. Door interviews, vragenlijsten of ‘walk through’.

Stap 10: documentenanalyse

Een inventarisatie van de schriftelijke documenten.

Stap 11: proces mapping

De procesmapping is noodzakelijk als basis voor de vereenvoudiging en structureren van het proces. Het proces is zo sterk als de zwakste schakel. Door dit proces komen bottlenecks aan het licht. Gaat volgens de drum, buffer en rope theorie. Drum is de activiteit die het ritme van het proces aangeeft. Buffer is het systeem van veiligheidsmarges. Rope geeft de samenhang tussen bepaalde sleutelinterventies weer.

Het is belangrijk om de drum, buffer en rope te kennen voor het organiseren van een optimale planning.

Stap 12: vergelijking met “best practice guidelines”

Het gaat om de kritische evaluatie van de inhoud van het pad, op basis van “best practice”.

Stap 13: peer review

het voorleggen van het pad aan de betreffende diensten om na te gaan of het pad haalbaar.

CHECK FASE

De check-fase (stap 14-20) interpreteert de gegevens van de do fase en stelt het zorgpad bij op basis van de resultaten.

Stap 14: vastleggen van de operationele criteria voor afbakening van de patiëntenpopulatie
Het bepalen van de in- en exclusiecriteria die op het pad vermeld worden.

Stap 15: concreet uitschrijven van een klinisch pad vis een Time-Task matrix

De eerste versie van het klinisch pad (stap 6) wordt op basis van de resultaten uit de do fase omgezet naar een tweede versie.

Naast interventies moeten ook doelstellingen in het pad worden opgenomen. Het pad kan door specifieke software ondersteund worden.

Stap 16: planning van het volledige proces

Het uitwerken van een volledig capaciteits- en middelenplan, gericht op de meest ideale doorstroming van de patiënten.

Stap 17: capaciteit- en middelenplan

Het evalueren van de huidige capaciteiten en middelen.

Stap 18: opstellen van Service Level Agreements (SLA)

SLA bestaat uit een beschrijving van de verwachte bijdrage aan het klinisch pad van niet rechtstreeks verbonden medewerkers evenals de verwachte middelen, verwachte service en het kwaliteitsniveau.

Stap 19: vastleggen van de aansturing van het pad

Zoals verantwoordelijkheden, overlegmomenten, hoe wordt gerapporteerd, hoe worden wijzigingen aangebracht, wat te doen als pad niet gevuld wordt.

Stap 20: opleiding van alle medewerkers

Afspraken maken over hoe het pad gebruikt en opgevolgd dient te worden. Het is een leidraad geen standing order. Het moet duidelijk zijn waarom bepaalde beslissingen genomen werden.

ACT FASE

De act-fase (stap 21-30) is het implementeren en continue evaluatie van het zorgpad.

Stap 21: testcasus

Het pad wordt uitgetest bij een aantal patiënten gedurende 3 weken of een try-out bij 10 patiënten, afhankelijk van volume.

Stap 22: aanpassen van het pad tot een definitieve implementatieversie

Dit gebeurt na testfase

Stap 23: integratie van klinische paden in het patiëntinformatiesysteem
ICT ondersteuning is noodzakelijk.

Stap 24: integratie van het klinisch pad in het patiëntendossier

Lay-out van paden is zeer verschillend. Het kan in de vorm van checklists voor sleutelinterventies. De time-task geeft een overzicht van het proces, maar mist diepgang.

Stap 25: registratie van afwijkingen

Omdat elke patiënt uniek is, is het normaal dat er afgeweken wordt van het klinisch pad. Deze variaties kunnen zowel positief als negatief zijn. Er moeten afspraken gemaakt worden over de opvolging van deze variaties en de rapportage hiervan,

Stap 26: agendabeheer- en boekingssystemen

Ondersteunende diensten moeten ondergeschikt worden gemaakt aan het klinisch pad, als de patiënt centraal wordt gesteld. Dit vraagt een uitstekend boekingssysteem (van de luchtvaart)

Stap 27: patiëntinformatie via folders of internet

De informatie over het door de patiënt te volgen pad is interessant voor zowel de patiënt, de familie als de huisarts.

Stap 28: de beschikbaarheid van een klinisch pad en bijhorende infobrochures op een intranet

Dit is vooral zinvol voor eigen medewerkers, het kan tevens gebruikt worden voor informatie voor nieuwe medewerkers.

Stap 29: nameting en systematische evaluatie van het pad

Na enkele maanden wordt het geëvalueerd op basis van het Klinisch Pad Kompas. Dezelfde indicatoren die gemeten en gevuld zijn tijdens de do-fase (stap 7 tot 13) worden herhaald. Het kan ook op basis van de PDCA-cyclus, aangezien de gezondheidszorg complex en zeer dynamisch is, kunnen er altijd wijzigingen zijn die moeten worden aangepast en geëvalueerd.

Het opmaken van een bordkaart (Balanced Scorecard) op het niveau van het klinisch pad wordt ondersteund.

Stap 30: opzetten van een systematisch feedback loop

Het is belangrijk om de gegevens systematisch te verzamelen, evalueren en bij te sturen. Dit kan door informatiesystemen die dit Klinisch Pad Kompas ontwikkelen.

DE BELANGRIJKSTE STAPPEN ZIJN:

- samenstellen interdisciplinaire werkgroep (anders is er geen sprake van een klinisch pad)
- bepaling doelstellingen en operationaliseren van meetbare indicatoren
- eerste versie klinisch pad met lijst van sleutelinterventies, noodzakelijk om do-fase te doorlopen
- analyse huidige werkwijze door dossieranalyse, voormeting, patiëntensurveys en gesprekken met hulpverleners
- opmaak tweede versie van klinisch pad op basis van resultaten uit de do-fase
- opleiding aan hulpverleners
- implementatie van het pad via testcasus en later definitieve versie
- nameting en systematische evaluatie van het pad op basis van Klinisch Pad Kompas
- blijvende systematische opvolging

Appendix 3: Roadmap of 10 steps by VUmc¹⁰

De aanpak: stappenplan voor een zorgpad

Zorgpaden beschrijven een zorgproces voor een duidelijk omschreven groep patiënten binnen een specifieke organisatie, in ons geval het VUmc. Daarom kunnen ze niet zo maar van een andere instelling of van het internet worden gekopieerd. Om daadwerkelijk tot een zorgpad te komen, is het dan ook nodig om met het team van professionals een aantal stappen te doorlopen. Het Netwerk Klinische Paden heeft een gedetailleerd 30-stappenplan ontwikkeld (Sermeus & Vanhaecht, 2002). Onderstaand stappenplan is hierop gebaseerd, maar ingekort en aangepast aan de praktijk van het VUmc.

Stap 0: voorbereiding

Patiëntengroep bepalen. De overwegingen genoemd op pagina 1 kunnen hierbij gebruikt worden, maar ook de top 5 van uit de patiëntenmix kan gehanteerd worden (zie ook pagina 8). Belangrijke criteria bij de keuze blijken vaak te zijn: voorspelbaarheid van zorg, groot volume, hoog risico en hoge kosten. Vaststellen welke arts (met mandaat) als “eigenaar” van het zorgpad kan optreden. Doorgaans zal dit de hoofdbehandelaar zijn. Vaststellen hoe de medewerkers op de afdelingen en zorggroepen betrokken worden in de ontwikkeling van het zorgpad en de afspraken die daarover gemaakt worden. Tijdens het gehele proces van ontwikkeling en uitvoering van het zorgpad is het van belang dat goed wordt nagedacht over werkinstructies voor medewerkers bij veranderde werkwijzen en over benodigde opleiding, bij- of nascholing, zodat alle medewerkers op de hoogte zijn van het pad en er goed mee kunnen (blijven) werken.

Stap 1: samenstellen werkgroep van professionals

Samenstellen van een werkgroep. Dit is het team waarin de professionals (medici, paramedici en verpleegkundigen) van alle betrokken afdelingen vertegenwoordigd zijn. Een kerngroep van dit team (5 à 7 personen) zal onder voorzitterschap van een arts en tevens zorgpadeigenaar als afgevaardigde van hun specialisme het project uitwerken. Ook wordt een projectbegeleider (liefst met kennis van zorgpadontwikkeling) aangewezen om de voorzitter te ondersteunen. Het verdient aanbeveling om in het kader van patiëntenparticipatie een patiënt op te nemen in de werkgroep.

Stap 2: verkenning doelstellingen en indicatoren

Verkenning van de doelstellingen van het pad en het operationaliseren in meetbare indicatoren. In deze fase gebeurt dit zo goed als mogelijk. De praktijk leert dat er meestal nulmetingen nodig zijn om de doelstellingen definitief vast te stellen (zie stap 5). In deze stap kan gebruik worden gemaakt van beschikbare literatuur over de gekozen patiëntengroep, evidence based richtlijnen, en voorbeelden van klinische paden en projecten uit andere ziekenhuizen. In elk zorgpadontwikkelingsproject zal, zoals in alle nieuwe kwaliteitsprojecten, een kostenbatenanalyse gemaakt moeten worden. Hierbij verwijzen we naar het *Beleidskader Kosten-batenanalyses*, de methodiek van de “kwaliteitsbriljant” en het rekenformat voor een financiële analyse. Beleidskader en hulpmiddelen zijn op intranet voor iedere VUmc-medewerker beschikbaar. In deze stap kan hiervan de eerste versie opgesteld worden. Tot slot kan in deze stap besloten worden om meerdere zorgpaden voor gerelateerde patiëntgroepen te clusteren als dit voordelen oplevert.

Stap 3: analyse van de huidige werkwijze en schets van de gewenste werkwijze

Procesanalyse van de huidige werkwijze in het team. Hierbij zullen al meteen verschillen in werkwijze aan het licht komen. Door te besluiten welke werkwijze in het vervolg gevuld zal worden, maakt het team een begin met het vastleggen (protocollen) van de gewenste werkwijze. Bij deze stap hoort ook de tijdsas: op welke dag gebeurt wat? Het resultaat van

deze stap is consensus over een eerste, ruwe versie van het zorgpad . Een risico-inventarisatie uit het oogpunt van patiëntveiligheid is onderdeel van de procesanalyse.

Stap 4: knelpunten benoemen

In de vorige stap zijn problemen aan het licht gekomen, die de professionele kwaliteit (wijze van behandelen door de professional), organisatorische kwaliteit (logistieke bottlenecks, veiligheid) of servicekwaliteit (bejegening, informatie) negatief beïnvloeden. Het team moet proberen om deze knelpunten uit het zorgpad te halen, zodat de eerder geformuleerde doelstellingen gehaald kunnen worden.

Stap 5: objectiveren

Objectiveren van het proces (door meten, best-practice vaststellen, etc). Het verzamelen van gegevens kan met behulp van een dossieranalyse, een nulmeting en/of door patiënt surveys (evaluatiegesprekken, meelopen met paar patiënten, focusgroep, etc.). In deze stap komen ook evidence based en best practices naar voren, zoals ze door toonaangevende organisaties zijn geformuleerd. Uit deze stap moet blijken hoe het proces in de huidige situatie presteert op de geformuleerde indicatoren uit stap 2. De resultaten helpen het team bij het doorvoeren van de juiste verbeteracties en maken het mogelijk om achteraf de effecten vast te stellen. Veelal vanaf het begin en juist bij deze stap zal de werkgroep ondersteuning nodig hebben. Deze ondersteuning is momenteel binnen het VUmc geregeld binnen het project Sneller Beter en zal ook de komende jaren vorhanden zijn (zie paragraaf 6. Ondersteuning).

Stap 6: definitief vaststellen van doelstellingen en indicatoren

Vaststellen van de doelstellingen en de goed meetbare indicatoren (definitieve versie stap 2). Zo mogelijk gebeurt dit nadat het zorgpad is uitgetest bij enkele patiënten (testcasus). Met de informatie uit stap 5 is het mogelijk om definitief de doelstellingen en indicatoren voor het zorgpad vast te stellen.

Stap 7: aanpassen van het zorgpad

Op basis van de voorgaande stap (en testcasus) worden verbeteringen aan het zorgpad aangebracht. Denk aan aanpassingen in de inclusie- en exclusiecriteria van patiënten of aan de volgorde van de stappen in de tijd. Hierbij worden de resultaten uit stap 5 gebruikt. In deze tweede versie van het zorgpad worden ook de organisatorische consequenties, het benodigde beslag op capaciteiten, de inzet van en afspraken met medisch ondersteunende diensten en dergelijke meegenomen. Ook wordt de definitieve risico-inventarisatie uit het oogpunt van patiëntveiligheid gemaakt. De definitieve kosten-batenanalyse kan nu ook opgesteld worden.

Stap 8: invoeren, monitoren en verbeteren van het zorgpad

De tweede versie van het zorgpad wordt ingevoerd voor een nog beperkt aantal patiënten. Aan de hand van de vastgestelde indicatoren vindt monitoring plaats. Afwijkingen van het pad worden geregistreerd (variantie rapportage). Knelpunten en suggesties voor verbetering worden verzameld. Eventueel wordt een actieplan opgesteld om problemen op te lossen. Aangeraden wordt om in deze stap ook een patiëntenversie van het zorgpad te maken, opdat de patiënt goed geïnformeerd wordt over het zorgproces.

Stap 9: werken met continu systeem van melden en meten

Via een continu feedbacksysteem van meldingen, registraties, metingen e.d. van zowel patiënten als zorgverleners wordt het in stap 8 ingevoerde zorgpad continu bijgesteld en wordt de zorgverlening continu verbeterd. Helder is: wie meldt en registreert? Hoe? Aan wie? Wanneer? Wie reageert? Zo ontstaan meerdere, steeds verbeterde versies van het zorgpad. Steeds is ook aandacht voor betrokkenheid en opleiding van het personeel op de betreffende afdelingen en voor adequate voorlichting aan patiënten.

