Impact assessment of post-treatment options in nuclear medicine therapy:

Interim Report

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1 Changes in project scope and objectives

The objective of the project has not changed. Our objective is to construct a model that assesses the impacts of post-treatment options in nuclear medicine therapy, with a focus on evaluating the overall benefits and detriments of the treatment. We have tried to reduce our initial scope which was to focus on the Lu-177 treatments done in Finland and specifically, in public healthcare, to keep the project feasible. When we started the data-gathering process we realized that if we did not reduce our scope, there would be too many perspectives and scenarios that could affect the impact of the treatment, and with the given time, including all of the possible scenarios to our model would not be feasible.

At this point, the final scope remains unclear, as it constantly changes when new information is gathered. Thus we hypothesize that the exact scope will be known after all data is gathered and analyzed, as then we know all the information and can decide on which scenarios are the most important ones to include in our model. To remain efficient and within the schedule, we will prioritize some events and perspectives to be included first in the model, and if there is time left we can extend our scope further. This way we will ensure that we will have some model constructed at the end, even if it does not include all the relevant scenarios. Currently, we have started to construct a model that focuses on three different parts which are the hospital, patient's home, and waste management. We will not focus on the possible radioactivity of sewage. The model is constructed to evaluate the impacts of a single treatment. Thus if the patient goes to multiple consecutive treatments, the impacts are multiplied, and thus the different starting conditions and possibly different scenarios of the consecutive treatments are ignored. This is our starting scope, but when additional information and data are gathered and analyzed this scope may need to be modified. Identifying the starting scope helped us to start constructing the initial model, and if the scope changes, due to the dynamic nature of the Excel model, it can be modified easily according to the changes in the scope.

2 Project status

2.1 Completed tasks

Before presenting our project plan, we had completed most of the literature research on the topic. Our aim was to get more familiar with the topic so that we would be able to determine post-treatment options for the model. During the literature research, we focused on for example radiopharmaceutical therapy in cancer treatment, patient guidelines, justification of radiation practices in medicine, previously used models, post treatment impacts of radiopharmaceutical therapy and evaluation of quality of life. Through scientific literature, we gained a better understanding about the Lu-177 treatment and its post-treatment impact on individuals and society. We will continue literature research until the data is fully analysed because we need to review the literature to construct the model.

To complete the project successfully, we contacted appropriate parties related to health and waste management problems. We formed questions for different parties using the knowledge we had gained through the literature research. The questions were written in Finnish. We contacted HUS, Kuopio University Hospital, Docrates Oy, Fortum Waste Solutions Oy, Suomen kiertovoima Oy, Jätekukko Oy and Finnish Environment Institute. We created separate questions for the hospitals and waste management institutes. In some cases, we had to send follow-up questions. Some of the experts were interviewed by the group and some of them preferred to answer by email. We have received answers from Fortum Waste Solutions Oy, Suomen kiertovoima Oy and Finnish Environment Institute. We also have a meeting with an expert from HUS in week 16. In addition, we expect answers to the questions from Kuopio University Hospital in the near future.

2.2 Current tasks

After receiving data from the specialists, we now need to analyze it. Based on the analysis, we can form parameters to our model: probabilities of certain outcomes and their monetary values. Some parameters are more difficult to evaluate, so we are forming ranges for them, and will later examine how the results change based on the value of the parameter.

We are evaluating some outcomes by performing interviews on the specialists. In these interviews, we ask the interviewees to choose between a certain outcome and a gamble, or a certain outcome and a given amount of money. Based on these questions, we will give monetary values to the outcomes.

We are currently constructing our model. We have already made first drafts of different parts of our model, and combined these parts. There is still more construction ahead but the work is already on progress.

At this point, we also need to agree on our final scope. We have asked STUK their opinions on the scope, but we will have to do some of the scoping ourselves. When analyzing the data and constructing the model, we need to keep our scope in mind and disregard some data, if it is out of our scope. We will also disregard data related to events that are very specific, even if they are within our scope.

