

Supplementary File I: Interview questions

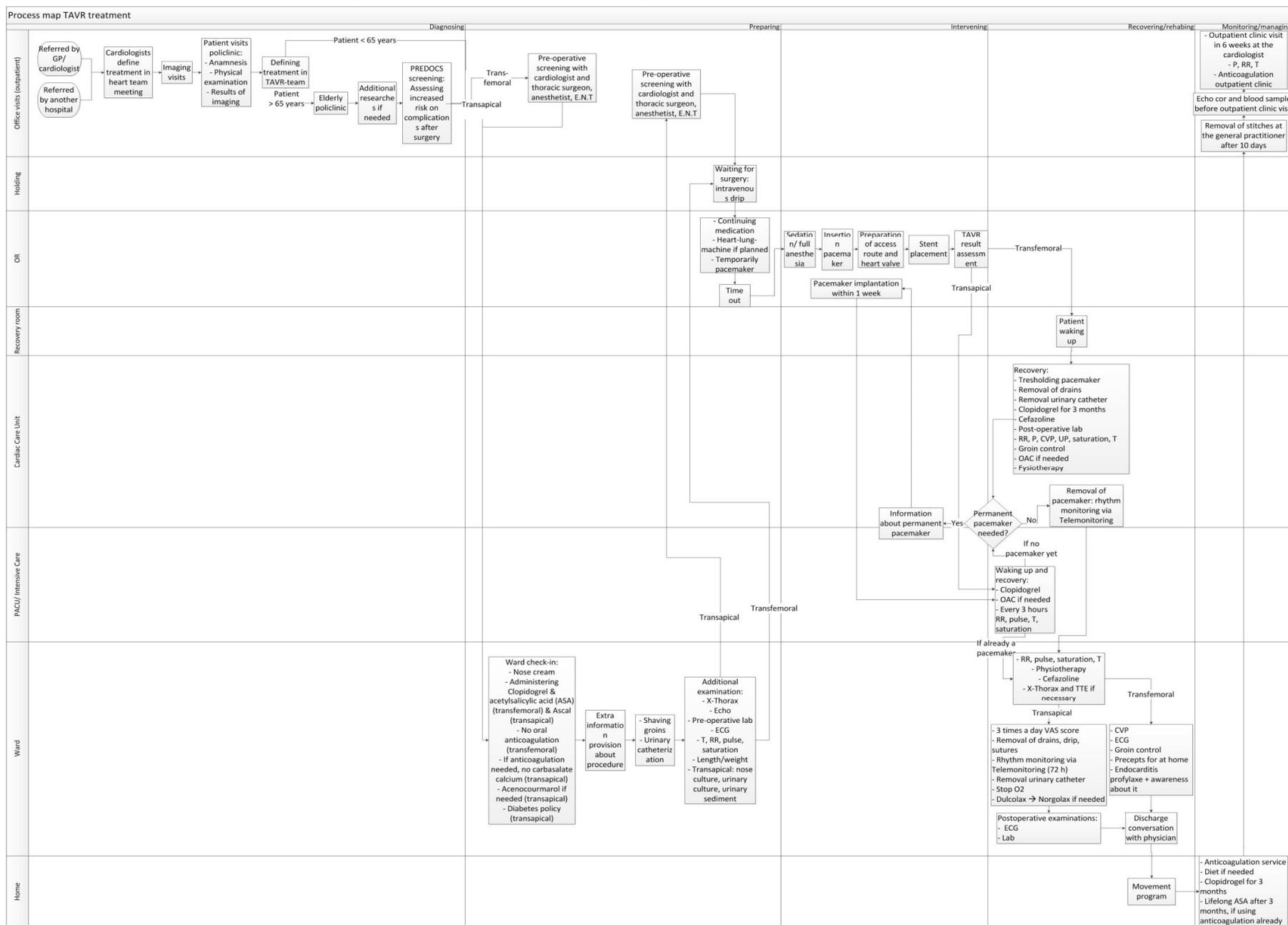
1. Which processes regarding Diagnosing/Preparing/Intervening/Recovering and rehabbing/Monitoring and managing do you think are the most important because they could influence outcomes? And why?
2. How would you prioritise them based on important to unimportant?
3. Are there any improvements possible within these processes? How could one handle these processes the best?
4. Are any other complications possible which may impact outcomes that severe, that you would want to measure and track them?