Stap 10: einde project en verankering in de organisatie

Het ontwikkelings- en invoeringsproject is klaar. De belangrijkste knelpunten zijn uit de weg

geruimd. Monitoring en bijstelling vinden continu plaats. Het zorgpad wordt nu onderdeel van de reguliere organisatie. Helder is belegd wie eigenaar van het pad is en wie voor continue updating zorgdraagt. Ook alle noodzakelijke documenten en formulieren worden overgedragen en opgenomen in het (t.z.t. accrediteerbare) kwaliteitssysteem van de betrokken afdelingen.

Aandachtspunten

- **Tijdsduur:** De ervaring leert dat het ontwikkelen en invoeren van een zorgpad voor de eerste keer 9 à 12 maanden duurt. Bij een tweede keer is deze periode al aanzienlijk korter. Werken met de zogenaamde snelkookpanmethode (een aantal intensieve dagbijeenkomsten met het hele team) kan deze periode verkorten.
- **Eigenaarschap zorgpaden:** Voor een goede borging is het van belang dat het eigenaarschap van een zorgpad goed wordt belegd in de organisatie (zie ook stap 0). Dit is van belang voor de rapportage van afwijkingen van het pad, voor de monitoring van gemaakte afspraken en behaalde resultaten en last but not least voor een continu proces van het up to date houden van het zorgpad. Uitdrukkelijk wordt dan ook gevraagd hier aandacht aan te schenken in elk zorgpadontwikkelingsproject.
- **Kwaliteits- en managementinformatie:** Voor een goede borging van de resultaten is het verder van belang dat kwaliteits- en managementinformatie over een zorgpad gegenereerd wordt. Deze informatie maakt het mogelijk dat de zorgverlener op het scherm steeds actuele informatie van een patiënt in het zorgpad bij elkaar heeft. Tevens kan zo op basis van geaggregeerde informatie beleidsmatig gestuurd worden op de patiëntenumix en de verschillende patiëntengroepen in een zorgpad binnen deze mix. Hiermee is al een start gemaakt: op Focuspagina's zijn vastgestelde indicatoren van enkele ontwikkelde zorgpaden te volgen. BIZA zal gevraagd worden deze ontwikkeling verder ter hand te nemen.
- **Vastlegging van zorgpaden:** Het vastleggen van zorgpaden zal uiteindelijk moeten gebeuren in het documentbeheersysteem dat momenteel geselecteerd wordt als centrumbrede standaard door de werkgroep documentbeheer. Invoering van een adequaat systeem is een absolute voorwaarde voor een succesvolle doorvoering van zorgpaden binnen het VUmc.

Appendix 4: Roadmap of 13 steps by Campbell⁹

The following steps are should be taken to develop integrated care pathways.

Select an important area of practice—Selection criteria could include common or costly clinical conditions, those where there is a high level of interest among local staff, or those where variations in practice occur and affect patient outcome.

Gather support for the project both locally among health care staff and nationally through user groups.

Form a multidisciplinary group to compare current practice with established clinical guidelines.

Identify established guidelines or develop these following national recommendations such as those published by the Scottish Intercollegiate Guidelines Network.

Review practice, both current and past.

Involve local staff from all disciplines providing care for this condition in developing a local protocol focus-ing on best practice which is feasible to achieve locally.

Identify key areas for service development for that clinical condition and express appropriate goals for the service.

Develop an integrated care pathway which specifies elements of care detailed in local protocol, the sequence of events, and expected patient progress over time.

Prepare documentation for the integrated care pathway.

Educate staff in the use of the integrated care pathway.

Pilot then implement the integrated care pathway. This should include regular review to assess the level of completion of data recording.

Regularly analyse variances from the integrated care pathway. Investigation of the reasons why current practice is different from that recommended in the integrated care pathway can be used to: (a) identify common variations from agreed best practice; (b) alert staff to patients who are failing to progress as expected; (c) update the integrated care pathway by incorporating agreed changes; and (d) identify research issues.

Discuss variations from the integrated care pathway and distinguish avoidable from unavoidable variations; then identify and implement solutions to avoidable variations. An unavoidable variation might be coexisting disease which complicates care for an individual; an avoidable one might be a delay in the reporting of a laboratory test which delays further carem and discharge from hospital.

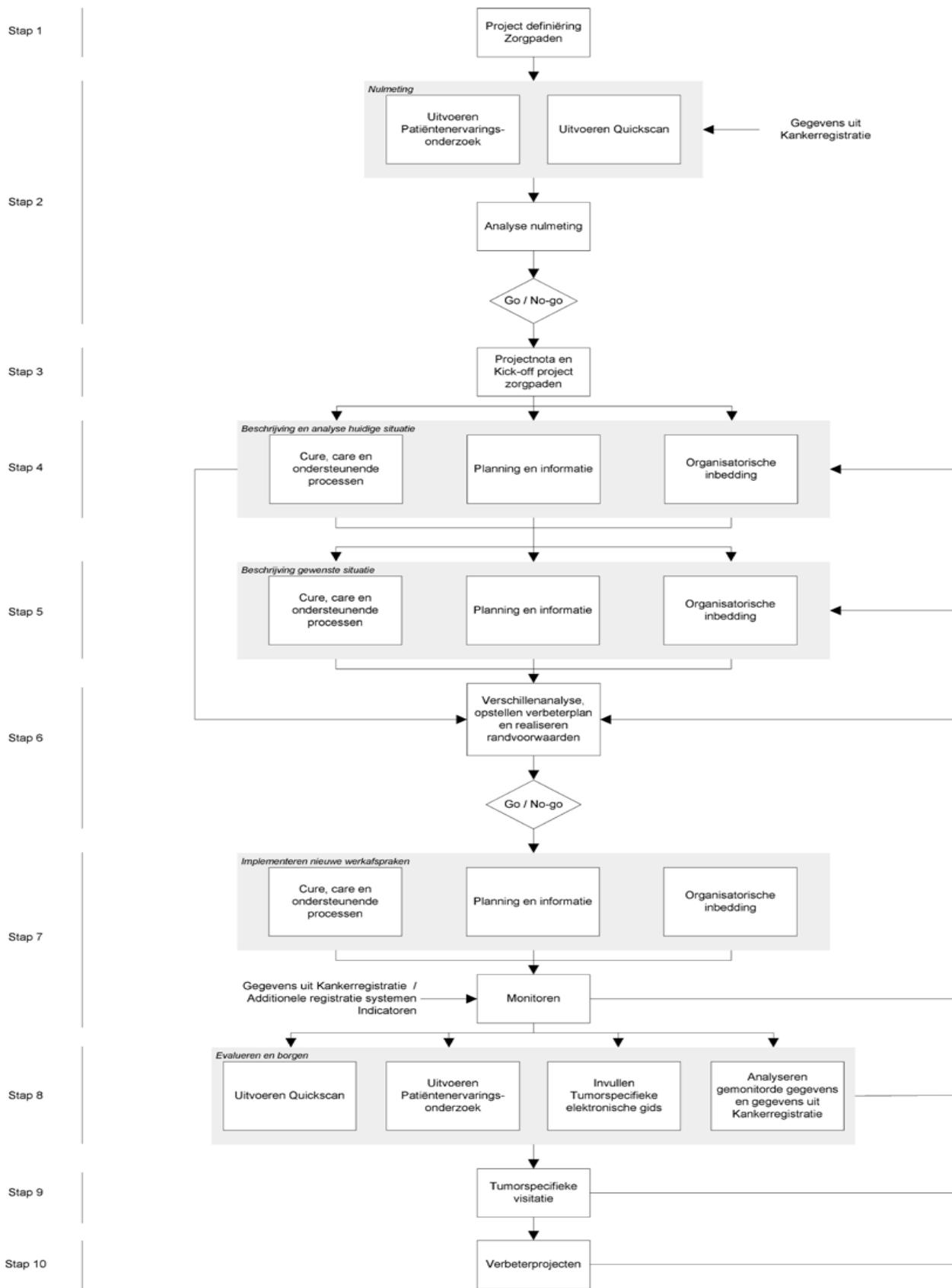
Appendix 5: Roadmap of 9 steps by Panella⁷

Clinical pathway development

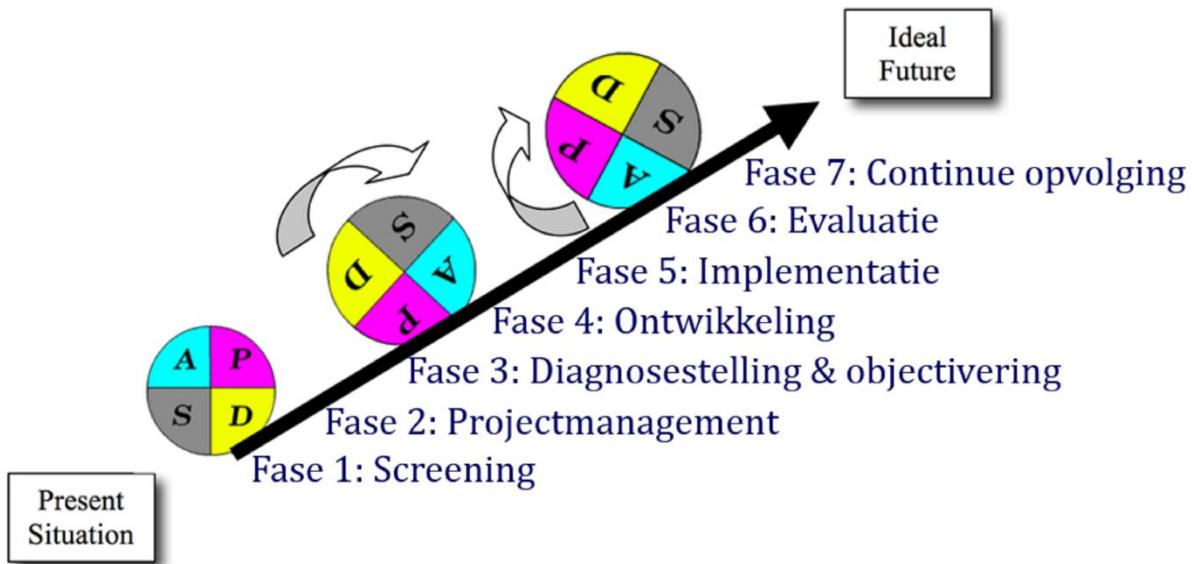
To build the clinical pathways, we merged EBM tools with business process re-engineering techniques as follows:

1. *Select the area of practice.* We chose the area with a selection matrix, including diagnoses, with higher costs, higher volumes, higher mortality, higher length of stay, or greater number of outcome variations.
2. *Build the multidisciplinary work-team.* We involved physicians (from family practitioners to specialists), nurses, therapists, social workers, and administrators providing care in the selected area.
3. *Define the diagnosis.* We identified clinical selection criteria for each diagnosis with explicit and shared disease-staging scales.
4. *Define the patients.* We identified other selection criteria as non-clinical, such as socio-economic factor, housing status, age of the patient, etc.
5. *Review practice and literature.* We analysed the care processes and researched the best evidence for the patients. The results of this phase came from all the members of the team.
6. *Develop the clinical path.* We started by defining the appropriate goals to satisfy the multidimensional needs of the patients (patient focus phase). Next we ‘translated’ the results from the review phase into elements of care detailed in local protocols and documentation, including the sequence of events and expected progress of the patients over time. The elements of care for each professional were defined according to the care categories.
7. *Pilot and implement the clinical pathway.* We educated the staff and monitored the use of the pathway. This last step was carried out by completing data record sheets that summarized the tasks of each professional during the care of the patients and the possible deviations from the path.
8. *Ongoing evaluation.* We assessed the level of completion of the data recording, investigated why there were any differences between the one in practice and the recommended one (deviations from the pathways), and measured patients outcomes.
9. *Implementation.* The last phase consisted of the daily utilization of the clinical path, its regular monitoring (every 3 months) and updating (yearly).

Appendix 6: Roadmap of 10 steps by Hummel⁸



Appendix 7: 7 phase method by Vanhaecht³



Screeningsfase

- Er is vraag naar een nieuw zorgpad of aanpassing bestaand pad.
- Nagaan of een zorgpad de juiste methodiek is voor het oplossen van de vraag.
- Informatie bij elkaar brengen over het mogelijke eigenaarschap (wie stelt de vraag?)
- Draagkracht en bereidheid van team tot verandering en innovatie, methoden:
 - Stakeholder mapping
 - Impactanalyse
 - Vragenlijsten teamwerking
 - Gesprekken leidinggevenden en kernspelers²⁴
- Zicht op bestaande organisatie en resultaten van zorgproces, d.m.v. beschikbare informatie:
 - Performantie-indicatoren
 - Financiële feedback
 - Kerncijfers
- Evt. nieuwe informatie/gegevens verzamelen d.m.v. een soort quickscan door bv
 - ZPZET²⁰ (zie Appendix 8), dit helpt het team een score toe te kennen aan de bestaande organisatie.
- Met deze informatie nagaan of daadwerkelijk een project gestart moet worden
- Is het opstarten van het project een verantwoorde keus:
 - Is er nood aan een herwerking van het zorgproces
 - Is een zorgpad voor deze knelpunten de geschikte tool
 - Is het team veranderingsbereid

Projectmanagementfase

- Zorgproces afbakenen en kernteam plus werkgroep samenstellen met afspraken over taakverdeling en projectplan.
 - Inclusie- en exclusiecriteria
 - Tijdskader

- Kernteam gaat zorgen voor voorbereiding van het volledige project, uitwerking en evaluatie.
- Kernteam informeren over het waarom van dit initiatief (concept en methodiek)
- Concrete afspraken maken over projectleiderschap, de verschillende rollen en de verantwoordelijkheden
- Projectplan praktisch uitwerken door taken en opdrachten bv uit te zetten op een time-task matrix, zodat het project ook opgevolgd en bijgestuurd kan worden. Noodzakelijke middelen kunnen berekend en opgevolgd worden.
- Duidelijkheid over de grenzen van het zorgproces, het waarom, de projectaanpak en het gewenste verloop.
- Aan het eind van deze fase bevestiging van beslissing tot wel of niet uitvoeren van dit project.