2.3 Remaining tasks

After completing the current tasks, we still have some upcoming tasks that must be completed before finalizing the project. After analyzing the data received from the specialists, we must link the analyzed data to the right parts within our model. To do this, we need to implement ranges for different variables used in the model. After fulfilling the model with the information provided by the specialists, we need to trim the model so that all three parts of our model are coherently formatted.

We will report the findings of our project in the final report. In the final report, we will not only report the main results of the project but also reflect on the execution of this project. Before submitting the project, we will clean up the Excel file and provide STUK instruction on how to use the Excel model that we have implemented. This will make it easier for STUK to further develop and modify the model in the future.

3 Changes to the initial project plan

There have not been any major changes to the tasks introduced in the project plan, but there have been some changes to our project schedule. The literature review is extended to last until the end of data analysis, as we will need to review the literature to analyze the data we will receive and to identify the most relevant scenarios. As was stated at the beginning of this report, the scoping of the problem will continue until the end of data analysis, which previously was expected to be done during the first week of the project. In addition, there have been some minor changes to the client meetings. The revised project schedule is in Figure 1.

Tasks	Subtasks	Week																	
		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Initial research and scoping																			
	Discussions with the client	■						■											
	Literature review			■	■	■	■	■	■	■	■	■	■	■					
Data collection and validation																			
	Data collection from companies and reports							■	■	■									
	Constructing and iterating parameter ranges										■	■	■	■					
	Client validation meetings													■					
Constructing the model																			
	Constructing the Excel model										■	■	■	■					
Validation of the model																			
	Sparring with the client													■			■		
	Modifying the model																■		
Reporting																			
	Project plan			■	■	■													
	Interim report										■	■							
	Final report														■	■	■	■	■

Figure 1: Revised schedule of the project

4   Updated risk management plan

The updated risks of the project are presented in table 1. For each risk, its likelihood, impact, effect and prevention mechanism have been identified. The scale of likelihood and impact estimate is low, medium and high. Identifying the risks at early stage, helps us eliminate them and as a result, complete the project on time.

The likelihood of some risks has changed as the project has progressed. The likelihood of inaccurate data has decreased from medium to low as the project has progressed because we have already some data from the experts. On the other hand, the likelihood of having overly complex model with too many variables is updated from medium to high. We have namely noticed that different experts value different cases and at each discussion with the experts, they have pointed out more scenarios that should be included in the model. This increases the risk of having too complex model if we are not able to narrow down our scope well enough. Due to the above-mentioned reasons, we also added a new risk: a lack of a general picture on the topic. This risk considers that we have had problems of receiving help for narrowing down the scope because we have mainly obtained more topics to add to the model from the discussions with the experts. The team members have tried to narrow down the scope and take only the most important scenarios to the model. We also increased the likelihood of lack of time to medium due to the problems on narrowing the scope.

Table 1: *Main risks that can occur in the project*

Risk	Effect	Likelihood	Impact	Mitigation
Communication problems with the client	Not getting appropriate feedback for the model. The final model does not meet the client's requirements.	Low	High	Initiating communication with the client.
Inactive group members	Project is not completed on time due to increased workload	Low	High	Having meetings regularly. Good communication between team members. Following the schedule.
Inaccurate data	The quality of final model has decreased.	Low ~~Medium~~	High	Trying to contact different parties related to health care and waste management in order to get more data. Getting the data as early as possible so that it can be discussed with the client.
Unrealistic assumptions	The final model is not accurate.	High	High	Consulting the client about the assumptions. Constructing ranges for the parameters based on publications and reports about the topic.
Poorly defined objective	The final model does not capture the problem and therefore, does not meet the requirements.	Low	High	Discussing about the objective with the client at an early stage. Also getting familiar with the data and literature at an early stage.
Overly complex model with too many variables	The model is not completed because the problem is too wide for the time we have reserved.	High ~~Medium~~	High	Formulating the objective clearly. Having a clear plan.
Lack of time	The model is not completed on time or the problem is simplified significantly in order to complete the model.	Medium ~~Low~~	High	Having a clear plan and schedule.
Lack of a general picture on the topic	The model is not completed on time because we have not received enough help on prioritising which scenarios are the most important.	High	High	Team members try to narrow down the scope by decide which scenarios are most important to take into the model. Consulting client about the scenarios.