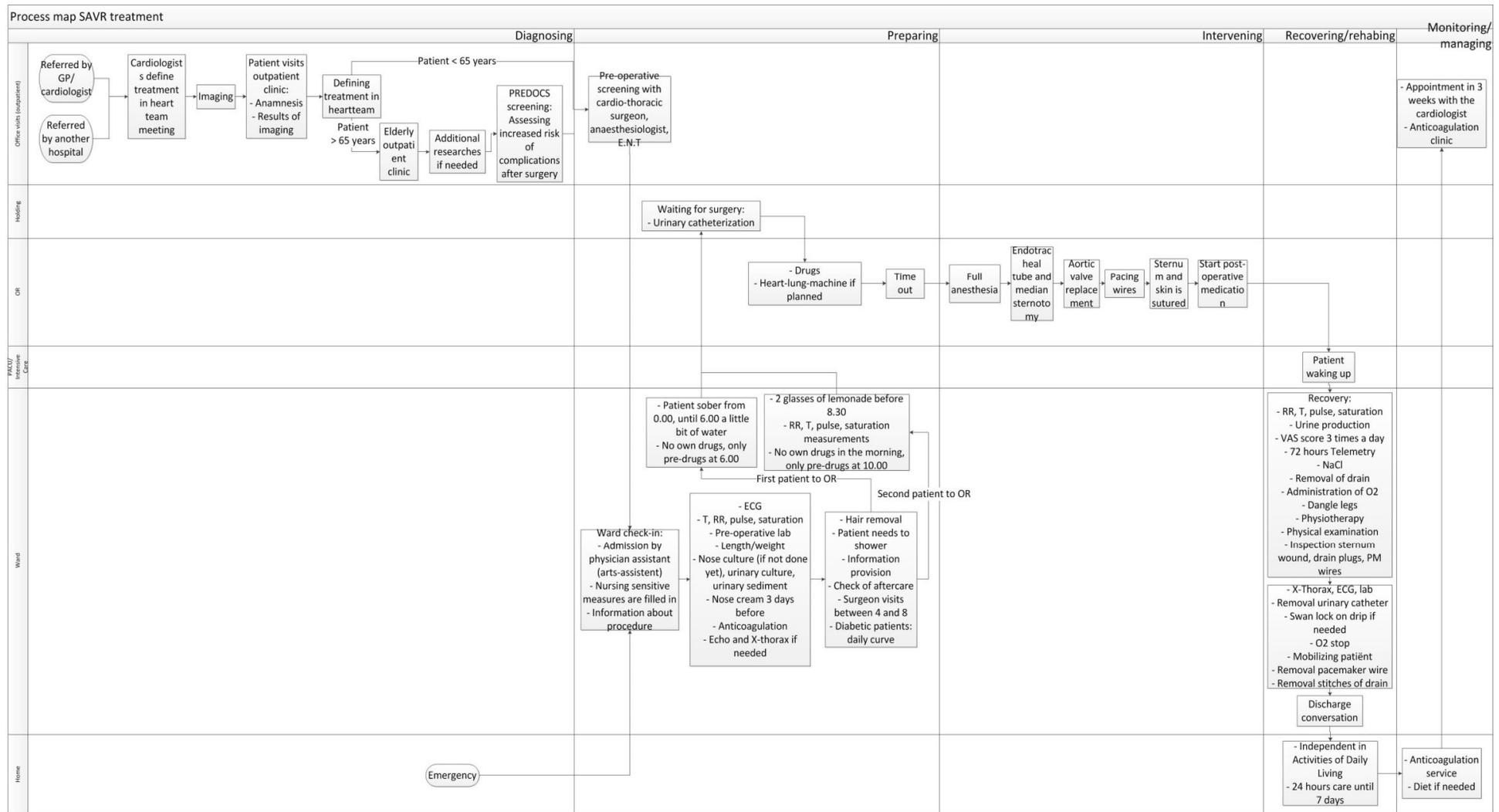
Supplementary File II: Outcome measures set of the NHR