Diagnosestellings- en objectiveringsfase

- Op objectieve en kritische wijze het bestaande zorgproces evalueren om deze organisatie op objectieve en verantwoorde wijze te kunnen optimaliseren.
- Start wanneer het project is voorbereid en men klaar is voor evaluatie
- Evaluatie uit 4 verschillende invalshoeken:
 - Vanuit eigen organisatie en team
 - Bepalen doelstellingen van het zorgproces a.h.v. ZPZET²⁰, klinischpadkompass²¹, 3-bordenmethodiek^{22, 23}
 - Analyse van knelpunten
 - Bepaling noodzakelijke middelen om zorgproces kwalitatief te organiseren en optimaliseren
 - Diagnosestelling is mogelijk m.b.v. verschillende analyse-en kwaliteitstechnieken²⁴
 - Analyse van de structuur van het team m.b.t. leiderschap, samenstelling, toewijzing en coördinatiemechanismen
 - Visie van patiënt/cliënt (en familie)
 - Interviews of focusgroepen m.b.t. patiënttevredenheid of – verwachtingen en –voorkeuren.
 - Of een walkthrough/shadowing → volgen van patiënt door hulpverlener door het zorgproces
 - Beschikbare evidence en wetgeving
 - Sleutelinterventies (interventies met meeste impact op patiëntenresultaten) moeten ondersteund worden door internationale standaarden, lokale protocollen of klinische expertise
 - Dit geldt ook voor op te volgen resultaatsindicatoren
 - Ondersteunen van zorgpaden door richtlijnen en beschikbare lijsten met op GVP gegrondde sleutelinterventies
 - Het formuleren van performantie-indicatoren
 - (Afstemmen van zorgpaden op wetgeving)
 - Visie externe partners?
 - Evaluatie en optimalisatie door externe partners m.b.v. interviews en vragenlijsten
- Uit elk van de 4 invalshoeken dient objectieve informatie over het zorgproces beschikbaar te zijn om op basis hiervan het zorgproces te herontwerpen en te verbeteren.

Ontwikkelingsfase

- Start wanneer alle informatie uit vorige fase beschikbaar is.
- Ontwikkeling van het pad op basis van objectieve informatie en vooraf bepaalde doelstellingen.
- Nagaan of afbakening patiëntengroep en tijdskader haalbaar zijn.
- Sleutelinterventies aanbrengen op een tijdsas.
- Bijsturing ontwerp zorgproces a.h.v. haalbaarheid op basis van mogelijkheden voor team en organisatie.
- Praktische uitwerking zorgpad
- Afspraken m.b.t. organisatie standaardiseren als onderdeel van het patiëntendossier.
- Aangeven doelen en sleutelinterventies
- Rollen en opeenvolging activiteiten coördineren
- Resultaten en afwijkingen t.a.v. sleutelinterventies moeten worden gedocumenteerd, opgevolgd en geëvalueerd.
- Positieve beoordeling indien het pad multidisciplinair is voorbereid en opgesteld voor een specifieke patiëntengroep in een gedefinieerd tijdskader in de vorm van bv een time-taskmatrix met duidelijk start- en eindpunt.
- Visuele weergave doelstellingen en sleutelinterventies, zoveel mogelijk evidence onderbouwd.
- Goedkeuring zorgpad door kernteam na advies van werkgroep
- Uitwerking patiëntenversie van het zorgpad om cliënt te betrekken

Implementatiefase

- Start implementatie na volledige uitwerking zorgpad
- Alle teamleden inlichten voor gebruik van het pad gedurende een bepaalde periode
- Opstellen implementatieplan → rolverdeling, aanspreekpunten bij problemen, feedback centraal opvolgen
- Informatiesessies vooraf aan het testen van het zorgpad met info over dit pad, de belangrijkste wijzigingen, hoe het pad gebruikt wordt en hoe de communicatie verloopt.
- Testen van pad bij beperkte groep patiënten
- A.h.v. eerste ervaringen wordt het pad bijgestuurd waar nodig. Feedback komt in een verslag.
- Evaluatie testfase op basis van feedback van teamleden
- Positieve beoordeling indien pad toegelicht en getest is en na overleg binnen kernteam is besloten tot het al dan niet gebruiken van het pad in dagelijkse praktijk.

Evaluatiefase

- Nagaan of knelpunten vóór implementatie nu weggewerkt zijn
- Evaluatie van bruikbaarheid.
- Nagaan van compliantie t.a.v. sleutelinterventies (procesindicatoren) en intermediaire en eindresultaten van zorg (resultaatsindicatoren).
- Deze eerste evaluatie 2 tot 3 maanden na implementatie.
- Ook hier wordt gewerkt vanuit 4 invalshoeken zoals in de diagnosestellings- en objectiveringsfase, evt. met gebruik van dezelfde technieken zoals de ZPZET²⁰.
- Variantieanalyse: voor elke sleutelinterventie kijken bij welk percentage patiënten deze ook volgens plan werd uitgevoerd.

- Opvolgen van resultaten van de zorg via bv boordtabellen, runcharts of statistical process control.²⁴
- Gebruik van de ZPZET om na te gaan hoe het team de nieuwe organisatie ervaart.
- Evaluatiefase is positief verlopen indien evaluatie uitgevoerd is vanuit de 4 invalshoeken met objectieve gegevens, die statistisch kunnen worden getoetst.
- Er kan gekeken worden naar het verschil tussen de diagnosestellings- en objectiveringsfase en de evaluatiefase.
- Op basis van de evaluatieresultaten wordt beslist of er doorgegaan wordt met het zorgpad of dat er bijsturingen moeten plaatsvinden.

Continue-opvolgphase

- Het gebruik en de resultaten moeten continu opgevolgd worden. Het pad moet levend gehouden worden en waar nodig bijgestuurd.
- Afspreken wie deze taak op zich zal nemen. De verdere verdeling van taken of rollen hangt af van de organisatiestructuur.
- Continue evaluatie via variantieanalyse en opvolging proces- en resultaatsindicatoren. (1x per jaar, bv m.b.v. elektronisch of informatica systeem.)
- Inhoudelijk herbekijken van het pad elke 6 maanden, nagaan of sleutelinterventies nog steeds van toepassing zijn.
- Op basis van de resultaten kan beslist worden om het pad waar nodig inhoudelijk bij te sturen, een project te starten om de resultaten te optimaliseren of de indicatoren voor opvolging te (her)definiëren.

(dubbelklik op afbeelding)

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STATE OF THE ART

7-fasenmodel voor de ontwikkeling, implementatie, evaluatie en continue opvolging van zorgpaden

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Samenvatting

Zorgpaden, ook gekend als klinische paden, worden wereldwijd gebruikt om patiëntgerichte zorgprocessen op een transparante wijze te organiseren en op te volgen. Zorgpaden worden momenteel gedefinieerd als een complexe interventie. In de voorbije jaren werkten meer dan 110 organisaties in België en Nederland zorgpaden uit in meer dan 1.250 projecten. Deze projecten werden uitgewerkt op basis van het 30-stappenplan van het Netwerk Klinische Paden, dat tussen 1998 en 2002 ontwikkeld werd door het Centrum voor Ziekenhuis- en Verplegingswetenschap van de Katholieke Universiteit Leuven.

Op basis van de ervaring binnen dit netwerk tussen 2002 en 2009 en op basis van nationaal en internationaal onderzoek in samenwerking met de European Pathway Association (E-P-A) werd de methodiek geactualiseerd. Het 30-stappenplan werd herwerkt tot een 7-fasenmodel voor de ontwikkeling, implementatie, evaluatie en continue opvolging van een zorgpad en is bruikbaar voor zowel intramurale, extramurale als transmurale projecten. Dit 7-fasenmodel omvat een screeningsfase, een projectmanagementfase, een diagnosestellings- en objectiveringfase, een ontwikkelingsfase, een implementatiefase, een evaluatiefase, en een continue opvolgingsfase.

Het volgen van deze methodiek is geen garantie tot succes, maar kan wel ondersteuning bieden aan multidisciplinaire teams die veilige, efficiënte, effectieve, patiëntgerichte, tijdige, billijke, continue en geïntegreerde zorgprocessen willen (her)ontwerpen. De medewerking en kritische ingesteldheid van het volledige multidisciplinaire team onder leiding van de verantwoordelijke arts is de sleutel tot succes.

Inleiding

In 2002 werd het artikel *Ontwikkeling en gebruik van klinische paden (clinical pathways) in de gezondheidszorg* in dit tijdschrift gepubliceerd (1). Deze publicatie beschreef de toenmalige status van het concept, de definitie en de 30-stappenmethodiek en inspireerde over de voorbije jaren meer dan 110 organisaties met meer dan 1.250 projecten in België en Nederland als lid van het Belgisch-Nederlandse Netwerk Klinische Paden (2, 3). Dit netwerk is het grootste kwaliteitsnetwerk van de Lage Landen en is een vormingsinitiatief van het Centrum

voor Ziekenhuis- en Verplegingswetenschap, K.U.Leuven (CZV). Het CZV doet dit in samenwerking met de Université Catholique de Louvain en het Kwaliteitsinstituut voor CeZondheidszorg in Nederland. Het Netwerk is op zijn beurt lid van de European Pathway Association (www.E-P-A.org).

In dit artikel wordt kort gerapporteerd over de stand van zaken rond het concept en de huidige definitie. Het hoofddoel van deze publicatie is de nieuwe methodiek voor de ontwikkeling, implementatie, evaluatie en continue opvolging van zorgpaden toe te lichten. De optimalisatie van de methodiek gebeurde op basis van de ervaring binnen het netwerk tussen 2002 en 2009, alsook op basis van nationaal en internationaal onderzoek binnen het netwerk en de samenwerking met de European Pathway Association (4).

Het concept en de definitie

Klinische paden worden steeds vaker „zorgpaden“ genoemd vanwege het bredere transmurale karakter en de internationale afspraken over de term „care pathway“. Ze zijn een van de methoden om patiëntgerichte

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² European Pathway Association, Leuven.

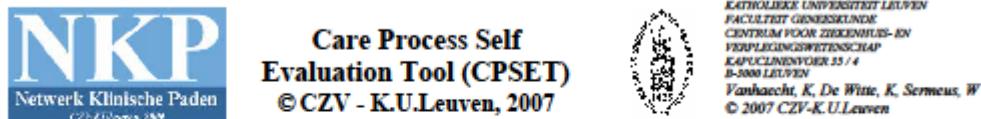
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Appendix 8: CPSET

(Double click on image)



The Care Process Self Evaluation Tool (CPSET).

The Care Process Self Evaluation Tool (CPSET) is a valid and reliable tool to score the organization of a care process (Vanhaecht, De Witte, Sermeus, 2007). This care process can be supported by a pathway, a protocol or a case manager. It is usable for every kind of care process within a hospital for any disease.

The instrument was developed and tested within the Belgian Dutch Clinical Pathway Network, in close cooperation with the European Pathway Association. More than 885 professionals and patients participated at the validation phase. It has not been developed within a specific clinical area.

The CPSET is a 29 item questionnaire and has 5 subscales. Every item can be scored on a 1 (totally disagree) to 10 (totally agree).

The 5 subscales are:

- 1) Patient focused organizations
- 2) Coordination of the care process
- 3) Communication with patients and family
- 4) Collaboration with primary care
- 5) Follow-up of the care process

Every individual team member has to score the 29 items. A scoring category "not applicable" is not included. All of the team need to score, based on the know-how and experience of that individual team member. The last page of this document poses some general questions, necessary to develop the feedback and to further evaluate and improve the questionnaire.

The 29 scores per team member will be sent (in an excel database) to the Catholic University Leuven, Belgium. They will analyze the scores and send the feedback to your local contact person. Based on this feedback the team will be able to discover the bottlenecks in the organization of the care process and start up improvement projects.

Best Regards,

Dr. Kris Vanhaecht
Prof. Dr. Walter Sermeus
Prof. Dr. Karel De Witte



**Care Process
Self Evaluation Tool (CPSET)
CZV - K.U.Leuven, 2007**



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Vanhaecht, K., De Witte, K., Sermeus, W.
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This CPSET evaluates the following care process:

This CPSET was completed by:

Do you agree with the following statements		Totally disagree					Totally Agree				
		1	2	3	4	5	6	7	8	9	10
PO1	A patient focused vision exists within the organization.										
PO2	Quality of care is the priority within the organization.										
PO3	The care process coordinator has a patient focused vision.										
PO4	Patient communication is considered to be important within the organization.										
PO5	The organizational structure is patient focused.										
PO6	There is a clear vision of policy regarding care throughout the entire hospital.										
Coordination of the care process.		1	2	3	4	5	6	7	8	9	10
COR1	Agreements are observed.										
COR2	All team members are familiar with the various steps in the care process.										
COR3	There is an optimum timing of activities within the care process.										
COR4	Concrete agreements are made within the care process.										
COR5	Team members consider themselves to be engaged in the organization of the care process.										
COR6	Patients/family are provided with candid (frank, open; straightforward) information regarding their health.										
COR7	Discharge is communicated in a timely manner to the patient and family so that they can take necessary measures.										
Communication with patient and family		1	2	3	4	5	6	7	8	9	10
COM1	Within the care process time is explicitly provided to listen to the patient and his family.										
COM2	Time is explicitly scheduled within the care process for communications between healthcare professional and patient.										
COM3	Within the care process there is provision for sufficient time to provide information.										
COM4	The patient is explicitly asked for his consent with regard to the proposed care.										
Collaboration with primary care.		1	2	3	4	5	6	7	8	9	10
SE1	Primary care is considered by the hospital to be an equal partner.										
SE2	Good cooperation exists between the hospital and primary care.										
SE3	In complex care situations consultation takes place between the physician/surgeon and general practitioner.										
Monitoring and follow-up of care process		1	2	3	4	5	6	7	8	9	10
OP1	When (re)designing the care process quality indicators are formulated.										
OP2	Whether the care provided is tailored to the patient's needs is systematically monitored/followed-up.										
OP3	Within the care process patient satisfaction is monitored/followed-up systematically.										
OP4	The goals of the care process are described explicitly.										
OP5	Within the care process monitoring/follow-up is performed to verify whether planned activities are actually performed.										
OP6	Outcomes are systematically monitored/followed-up.										
OP7	Variances can be monitored within the care process.										
OP8	Within the care process risks of complications are monitored / followed-up systematically.										
OP9	The progress in the care process is continuously monitored/followed-up and adjusted.										