Hierarchy	Generic outcome measures	SAVR-specific outcome measures	TAVR-specific outcome measures
Survival	120-day mortality Long-term survival		Procedural mortality 30-day mortality
Degree of recovery/ health	Quality of life		NYHA classification
Damage of the treatment (side effects, complications or medical mistakes)		CVA Deep sternal wound infection Implantation new permanent pacemaker	CVA Implantation new permanent pacemaker Vascular complications
Durability of recovery or health		Freedom of valve re-intervention	Freedom of valve re-intervention

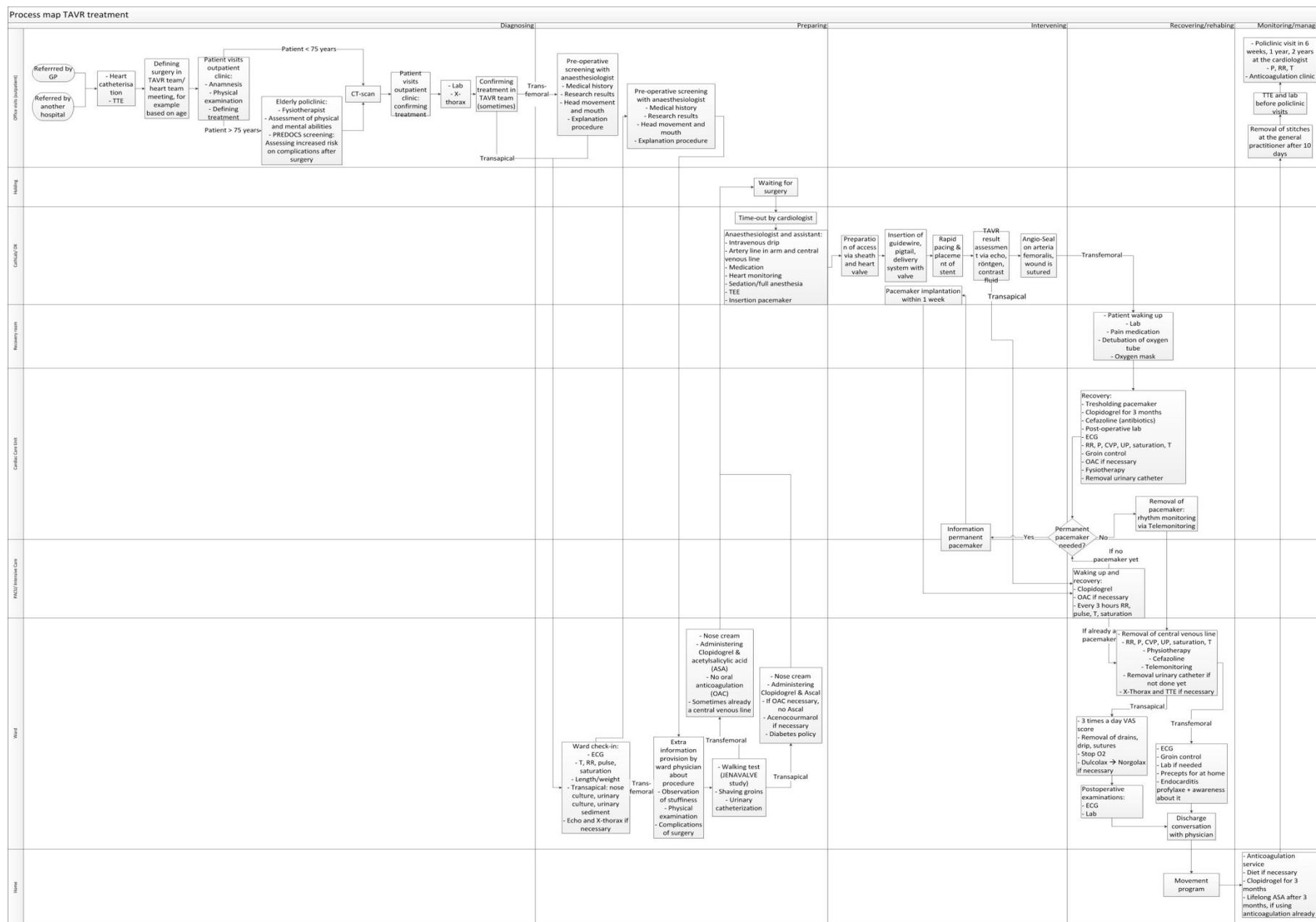
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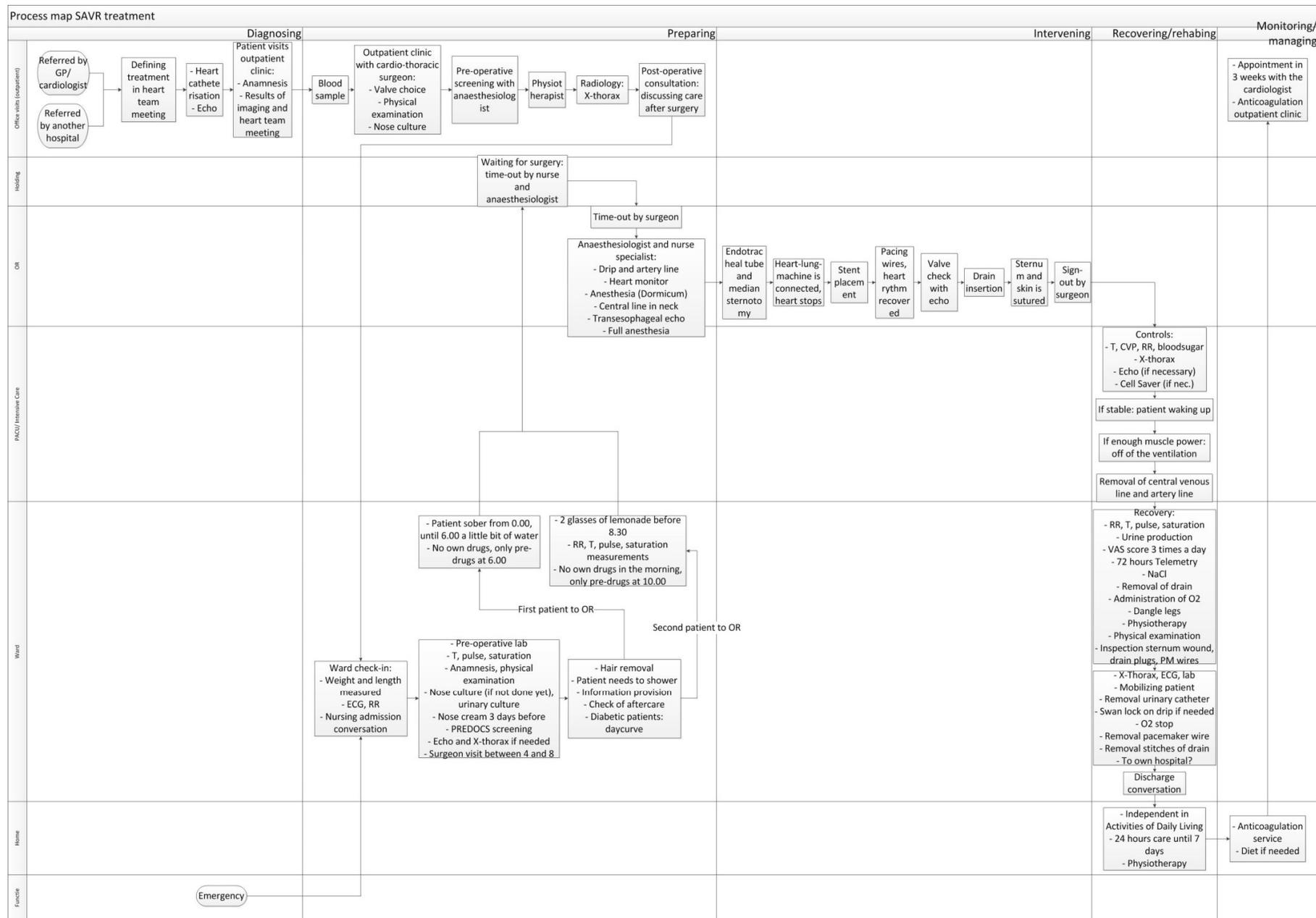
Supplementary File III: Work-as-imagined TAVR and SAVR process maps