*Care Process Self Evaluation Tool(CPSET) © 2007, CZV-KULeuven, Catholic University Leuven, Belgium
For more information, please contact Kris.Vanhaecht@med.kuleuven.be*



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B-3000 LEUVEN
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The following additional questions are necessary to analyze the scores, prepare the feedback and further improve the Care Process Self Evaluation Tool.

1) What is the name of your hospital / organization?

2) Which care process are you evaluating? (knee arthroplasty, COPD, diabetes, ...)
.....

3.1) Do you use a care pathway for this care process?

- No (0)
- Not yet but under development (1)
- Yes (2)

3.2) If there is a care pathway in under development or in use, since how many months?
.....months

4) To which professional group do you belong?

- Medical doctor (1)
- Nurse (2)
- Allied Health Professional / Paramedic (3)
- Management (4)
- Quality department – Risk Management – Patient Safety (5)
- Care pathway facilitator (6)
- Other: (7)

5) Your age: 20-29 (1) 30-39 (2) 40-49 (3) 50-59 (4) 60-69 (5) >70 (6)

6) Your gender? Man (1) Woman (2)

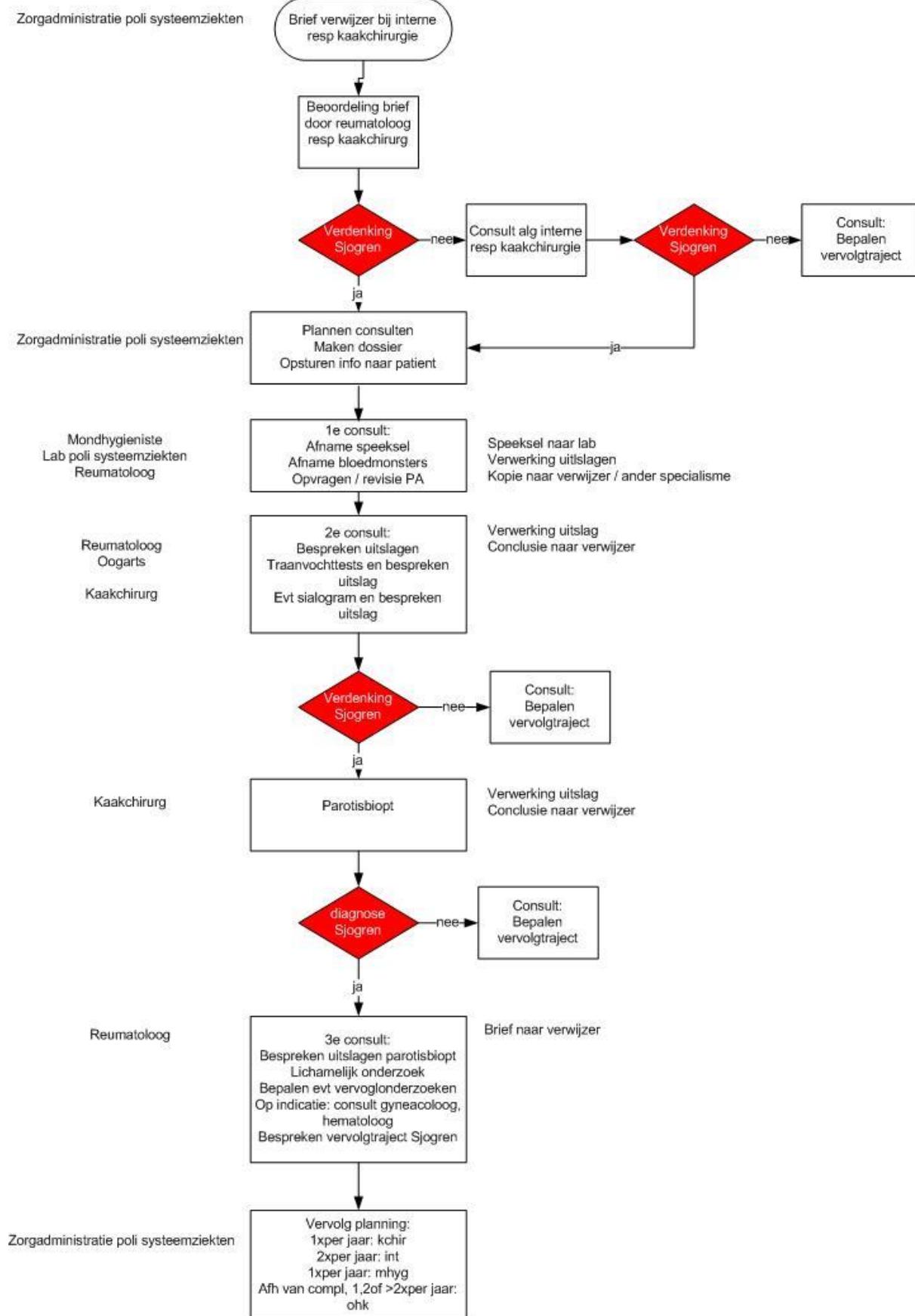
7) In what month and what year have you filled in this questionnaire:

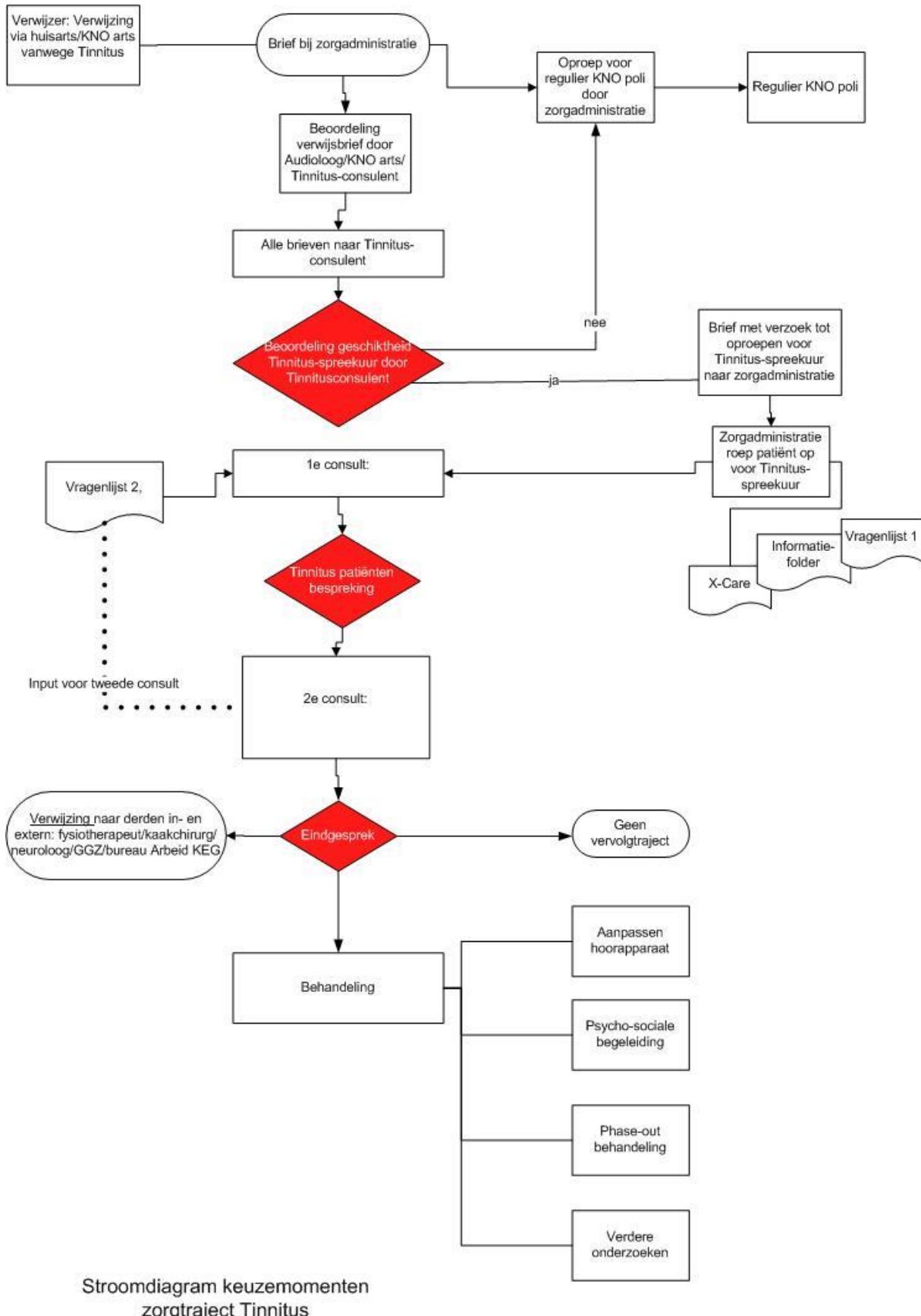
Month:

Year:

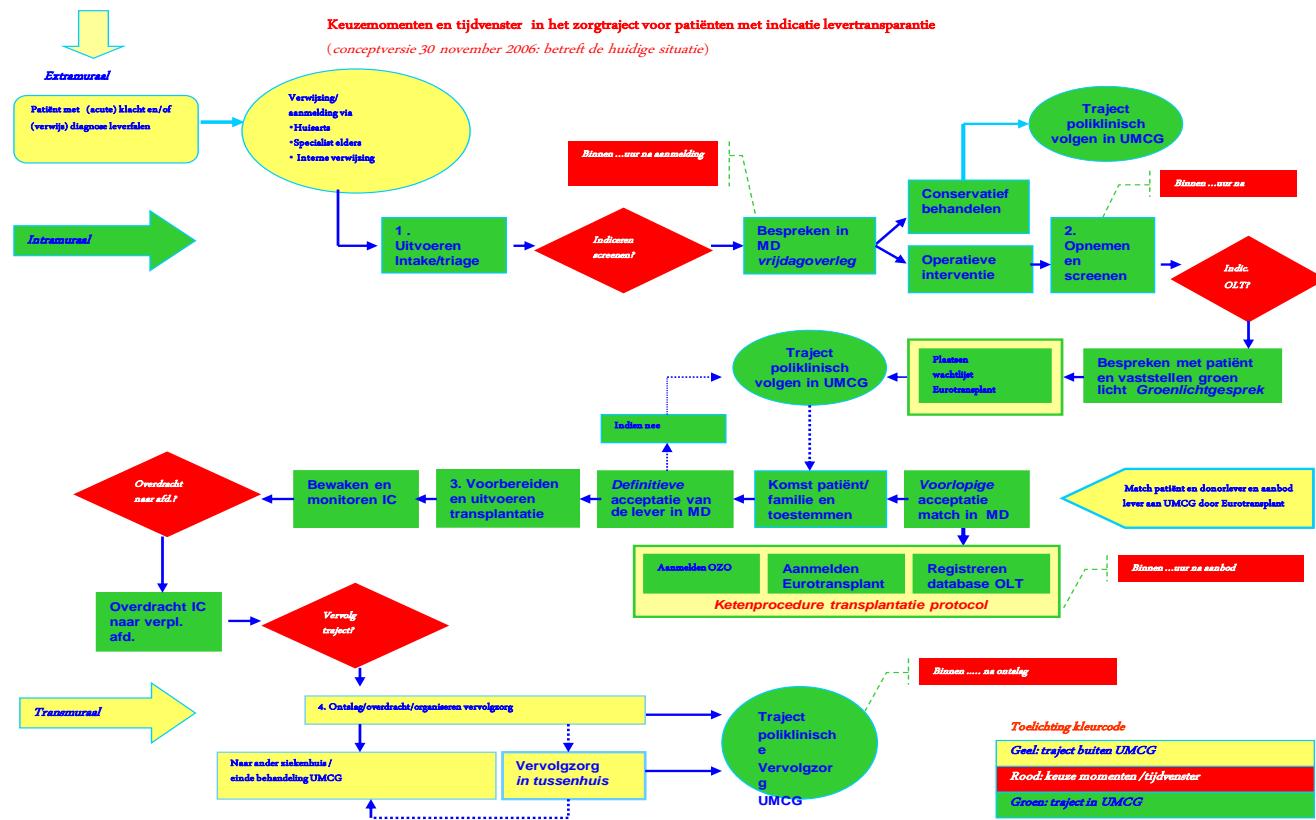
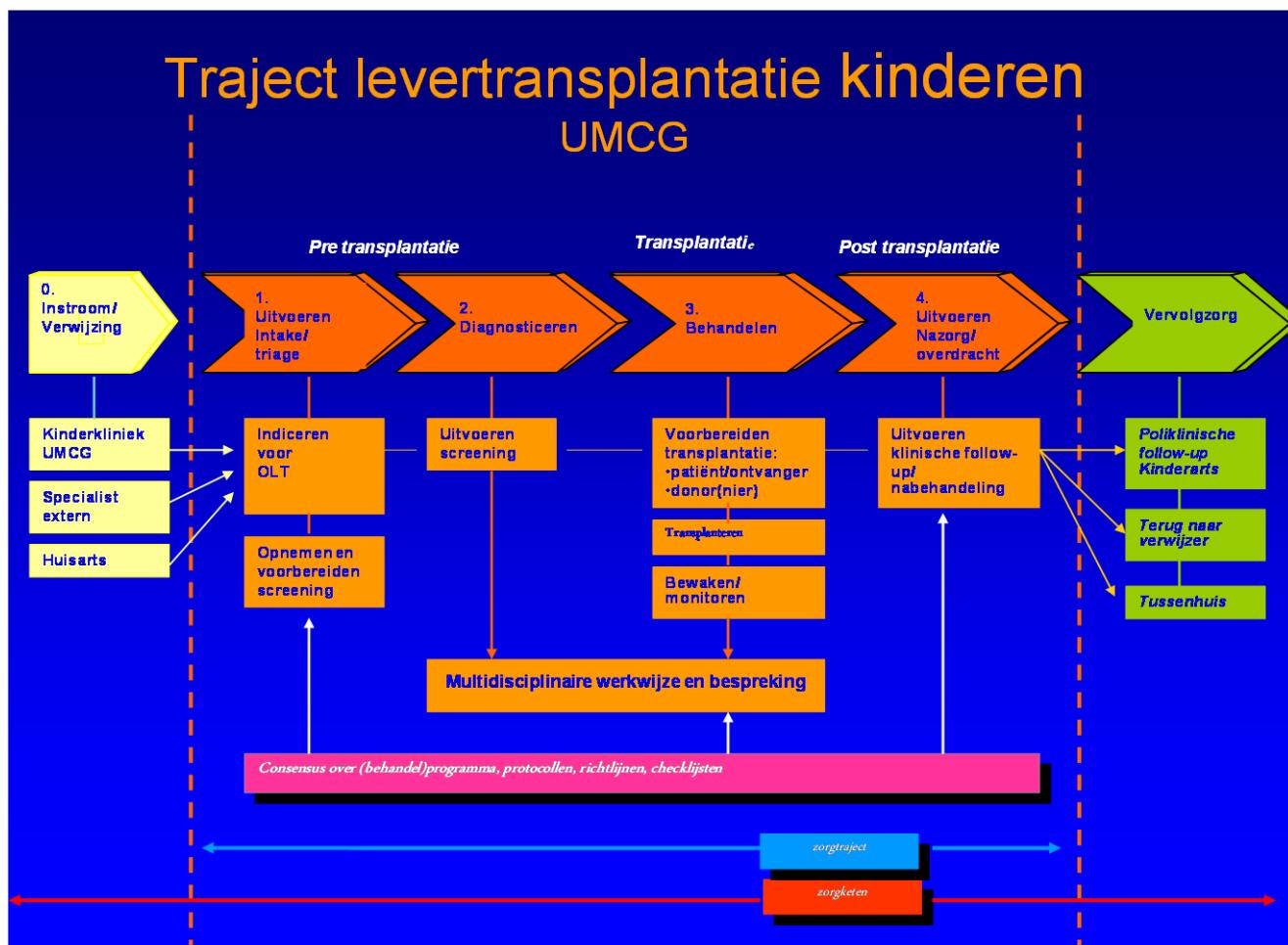
Appendix 9: Flow Chart

Uitvoerende





Appendix 10: Trajectory description



Appendix 11: Checklist / Protocol hyperparathyreïdie

Primaire Hyperparathyreïdie, Organisatie en procedure voor behandeling van,
concept Medisch protocol, versie 1, 06-06-07, T.T. Pentenga, Chirurgie.
versie 2, 19-09-07, T.T. Pentenga, M. te Groen, Chirurgie
Samenvatting
In dit medisch protocol wordt organisatie en procedure rond de behandeling primaire hyperparathyreïdie beschreven. De behandeling van primaire hyperparathyreïdie is een multidisciplinaire aangelegenheid. Patiënten met een primaire hyperparathyreïdie worden besproken in de (bij)schildklierwerkgroep
Communicatie
Patiënten die binnen het UMCG onder behandeling zijn voor primaire hyperparathyreïdie worden multidisciplinair besproken tijdens de schildkliercarcinoombesprekking (bij leden bekend)
Het stellen van de diagnose en Intake
Verwijskanalen: 1 Via perifeer chirurg of internist naar chirurg UMCG 2 Via perifeer chirurg of internist naar internist UMCG 3 Via andere arts naar chirurg of internist
Ten behoeve van het stellen van de diagnose en een operatie-indicatie dienen onder genoemde onderzoeken plaats te vinden of hebben plaats gevonden: Laboratorium bepaling Ca, PTH, Ph, Albumine, Kreat, AF en Osteocalcine Botdichtheidsmeting Urineonderzoek, 24 u urine Ca + klaring
In de poliklinische fase is de patiënt aangemeld bij de chirurg ook onder behandeling van: endocrinoloog als Ca > ?? 3.00 mmol/l schrijf consult endocrinoloog
Pagina 1
De operatie-indicatie wordt gesteld onder eindverantwoordelijkheid van Chirurg op indicatie van schildkliercarcinoombesprekking+C51 factoren: 1 leeftijd < 50 jaar 2 Ca > 3.0 mmol/l 3 nefrolithiasis 4 daling kreatklaring > 30% 5 BMD >-2 SD 6 klachten, (moe, dorst, spierzwakte, polyurie, pyrosis) 7 hypertensie 8 hypercalciurie 10mmol/24uur
Chirurg schrijft opnameformulier Nadat een positieve indicatie voor het opereren van het adenoom is gesteld wordt de patiënt doorverwezen naar het preoperatieve spreekuur van de anesthesiologie (POPA)
Visualisatie van het adenoom: Diagnostiek
Behandelaar schrijf aanvraag NGMB
Ten behoeve van het lokaliseren van het adenoom vinden de volgende onderzoeken plaats: 1 Tc-Mibi scan indien uitslag scan negatief dan in onderstaande volgorde: patiënt (telefonisch) inlichten en onderstaand onderzoek plannen 2 CT-angio 3 Echografie 4 MET-PET, echter alleen als alle andere diagnostiek negatief is.

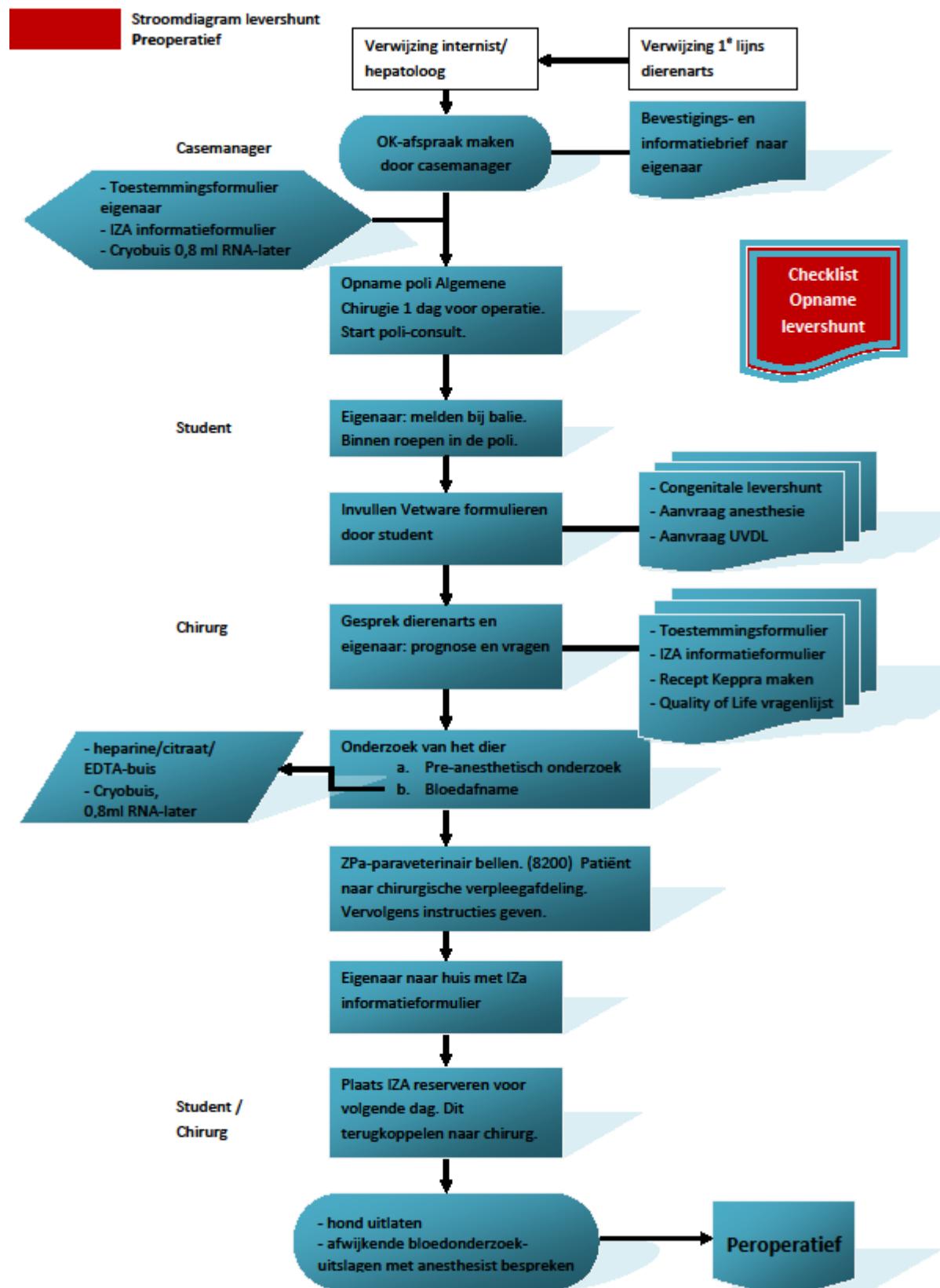
Planning van de operatie:		Behandeling
De operatieplanning wordt gemaakt door de chirurg in vervolgopleiding (CHIVO)		
operatie plannen binnen 1 maand indien Ca \geq 3.00 mmol/l		
operatie liefst plannen binnen 3 maand indien Ca \leq 3		< 3.00 mmol/l
Reserveren toediening Tc-Mibi en gammacamera bij afdeling Nucleaire Geneeskunde Moloculaire Beeldvorming (NGMB) (13541) minimaal 1 week voor ingreep		
Reserveren quick PTH analyse bij laboratorium bindingsanalyse (12883) (j.koerts@lc.umcg.nl)		
Patient staat nooit als eerste op operatieprogramma		
Operatie		
Opname is één dag voor ingreep		
Opnamedag:		
lab bepaling opnamedag Ca, kreat, PTH, TE, Alb		
consult polikliniek KNO voor stembandonderzoek		
consult endocrinoloog		
1 bij patienten bekend op pk endocrinologie		
2. bij Ca > 3.00 mmol/l		
3 bij geplande open procedure		
4. bij secundaire complicaties		
Chirurg ziet patiënt en bespreekt (nogmaals) operatie		
Na afloop van de operatie opgegeven contactpersoon inlichten		
Na afloop van de operatie patiënt over operatie inlichten		
<i>Minimaal invasieve procedure (probe geleid)</i>		
1 uur voor operatie toediening Tc-Mibi door laborant NGMB		
Quick PTH bepaling op T0, T1, T2, T3, T4		
<i>Conservatieve methode</i>		
Postoperatief controle:		
wond		
vitale functies		
lab. bepaling Ca		
Postoperatief consult endocrinoloog indien Ca < 2.1 of klachten van tetanie en of tintelingen		
Postoperatief bij ongecompliceerd verloop ontslag op dag 1		
Follow-up		Nazorg
Patient ontvangt bij ontslag een voorlopige ontslagbrief		
Verwijzer ontvangt brief		
Huisarts ontvangt binnen 10 werkdagen een definitieve ontslagbrief		
Follow-up vindt minimaal eenmaal plaats door de chirurg, twee weken na klinische opname. (Bespreken P.A. met de patiënt)		
Follow-up vindt tevens plaats door endocrinoloog als patiënt pre- of postoperatief onder behandeling van endocrinoloog was, i.o.m. endocrinoloog.		