Supplementary File IV: Work-as-done TAVR and SAVR process maps





Supplementary File V: Substantiation in literature

1. Information provision to patients about SAVR treatment

Our study proposes that a poor timing of mobilization might lead to sternal dehiscence. Important is that sternal dehiscence is not only caused by poor mobilization, but also other risk factors identified by earlier studies, such as obesity.⁴ However, using the process measure about 'information provision' might lead to the first steps in the direction of quality improvement of the 'sternal wound infections' result.

2. Valve choice for TAVR and SAVR treatment

We used the process measures of the NHR for TAVR and SAVR prosthesis types in our definition for 'valve choice', which were '*Type of prosthesis of the SAVR*' and '*Type of prosthesis of the TAVR*'.¹ Previous studies concluded that the brand of the valve influences a permanent pacemaker implantation, because CoreValve prostheses showed a higher risk for pacemaker implantation than an Edwards Sapiens prosthesis after TAVR.^{5,6} The 'valve choice' might not always be influenceable but measuring the amount of different types of prostheses would give insight in why specific treatment outcomes were found. It could illuminate whether other factors play a role in satisfying or disappointing treatment outcomes.

3. Frailty screening of patients undergoing TAVR and SAVR treatment

Despite the differences in frailty assessment tools between studies, frailty was found to be significantly associated with 1-year and 30-day mortality in multiple earlier studies.⁷ No definition or criteria for a frailty score have been given in our study because different criteria are used in the literature.^{8,9} Hospitals might want to choose a definition of frailty themselves to use during the elderly outpatients' clinic or the elderly screening but the goal should be the use of an universal frailty score.

It was also recommended in the literature to evaluate the procedural risk of TAVR patients in addition to the decision of the heart team, to prevent that too frail patients are subjected to an inappropriate treatment. In addition to our study, that study proposes to measure the quality of life of TAVR patients before and after the intervention. This is considered important because it indicates the clinical benefit and determines which patients benefit the most of TAVR.¹⁰

4. Managing waiting lists for TAVR and SAVR treatment

Our process measure 'time between the TAVR surgery indication and surgery' has also been supported in literature. A previous study found that a longer time on the waiting list is associated with higher mortality and morbidity. No threshold period was found below which waiting times were safe because clinical events showed a constant relationship with waiting time.¹¹ Considering the results of our study, a long waiting list is unfavourable for vulnerable TAVR patients but a too short waiting list for SAVR patients can lead to changes in OR planning and procedural delays, which could lower the quality of life of the patient. The balance between a too short or too long waiting list is of importance here. However, this is subject for further research.

5. Stopping anticoagulants in SAVR treatment

Regarding 'stopping anticoagulation on time', it was confirmed in previous studies that anticoagulation treatment before surgery increases the risk of re sternotomy.¹²

6. Permanent pacemaker implantations in TAVR and SAVR treatment

It was found in previous studies that it is debatable whether 'permanent pacemaker implantations' take place fast enough. An association of early pacemaker implantation with death was found, but the permanent pacemaker implantation itself was not leading to lower survival.¹³ Moreover, AV conduction disturbances were partially shown to recover over time.⁶ Therefore, it is important for a hospital to decide on guidelines regarding the waiting time for heart rhythm to restore.

7. Pain measurement of patients after SAVR treatment

The importance of 'pain treatment' is also emphasized in previous studies because poor pain treatment may lead to for example negative cardiac, pulmonary and musculoskeletal effects. Regular measurement of pain is important in the treatment of pain.¹⁴ We used the Dutch Health and Youth Care Inspectorate's

measure to define our process measure for pain management, which was: *'The number of clinical surgical patients whose pain level is recorded digitally at least once a day during each day of admission'*.¹⁵

References

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