Appendix 12: Time-task matrix

TIME/TASK matrix Transuraal klinisch zorgpad Du Vinci Prostatectomie		Dag -14 (diagnosestelling)	Periode - 13 tot -2	Dag - 1	OPNAME ZIEKENHUIS	Dag ontslag tot dag x	Dag x (zie afspraakkaartje)	
PATIENT		<ul style="list-style-type: none"> <input type="checkbox"/> ontvangen zorgmap + informatie door de uroloog/prostaatverpleegkundige <input type="checkbox"/> RX-thorax <input type="checkbox"/> bespreken preoperatieve kine 	<ul style="list-style-type: none"> <input type="checkbox"/> afspraak maken huisarts – bespreken van eventuele vragen <input type="checkbox"/> invullen preoperatief samenwerkingsdocument + thuismedicatie <input type="checkbox"/> invullen zorgfiche (SIT) + lijst nuttige telefoonnummers <input type="checkbox"/> preoperatieve onderzoeken (in samenspraak met de huisarts) <input type="checkbox"/> kinesist contacteren <input type="checkbox"/> eventueel dienst gezinszorg contacteren 	<ul style="list-style-type: none"> <input type="checkbox"/> licht ontbijt / geen middagmaal (behalve yoghurt en pudding) <input type="checkbox"/> darmvoorbereiding (lavement) <input type="checkbox"/> opname in ziekenhuis om 16 uur 		<ul style="list-style-type: none"> <input type="checkbox"/> bij ontslag : huisarts, thuisverpleegkundige, kine, (gezinszorg) contacteren <input type="checkbox"/> materiaal verzorging in huis halen (via apotheek) 	<ul style="list-style-type: none"> <input type="checkbox"/> consult uroloog <input type="checkbox"/> na verwijderen sondé : plaskalender invullen 	
HUISARTS			<ul style="list-style-type: none"> <input type="checkbox"/> consult : gesprek met patiënt / verdere uitleg <input type="checkbox"/> invullen preoperatief samenwerkingsdocument + thuismedicatie <input type="checkbox"/> preoperatieve onderzoeken <input type="checkbox"/> nagaan stop anticoagulantiebeleid <input type="checkbox"/> invullen zorgfiche (SIT) + lijst nuttige telefoonnummers <input type="checkbox"/> preoperatieve kine verder bespreken <input type="checkbox"/> afspraken maken iwm met bereikbaarheid postoperatief 		<p>Huisarts wordt door de sociale dienst van het ziekenhuis gecontacteerd – datum ontslag wordt aangegeven.</p> <p>De huisarts is de externe zorgcoördinator</p>		<ul style="list-style-type: none"> <input type="checkbox"/> patiënt contacteert de huisarts, zodra contacteert de huisarts de patiënt <input type="checkbox"/> bereikbaar zijn voor overleg en eventueel doorverwijzing bij sondeproblemen 	<ul style="list-style-type: none"> <input type="checkbox"/> verdere opvolging en ondersteuning
THUISVERPЛЕEКKUNDIGE					<p>Huisarts wordt door de sociale dienst van het ziekenhuis gecontacteerd – datum ontslag wordt aangegeven.</p> <p>De huisarts kan de wondzorg worden meegescreven.</p> <p>Startpaktek zorgzorg wordt voorzien.</p>		<ul style="list-style-type: none"> <input type="checkbox"/> controle stoelgang en opvolgen pijn <input type="checkbox"/> aanzetten tot mobilisatie + TED kousen <input type="checkbox"/> inspuiting LMH (preventie trombo-embolie) <input type="checkbox"/> sondezorg-penisverband 	<ul style="list-style-type: none"> <input type="checkbox"/> zes uur na verwijderen sondé : observatie pijn en mieie <input type="checkbox"/> verdere verzorging indien noodzakelijk
KINESIST			<ul style="list-style-type: none"> <input type="checkbox"/> opstarten preoperatieve kine 				<ul style="list-style-type: none"> <input type="checkbox"/> opstarten postoperatieve kine 	<ul style="list-style-type: none"> <input type="checkbox"/> controle invullen plaskalender <input type="checkbox"/> verdere kine volgens noodzaak
VERZORGENDE							<ul style="list-style-type: none"> <input type="checkbox"/> Indien gewenst ondersteuning bij opvolging 	

Appendix 13: Flow Chart of the CPSS care pathway

(Double click on image)



Appendix 14: Clinical Protocol CPSS

Clinical Protocol CPSS (aangepast t.b.v. levershunt-CP onderzoek*)

In 2013 a prospective study is started in dogs with a single extrahepatic portosystemic shunt that are presented to the Queen Mother Hospital for Animals of the Royal Veterinary College in London, the Universiteitskliniek voor Gezelschapsdieren of Utrecht University in Utrecht, and the Klinik für Kleintierchirurgie of the Vetsuisse Faculty in Zurich. The aim is to compare partial attenuation by means of prolene ligation with cellophane banding in dogs that do not tolerate complete closure of their CPSS (levershunt-CP onderzoek).

Inclusion criteria are a single extrahepatic portosystemic shunt and informed consent by the owner. Exclusion criteria are previous surgery related to the shunt and unwillingness or inability of the owner to adhere to the treatment schedule. Follow-up of the cases will be at 3, 12, and 36 months after surgery. All adaptations in this protocol that are made because of this study are written in italics.

A. The presurgical procedures

A CPSS is most often suspected from clinical symptoms. The diagnosis is confirmed by evidence of abnormal hepatic function and ammonia metabolism and diagnostic imaging. Diagnostic tests that are performed are:

- In plasma: bile acids, alkaline phosphatase, and fasted ammonia
- Abdominal ultrasonography (including liver, gallbladder, kidneys and urine bladder)
- A bile acid stimulation test (BST; appendix 1)

In addition an ammonia tolerance test (ATT) can be performed when fasted ammonia concentration is elusive (appendix 2). CT scanning of the liver and the venous vasculature is strongly advised when ultrasonography is not conclusive with respect to shunt localisation and in animals with an intrahepatic shunt to aid surgical planning. A CT-scan is performed separately from the surgical procedure (at least one week prior to surgery).

Patient history and clinical findings are recorded in the digital patient administration system (Vetware) in a form especially designed for these animals.

A Quality of Life Questionnaire was developed to evaluate the clinical status of the dogs. This form is filled in by the owner preoperatively.

After confirmation of the diagnosis, first choice treatment consists of surgical attenuation of the shunt.(Greenhalgh et al. 2010) Preoperatively, or when surgery is declined, a conservative treatment is started. This treatment consists of a low protein or hepatic diet which is supplemented with oral lactulose if necessary. In animals with plasma albumin concentrations <19 g/L (Kummeling et al. 2012), surgery is preferably scheduled after a period with conservative treatment of at least 4 weeks. In young dogs, surgery is scheduled at an age of at least 4 to 6 months, depending on size and condition of the dog.

Surgical procedures are usually scheduled on Wednesday mornings. The animals are admitted the day before the surgery. On admission, a complete physical examination is performed and blood is collected.

Routinely the following laboratory tests are performed the day before surgery:

- Haematocrit / PCV

- Leukocyte count
- Platelet count
- Electrolytes (Na, K)
- Glucose
- Total protein
- Albumin
- Coagulation (PT, APTT, fibrinogen)

The completed physical and laboratory status reports are used to determine perisurgical risk, following oral communication to the anaesthesiology department and to the intensivist that is responsible for the postoperative intensive care. If the surgeon, anaesthetist and the intensivist conclude that it is necessary to stabilise the dog before surgery, the dog should immediately be admitted to the intensive care. If not, the dog is admitted to the surgery ward. The dog is withheld food approximately 8 hours before surgery.

All cats and dogs are to receive **levetiracetam (Keppra®; 100mg/ml)** from 24 hours before surgery until 72 hours after surgery (20 mg/kg 3dd per os). This a preventive measure against postoperative neurological complications.(Fryer et al. 2011) If oral intake is not possible (at the day of surgery), levetiracetam is administered intravenously (parenteral solution is available at the ICU).

The owner is fully informed and is asked permission when additional procedures are performed because of current clinical research, for example usage of collected blood samples for future DNA and mRNA research and hepatic biopsies.

B. Anaesthesia

Supportive care

O₂ therapy

Preoxygenation by high flow O₂ is initiated as soon as sedation starts to be noticeable and is continued for at least 5 minutes prior to induction.

FiO₂ is kept above 35% from orotracheal intubation onwards and supplemental oxygen is provided well into the recovery.

Thermoregulation

Dogs are placed on a heated induction table and IM premedicated. Additionally reflective foil is used immediately following orotracheal intubation until positioning in OR on a warm water mattress and forced air warming blanket (bair hugger).

Fluid therapy

Standard fluid therapy comprises an IV plasma transfusion started pre-operatively (20 ml/kg), followed by a balanced IV infusion fluid (Isosfandin) or equivalent in a rate of 5 ml/kg/hour, re-evaluated frequently based on the cardiovascular response to a fluid challenge or spontaneous changes in cardiovascular parameters or urinary output (be aware of overhydration).

With regards to plasma and colloid administration, one is referred to footnote 1.

Glucose substitution

At the time of IV catheter placement, blood glucose is analysed and re-checked every 30 minutes. Hypoglycaemia is treated by continuous IV infusion of glucose 20% via a central venous line (routine protocol) and glucose analysis intervals may be adjusted as deemed necessary.

At arrival at the ICU blood glucose is re-checked.

Premedication

Methadone 0.5mg.kg⁻¹ intramuscularly, 30 minutes before induction.

Atropin 0.02-0.03mg.kg⁻¹ may be administered at the same time or later based on pre-anesthetic heart rate and its response to the methadone.

Insertion of an intravenous catheter into a cephalic vein and a jugular vein (not with elongated coagulation times and/or clinically relevant thrombocytopenia)

Induction

Propofol intravenously (1-5mg.kg⁻¹) slowly to effect, followed by desensitisation of the larynx with topical lidocaine and orotracheal intubation with a cuffed ET tube of appropriate size.

In addition

- epidurally morphine1 (preservative free; epidural puncture is not attempted in animals with elongated coagulation times or clinically relevant thrombocytopenia): 0.1mg.kg⁻¹
- placement of a central (jugular) catheter or a peripheral catheter (especially in very small animals or in animals with abnormal coagulation) placement of a urinary catheter;
- clipping of the surgical area
- arterial catheter in a peripheral artery
- prophylactic antibiotics in intrahepatic shunts or when a hepatic biopsy is performed: cephazolin 20mg.kg⁻¹ IV

Maintenance

Isoflurane to effect in oxygen and air or nitrous oxide (FiO₂ 35-40%)

Automated ventilation (IPPV)

Fentanyl 12-42 µg.kg.hr⁻¹ or sufentanyl 1-2 µg.kg. hr⁻¹ (continuous IV infusion during surgery)

Intraoperative monitoring

1. arterial blood pressure
2. ECG & pulse oximetry
3. capnometry
4. oesophageal temperature
5. blood glucose concentration.
6. if available: central venous pressure and urinary output

1Remarks with respect to hetastarch, blood and plasma transfusions:

Animals with coagulopathy or hypovolaemia caused by blood loss may benefit from plasma with or without the combination with packed cells (or whole blood) transfusion, depending on

presurgical haematological screening or intraoperative findings. Plasma (or whole blood) replaces clotting factors and, to some extent, plasma proteins. Especially with low plasma albumin and total protein a synthetic colloid (e.g. Haesteril 6%) may be more effective in controlling hypovolemia and hypotension as compared to isotonic crystalloid solutions. However, colloids have a negative effect on coagulation. Although this effect is often minimal when the total amount stays within the recommended maximum daily dose, IV colloids are not used in animals with portosystemic shunting as long as plasma is available as a better alternative.

1. Decreased plasma clotting factors (as in PSS) and coagulopathy (severely elongated PT and APTT) before surgery is an indication to start plasma infusion before the surgical procedure.
2. Intraoperative blood loss of >20% of the estimated blood volume is an indication to start packed cells or whole blood transfusion during the surgical procedure.
3. Indications to start Hetastarch are persistent hypotension with a MAP <55mmHg and insufficient effect of crystalloid solutions and if plasma or whole blood is not available when animals suffer intraoperative blood loss of >20% of the estimated blood volume. In coagulopathic animals and animals with CPSS plasma is always preferred to synthetic colloids.

C. The surgical procedure

The abdominal cavity is opened by a median celiotomy from the xyphoid cartilage. The abdominal organs are explored with emphasis on the liver and its vasculature. After identification of the shunt, its diameter is estimated. The diameter or development of the portal vein or circulation distal to the shunt is evaluated to estimate the degree of shunt attenuation that can be achieved. A Prolene ligature (2-0) is placed around the shunt at the site where it joins the vena cava.

The shunt is temporary closed completely with latex or silicone tube over the Prolene 2-0 ligature.

Portal hypertension is assessed using the following parameters:

- Cyanotic discoloration of the stomach, small intestine and pancreas
- Increase of pulse rate over 15%
- Decrease of MAP over 15%
- Decrease of CO₂ET over 15%
- Portal pressure measurement:
(RVC: maximum rise 10mmHg of baseline, maximum rise should be less than twice the baseline, endpressure should be less than 18-20 mmHg)

If there is no portal hypertension the shunt is completely closed with Prolene 2-0

If there are signs of portal hypertension the shunt is partially closed after randomisation with cellophane or prolene 2-0.

Prolene ligatures are tied one-by-one around the shunt and a rod of a specific diameter placed longitudinally of the shunt to determine degree of closure.

Cellophane bands are closed similarly with vascular clips (Surgiclip, autosuture).

The shunt is attenuated to the smallest diameter possible without portal hypertension.

One prolene suture is tied loosely around the shunt to allow complete closure of the shunt if needed in the future.

A hepatic biopsy of a margin of a liver lobe is performed by the ‘guillotine’ method (PDS

3-0) and divided in small parts of tissue. Some parts of hepatic tissue are imbedded in paraffin for histology after 4 hrs fixation in formalin. The other parts of tissue are incubated in RNAlater solution during 24 hrs in the refrigerator and then, after removing the supernatant fluid, stored at -70° Celsius for future research.

An operation report is made in the digital patient administration system (Vetware). In the report the intraoperative findings are noted, including the location of the hepatic biopsy. *The method and degree of closure are blinded by using a randomisation code in the report which is only known by the surgeon (A. Kummeling)*

D. The postoperative procedures

After surgery, the animal is admitted to the Intensive Care Unit because of risks of postoperative complications and to provide adequate pain relief.²

Postoperative pain management is titrated to prevent overt sedation, yet provide adequate pain relief by low dose (su)fentanyl CRI or methadone every 4 -5 hours. Pain assessment is done every 4-6 hours. When recovery is uncomplicated after 8-12 hrs and the animal is comfortable, (su)fentanyl or methadone analgesia is replaced by buprenorphine QID.

Monitoring of respiration, circulation (pulse, mucous membranes, CRT, CVP), bleeding at the wound or location of the arterial pressure measurement, body temperature, and neurological status is advised every 15 minutes until the animal is responsive. Abdominal diameter is advised every hour directly after surgery (4-6 hrs postoperatively). Following the early postoperative (frequent) monitoring, these variables are monitored every 4 hrs in dogs with good recovery.

If indicated, blood is collected to monitor Ht, platelets, albumin, electrolytes, glucose, and coagulation.

Intravenous fluids are continued based on CVP measurements and fluid balance, and are stopped when the dog is drinking sufficiently.

Levetiracetam (Keppra®; 100mg/ml) administration is continued for 72 hours after surgery, which means until the third day after surgery (20 mg/kg 3dd per os). If oral intake is not possible, levetiracetam is administered intravenously (parenteral solution is available at the ICU).

Animals are encouraged to drink when sufficiently awake and encouraged to eat small portions (hepatic diet) a few hours following uncomplicated recovery.

All decisions, including the dismissal of the animal from the ICU, are made by the intensivist (responsible for the intensive care) in close consultation with the surgeon. Owners receive instructions regarding postoperative care in a standard discharge letter that is available in 2 languages, Dutch and English (recorded in Vetware and the appendix).

Postoperative medication

- Analgesia at home for 3-5 days: tramadol orally 3mg.kg⁻¹ every 6 hours (no

carprofen)

- No lactulose (only indicated in severe hepatoencephalopathy before surgery)
- Antibiotics only if indicated

Postoperative assessment of liver function recovery and persistent portosystemic shunting is advised 3, 12 and 36 months after surgery by visiting the policlinic 'Hepatology'.

A Quality of Life Questionnaire was developed to evaluate the clinical status of the dogs. This form is filled in by the owner preoperatively and at each visit after surgery.

The postoperative assessment consists of a general physical examination, abdominal ultrasonography (focussed on liver, shunt and portal circulation) and blood examination (normal biochemistry tests including a bile acid stimulation test). A ammonia tolerance test is no part of the study protocol, but a baseline plasma ammonia measurement is still useful. At three months after surgery a CT of the liver and portal system is made to assess residual shunting or formation of collaterals, in combination with a ultrasonography. At long-term visits (at 1 and 3 years p.o.) CT is advised in dogs without clinical or biochemical recovery.

The results are recorded in the digital patient administration system (Vetware).

If dogs are not completely recovered (clinical signs) and show evidence of (persistent) portosystemic shunting, a second surgery may be advised. These dogs may also be treated with a hepatic diet (and if needed additional lactulose) for the rest of their lives.

²Remarks with regard to postoperative complications:

Important postoperative complications that are seen mainly in animals after CPSS surgery and that need careful monitoring and immediate treatment are:

- bleeding of surgical/traumatized sites due to coagulopathy
- neurological dysfunction
- portal hypertension

Unfortunately these complications are sometimes not responsive to treatment

Bleeding

1. In dogs with significant abnormalities in coagulation times plasma transfusions may help to support coagulation and prevent or stop clinical bleeding. If coagulopathy exists before surgery or clinical bleeding tendency is suspected during surgery haematocrit/PCV, platelets, albumin, coagulation times, and, fibrinogen should be monitored after the surgical procedure.
2. All animals with portosystemic shunting should be monitored for clinical bleeding after surgery. This means monitoring of signs of shock, of abdominal diameter and of potential bleeding sites (IV catheters, arterial pressure lines, surgical wounds, et cetera). Local pressure can be applied (manually or by bandaging) if indicated. Suspected intra-abdominal bleeding should be confirmed by aspiration of the fluid (and Ht determination). Intra-abdominal bleeding may be a reason for surgical reopening of the abdominal cavity if the bleeding is local (for example from a hepatic biopsy). In hemoabdomen caused by diffuse bleeding (oozing), a second surgery is often not useful because the bleeding cannot be stopped surgically. In acute bleeding the hypovolaemia should be treated by plasma transfusion, whole blood transfusion or intravenous (colloid) fluids. Support the animals with oxygen administration and patient warming.

Neurologic dysfunction (PLS, postligation seizure syndrome)

1. Monitoring of early signs of this complication is very important because prognosis severely worsens if treatment is postponed. It is assumed that acute oedema in the cerebrum is followed

by irreversible necrosis. The incidence of PLS is higher in cats than in dogs and usually starts within 72 hours after surgery. During recovery from anaesthesia, central neurological signs may be difficult to recognize. Important signs of PLS are: abnormal behaviour, prolonged periods of lethargy, stupor, coma, seizures, opisthotonus, abnormal pupil reflexes or mydriasis (note: lethargy and vocalization can also be signs of discomfort or pain!).

2. All cats and dogs are to receive levetiracetam from 24 hours pre surgery for a period of 5 days (20 mg/kg 3dd po). This period may be prolonged in animals with neurologic signs.
3. Rescue treatment: phenobarbitone 2-3mg/kg po q12hrs (or if severe load with repeated doses up to a maximum of 18mg/kg and then continue with 3mg/kg q 12hrs) for any cat or dog displaying any form of neurological signs e.g. twitching, tremors, head-pressing, abnormal/change in behaviour, blindness (cats) and seizures. Taper with oral phenobarbitone at home over 2-3 weeks.
4. Convulsions are treated with propofol IV for neuro signs that are not controlled or progress despite phenobarbitone. (by continuous infusion, dosage based on effect). Discuss this treatment preferably first with the anaesthetist.
5. Support the animal with supplemental oxygen administration.
6. In severe cases artificial ventilation and IV mannitol have to be considered.
7. Monitor also CVP, body temperature, plasma glucose, sodium, potassium and ammonia.
8. Treatment of cerebral oedema with corticoids after shunt ligation is not advised
9. In most cases no effect is seen from treatment with lactulose. Lactulose is only useful if ammonia levels are (still) very high (hepatoencephalopathy) and this is not often seen in animals with PLS.

Portal hypertension

With an increase in abdominal distension and ascites, intra-abdominal pressure (IAP) measurement with the use of a catheter in the urinary bladder is warranted. The height of the IAP determines the actions that have to be taken.

1. **Mild hypertension (ascites)**
 - Signs: increased abdominal diameter, pain, (haemorrhagic) diarrhoea
 - Usually slow regression of signs in 1-3 weeks because of increased hepatic portal circulation or opening of collaterals.
 - Monitor the animals to detect clinical deterioration in time (development of obstructive shock)
 - Treatment: proper pain management, sometimes low dosages of furosemide can help to decrease the amount of abdominal fluid (preferably while monitoring CVP)
2. **Severe hypertension (shock)**
 - Signs: signs of (life-threatening) obstructive shock, painful distended abdomen, sometimes haemorrhagic diarrhoea and septicaemia
 - Shock treatment: IV infusion (colloids), blood pressure support and oxygen
 - Consider a second surgery to remove or loosen the ligature. If a thrombus has been formed in the portal vein, surgery may not be useful and the prognosis is poor.
 - Supportive treatment: proper pain management. Antibiotics (amoxicillin/clavulanic acid) can be administered if septicaemia is suspected.

References

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- Greenhalgh, S.N., Dunning, M.D., McKinley, T.J., Goodfellow, M.R., Kelman, K.R., Freitag, T., O'Neill, E.J., Hall, E.J., Watson, P.J. & Jeffery, N.D. 2010, "Comparison of survival after surgical or medical treatment in dogs with a congenital portosystemic shunt", Journal of the American Veterinary Medical Association, vol. 236, no. 11, pp. 1215-1220.
- Kummeling, A., Penning, L.C., Rothuizen, J., Brinkhof, B., Weber, M.F. & van Sluijs, F.J. 2012, "Hepatic gene expression and plasma albumin concentration related to outcome after attenuation of a congenital

portosystemic shunt in dogs", Veterinary journal (London, England : 1997), vol. 191, no. 3, pp. 383-388.

APPENDICES:

1. Protocol bile acid stimulation test (BST)
2. Protocol ammonia tolerance test (ATT)
3. Discharge letter in English
4. Pre operative plasma administration

Appendix 15: Checklist Opname levershunt

Checklist Opname levershunt (*aangepast aan levershunt-CP onderzoek*)

OK-afspraak maken door casemanager:

- Dier wordt 1 dag voor de operatie opgenomen via poli algemene chirurgie voor bloedafname, en benodigde behandeling pre-operatief. De hond mag 12 uur voor het poli bezoek geen voedsel hebben gekregen (12 uur vasten, wel water drinken). Voor honden jonger dan 6 maanden geldt een periode van 4 uur vasten voor het bezoek.
- bevestigingsbrief of mail naar eigenaar met informatiebrief over levershunt en opname folder (pdf-bestanden)
- Informatie over onderzoek door Anne Kummeling
- Casemanager meldt de patiënt in de ochtend van opname aan bij de IZA in het kader van de opname en de plasmatransfusie

Opname via poli Algemene Chirurgie:

Benodigdheden:

- Opnamefolder
- Cryobuis met 0,8 ml RNA later (te vinden op bureau Anne Kummeling)
- QoL vragenlijst en een toestemmingsformulier voor de eigenaar (voor levershunt-CP onderzoek). In principe hebben de mensen dit al opgestuurd gekregen. Extra exemplaren liggen in postvak A. Kummeling
- Protocol plasma transfusie op de IZA
- Medicijnkaart CVa
- Opname kaart CVa

Poli-consult stap voor stap:

1. Vetware formulier ‘Congenitale portosystemische shunt’ invullen: opname pre-operatief
2. QoL vragenlijst en toestemmingsformulier (laten invullen) controleren op volledigheid.
3. Vetware formulier ‘Aanvraag anesthesie’ invullen (pre-anesthetisch onderzoek uitvoeren)
Ook profylaxe AB Cefazoline aanvragen via dit formulier
4. Vetware formulier ‘Aanvraag UVDL’ invullen en bloed afnemen:
Ht + indices
Leucocyten (zonder differentiatie)
Thrombocyten
APTT +PT + fibrinogeen
Na/K

TE/Alb
Glucose
Galzuren

Nodig: heparinebuis / citraatbuis / EDTA-buis / Cryobuis: 0.5 ml vol bloed met 0,8 ml RNA-later. Daarna cryobuis (zonder sticker!) in koelkast op kamer Anne leggen

Bij het bloed afnemen niet de vaten in beide voorpoten gebruiken en probeer hematomen zo veel mogelijk te voorkomen ivm te plaatsen IV katheters en verminderde aanmaak van stollingsfactoren in deze dieren!

5. Dierenarts:

1. Gesprek met eigenaar over prognose en vragen beantwoorden
2. Toestemmingsformulier levershuntonderzoek bespreken en innemen (in postvak AK leggen)
3. Vragenlijsten controleren (volledig en goed ingevuld) en innemen (in postvak AK leggen)
4. Opnamefolder meegeven
5. Recept aanmaken en versturen voor Levetiracetam 1 flesje van 300 ml (100 mg/ml): **4 dagen 3dd 20 mg/kg PO** Eigenaren halen de medicatie zelf op bij de apotheek ivm verkrijgen van instructies. Start dag van opname!
6. Uitleg geven over BST-test in opname
7. **Opname** op de CVa als het dier klinisch stabiel is (via de ZPa-paraveterinair; 8200), waarbij de hond in de avond of nacht overgeplaatst wordt naar de IZa (in overleg met de IZa arts / ZPa paraveterinair).
Indien de klinische situatie (o.a. HE) of het bloedonderzoek (o.a. hypoglycemie) daartoe aanleiding geven, dan directe opname Iza.
8. **Verpleeginstructies** maken in vetware, opnamekaart en medicijnkaart invullen indien hond naar Cva gaat:
 - eiwit arm voer na de BST, vasten vanaf 2.00 uur komende nacht (voor zeer kleine en jonge dieren zijn andere instructies voor het vasten beschikbaar via de anesthesie)
 - Levetiracetam 3dd 20 mg/kg = 3dd 0,2 ml/kg per os. Flesje bij het hok leggen. Start dag van opname na de BST.
 - BST uitvoeren indien de hond nuchter is (zie hieronder)
 - Plaatsing iv braunule en starten van een plasma transfusie pre-operatief volgens bijgevoegd protocol op de IZa.
6. Eigenaren gaan naar huis.
7. Langs IZa lopen en samen met de IZA dierenarts/paraveterinair ZPa de opname en de instructies voor **de plaatsing van de braunule iv in de nacht en plasma transfusie in de volgende ochtend bespreken en vastleggen.**
Het plasma hoeft er echt niet om 8.00 uur allemaal in te zitten, maar is dan hopelijk wel gestart, zodat het grootste deel pre-operatief gegeven is.
8. **Anesthesist** beoordeelt bloeduitslagen om noodzaak voor andere voorbereidende maatregelen (zoals kaliumcorrectie) in te schatten.

BST (galzuren stimulatie test) op de CVa of de IZa!!

- Na de aanvraag van de basale concentratie galzuren via het UVDL in de eerste bloedaanvraag (bij de nuchtere hond), geef je de hond de volgende hoeveelheid Royal Canin Hepatic dieetvoer: 2 theelepels in honden <5kg, en 2 eetlepels in honden >5kg.
- Vervolgens wordt opnieuw bloed afgenoem voor bepaling van galzuren op 1 uur en op 2 uur na geven van het voer (1 ml in een heparinebuis). Dit bloed moet worden afgedraaid (5 minuten 3500 tpm) en, voorzien van naam en tijdstip van afname, in de koelkast worden geplaatst op de kamer van Anne Kummeling. Het mag ook op de ZPA in de koelkast worden gezet, maar dan met een briefje dat het bloed bewaard moet worden voor Anne Kummeling. Er hoeft dus geen aanvraag in Vetware te worden gemaakt.

Bij vragen, problemen, opmerkingen: Anne Kummeling (06-29148103)

Appendix 16: Checklist Controle levershunt

Checklist Controle levershunt (*levershunt-CP onderzoek*)

Voorafgaande aan het bezoek:

- De eigenaar maakt zelf de afspraak via de algemene receptie op de polikliniek Hepatologie (in principe op een donderdag)
- Anne Kummeling houdt in de gaten dat de afspraak ook daadwerkelijk wordt gemaakt en neemt indien nodig contact op met de eigenaren om dit te overleggen.
- De hond mag 12 uur voor het poli bezoek geen voedsel hebben gekregen (12 uur vasten, wel water drinken).
- Minimaal 1 week voor het bezoek worden de Radiologie (via Kim van Schaik-Gerritsen) en de Hepatologie (Hille en of Robert) door A. Kummeling op de hoogte gebracht van een controle bezoek in het kader van dit onderzoek.
- De aanvraag voor het echografisch onderzoek kan al worden gemaakt en verstuurd voorafgaande aan het bezoek door A. Kummeling.

Tijdens het bezoek (3 maanden, 1 jaar of 3 jaar na de operatie):

Benodigdheden:

- Vragenlijst postoperatief (te vinden in postvak A. Kummeling)
 - Cryobuis met 0,8 ml RNA later (te vinden op bureau A. Kummeling)
2. Eigenaar meldt zich bij balie en wordt binnen geroepen in de poli
 3. Er wordt gecontroleerd of de hond vandaag is gewogen en of dit is vastgelegd in Vetware.
 4. Een student vult formulieren in:
 1. Vetware formulier ‘Congenitale portosystemische shunt’
Aanklikken en invullen ‘controle’
Let er op dat duidelijk gevraagd en genoteerd wordt hoe lang de hond nog dieetvoer en/of lactulose heeft gekregen, en of de hond dit nu nog krijgt!
 2. Vetware formulier ‘Aanvraag Radiologie’ controleren (is het ingevuld en verstuurd) en Radiologie melden dat de patient binnen is.
 3. Aan de eigenaar wordt gevraagd de ‘Vragenlijst postoperatief’ in te vullen
 5. Lichamelijk onderzoek van het dier in de polikliniek
 1. Algemeen lichamelijk onderzoek
 2. pre-anesthetisch onderzoek (invullen in een ‘aanvraag anesthesie’, opslaan, nog niet versturen)
 6. Echografisch onderzoek:
 - a. De radioloog vermeldt niet in zijn mondeling en het schriftelijk verslag hoe (met welke techniek) de shunt is vernauwd (proleen ligatuur of met een cellophaanband gesloten met ligaclips) om het onderzoek voor de dierenarts die de klinische controle uitvoert en de eigenaren te blinderen. Indien er aanleiding voor is, kan contact op worden genomen met A. Kummeling, omdat de chirurgie wel op de hoogte is van de gebruikte techniek.

- b. Tijdens het onderzoek worden de lever, de portale circulatie, de shunt en de mate van flow door de shunt geeevalueerd. Daarnaast wordt onderzocht of er aanwijzingen zijn voor vorming van collateralen en de blaas wordt gecontroleerd op wandafwijkingen/sediment/urolithen. Bij aanwijzingen voor cystitis of urolihiasis graag cystocentesis voor algemeen urineonderzoek.
- c. Indien nodig kan de radioloog verzoeken om sedatie van de hond. Als deze sedatie kan voorkomen dat er een CT uitgevoerd hoeft te worden, kunnen de kosten voor rekening van het onderzoek komen. Graag melden bij A. Kummeling.
- d. Indien met echografie geen uitsluitsel gegeven kan worden over de mate van portosystemische shunting (flow door de shunt en/of aanwezigheid van collateralen), dan dient een CT onderzoek plaats te vinden op kosten van het onderzoeksproject. Deze afspraak zal apart worden gemaakt door A. Kummeling in overleg met de eigenaren, en dus op een andere dag plaatsvinden, op een zo kort mogelijke termijn na dit bezoek.

7. Bloedafname:

- i. UVDL: heparinebuis / EDTA-buis op ijs: aanvragen Ht, leucocyten (**zonder diff!!!!**), totaal eiwit, albumine, galzuren en veneus ammoniak.
Bij urologische afwijkingen (via de anamnese of uit echografie) graag ook een urine onderzoek algemeen aanvragen
- ii. Cryobuis: 0.5 ml bloed met 0,8 ml RNA-later. Daarna cryobuis (zonder sticker!) in koelkast op kamer A. Kummeling leggen.
- iii. BST uitvoeren (zie hieronder).

BST (galzuren stimulatie test)

- Na de aanvraag van de basale concentratie galzuren via het UVDL in de eerste bloedaanvraag (bij de nuchtere hond), geef je de hond de volgende hoeveelheid Royal Canin Hepatic dieetvoer: 2 theelepels in honden <5kg, en 2 eetlepels in honden >5kg.
- Vervolgens wordt opnieuw bloed afgenomen voor bepaling van galzuren op 1 uur en op 2 uur na geven van het voer (1 ml in een heparinebuis). Dit bloed moet worden afgedraaid (5 minuten 3500 tpm, op de IZA) en, voorzien van naam en tijdstip van afname, in de koelkast worden geplaatst op de kamer van Anne Kummeling. Er hoeft dus geen aanvraag in Vetware te worden gemaakt.

Indien de patient niet komt opdagen op de afgesproken tijd/dag:

- Waarschuw de afdeling Radiologie als duidelijk is dat de echografie op dat moment niet doorgaat.
- Waarschuw A. Kummeling zodat contact kan worden opgenomen met de eigenaar.

Bij vragen, problemen, opmerkingen: Anne Kummeling (06-29148103)

Appendix 18: Information letter levershunt

(Double click on image)

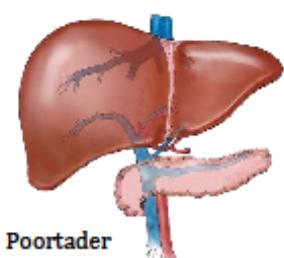


Universiteit Utrecht

Informatie over een aangeboren levershunt (portosystemische shunt)

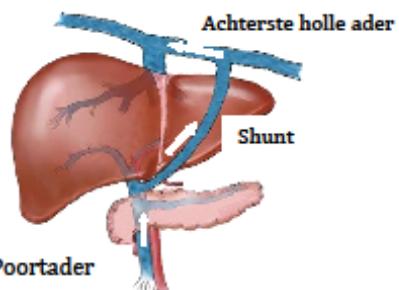
Wat is een portosystemische shunt?

Een portosystemische shunt of levershunt is een aangeboren abnormale verbinding tussen de poortader en één van de grote aders in de borst- of buikholte die deel uitmaken van de algemene bloedsomloop naar het hart. Bij een gezond dier voert de poortader bloed van het maagdarmkanaal naar de lever. Dit bloed bevat bouwstoffen en groeifactoren die van belang zijn voor de groei van de lever, maar ook schadelijke stoffen uit de darm die gefilterd moeten worden door de lever.



Poortader

**Normaal aangelegde bloedvaten
naar en van de lever**



Poortader

Aangeboren levershunt:
**het bloed stroomt van de poortader ,
door de shunt, direct naar de achterste
holleader, en niet door de lever zelf.**

Bij patiënten met een shunt stroomt het poortaderbloed niet naar de lever, maar wordt het via de shunt om de lever heen geleid. De bouwstoffen en groeifactoren bereiken de lever niet, waardoor deze zich niet kan ontwikkelen en niet goed werkt. Giftige stoffen die in de darm worden geproduceerd zoals ammoniak, worden door de lever niet uit het bloed verwijderd. Ammoniak in het bloed kan de hersenen binnendringen en leiden tot toegenomen slaperigheid en afwijkend gedrag zoals rondjes lopen, tegen dingen aan lopen, kwijlen of voor zich uit staren. Ook kunnen er door een verhoogde ammoniakuitscheiding in de nieren ammoniumsteentjes ontstaan in de nieren en de blaas. Deze steentjes kunnen leiden tot blaasontsteking, bloed in de urine en zelfs soms tot afsluiting van urinewegen. Daarnaast zien we bij deze dieren vaak een wisselende eetlust, veel drinken en veel plassen, vermagering of een vertraagde groei en soms overgeven van voer of diarree. Deze verschijnselen komen ook regelmatig bij andere ziekten voor en daarom moet worden vastgesteld of ze worden veroorzaakt door een levershunt.

Hoe wordt een portosystemische shunt vastgesteld?

Wanneer uw eigen dierenarts het vermoeden heeft dat uw hond of kat kan leiden aan een portosystemische shunt, wordt u meestal doorgestuurd naar de poli Hepatologie (leverziekten). Op de hepatologie-polikliniek wordt uw dier onderzocht door coassistenten en dierenartsen van die afdeling. Om vast te kunnen stellen of er sprake is van een levershunt worden standaard enkele onderzoeken gedaan, namelijk een bloedonderzoek en een echografisch onderzoek.

Bij het bloedonderzoek wordt de hoeveelheid ammoniak gemeten omdat hiermee bijna altijd kan worden vastgesteld of er sprake is van een portosystemische shunt. Daarbij is het soms ook nodig om te onderzoeken of de lever een toegediende hoeveelheid ammoniak op een normale manier uit het bloed kan filteren (een zogenaamde ammoniak

Appendix 19: Foundation and definitions of the care pathway

De basis van het zorgpad

Aan de basis van zorgpaden ligt de ontwikkeling van industriële theorieën omtrent planning en organisatie. Deze theorieën zijn gebruikt om complexe processen in de industriële sector beter te kunnen plannen en organiseren. Als gevolg van deze efficiëntere planning en organisatie hebben in de loop van de vorige eeuw verschillende industriële innovaties plaats kunnen vinden. In navolging van de succesvolle implementatie van de theorieën is er binnen de zorgsector een aantal van deze theorieën gebruikt als basisbeginsel voor de ontwikkeling van zorgpaden.^{4, 2} Door Huiskes en Schrijvers worden de volgende theorieën genoemd:²

- Critical Path Method (CPM);
- Program Evaluation and Review Technique (PERT);
- Six Sigma;
- Lean production
 - Toyotisering
 - KOOP;
- Business Process Redesign (BPR);
- Theory of Constraints.

Belangrijke voorbeelden van deze theorieën die hebben geleid tot de totstandkoming van het basisplan voor zorgpaden zijn de CPM en PERT. De CPM refereert aan een netwerkplanningstechniek waarmee de opeenvolging van die activiteiten, die de doorlooptijd van het project bepalen, wordt vastgesteld. Er wordt geprobeerd de ideale doorlooptijd van het project te bepalen om zo deze doorlooptijd en kosten van het project optimaal te beheersen. Binnen CPM is paralleliteit een belangrijk begrip; dit staat voor de mate waarin een activiteit tegelijkertijd met andere activiteiten kan plaatsvinden.^{2, 13} Met de PERT kan geanalyseerd worden welke taken nodig zijn om een project te voltooien en de vereiste tijd voor elke taak om te voltooien. Met deze methode wordt ‘de kritieke weg’ van start tot product in kaart gebracht. Er wordt niet zozeer gekeken naar de kortste route, maar naar de kritieke punten, oftewel de knelpunten, die het proces verlengen.^{4, 13} Met deze theorieën kan de effectiviteit en kwaliteit van een proces verbeterd worden. Dit is ook de opzet van de zorgpaden in de medische zorg. Een zorgpad is “een verzameling van methoden en hulpmiddelen om de leden van het multidisciplinair en interprofessioneel team op elkaar af te stemmen en taakafspraken te maken voor een specifieke patiëntenpopulatie, met als doel kwalitatieve en efficiënte zorgverlening te verzekeren”.⁴ Dit houdt tegelijkertijd ook een verbeterde planning en organisatie in.

De doelen die men met een zorgpad over het algemeen wil bereiken zijn als volgt:^{6, 10}

- diagnostiek en behandelplan gestoeld op evidence-based richtlijn;
- multidisciplinair besproken en geacordeerd behandelplan voordat het gesprek met patiënt(eigenaar) plaatsvindt;

- reductie van verslaglegging door efficiëntie;
- optimale zorg voor de patiënt in alle fasen van de behandeling met aandacht voor de ‘hele’ patiënt;
- optimale toegang en doorlooptijden;
- standaardisatie;
- optimale informatievoorziening voor patiënt(eigenaar) en medewerkers;
- eenvoudige en overzichtelijke inwerking voor nieuwe werknemers, direct handvat.

In Appendix 1 is een verder uitgebreide opsomming te vinden van de doelen van een zorgpad die door Bleser zijn benoemd.¹²

Voor het ontwerp van een zorgpad in de diergeneeskunde bestaat de mogelijkheid om medische richtlijnen te gebruiken. Binnen de diergeneeskunde zijn er voor verschillende aandoening medische richtlijnen ontwikkeld door de KNMvD. Deze richtlijnen geven de professionele standaard aan en geven dierenartsen een handvat, zodat zij de diergeneeskunde volgens Good Veterinary Practice kunnen uitoefenen. Voor het ontwikkelen van een zorgpad kan een dergelijke richtlijn als hulpmiddel gebruikt worden. Echter er zijn op dit moment voor nog maar enkele aandoeningen in richtlijnen besproken. Wel bestaat er een richtlijn voor bacteriële urineweginfecties bij hond en kat. Indien een zorgpad voor Cystitis ontwikkeld wordt, kan deze richtlijn van de KNMvD een handvat zijn.

Definities

Om beschrijving van zorgpaden eenduidig te maken zijn de volgende begrippen aangehouden in navolging van Huiskes en Schrijvers:²

- Klinisch pad = Pad binnen een kliniek.
- Zorgpad = Klinisch pad, maar met poliklinische handelingen, het ontslag en de nazorg vanuit het ziekenhuis.
- Transmuraal zorgpad = Zorgpad, maar omvat ook het voortraject en nazorg in de eerste lijn.
- Zorgstraat = Zorgpad binnen een specifieke bouwkundige omgeving, bijvoorbeeld het Oogziekenhuis Rotterdam.
- Focus factory = Instelling gericht op enkele patiëntengroepen, - Focuspoli bijvoorbeeld het Oogziekenhuis Rotterdam.