



UNDER PRESSURE

BEDSIDE RATIONING IN THE EMERGENCY AND CRITICAL CARE IN THE NETHERLANDS

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Rotterdam, 22-06-2021
Wordcount: 8664*

Abstract

Background

Rising health care expenditures, shortages of resources and unlimited demands put a strain on the affordability of health care systems around the world, including the health care system of the Netherlands. Bedside rationing is therefore according to some unavoidable. Bedside rationing can be defined as the withholding of a beneficial course of treatment for cost reasons. It is, however, not exactly clear where and to which extent bedside rationing takes place. Previous research has shown that bedside rationing is present among general practitioners and other medical specialties as internists but there has no research been done into bedside rationing in the emergency and critical care. The aim of this study is to find out if bedside rationing is present in the emergency and critical care and to what extent. Furthermore, the influence of certain patient and physician characteristics on bedside rationing will be studied.

Research methods

A quantitative study was performed by means of a cross sectional survey. The survey consisted out of eleven questions on physician characteristics, cost responsibility, cost awareness, bedside rationing and patient characteristics. The three patient characteristics that were studied were age, BMI and smoking status. The survey was distributed among ER doctors, trauma surgeons and intensivists working in thirteen academic and peripheral hospitals distributed throughout the Netherlands. Data analyses were performed with IBM SPSS statistics 26. Descriptive statistics were generated on the sample characteristics and the overall results. The effect of the physician characteristics on bedside rationing decisions was studied by the means of a binary logistic regression. The included physician characteristics were gender, years of experience, specialty and type of hospital. The regression was performed for both rationing in the normal situation as for rationing in emergency and critical situations.

Results

A total of 120 physicians responded to the survey of which 119 were included. On average, respondents reported to feel partly responsible for cost containment in health care. On the question on cost awareness 45 participants (37.8%) indicated never or to be very occasionally aware of treatment costs. 88 respondents (73.9%) reported, in varying degrees, to have ever performed bedside rationing in normal situations. In emergency and critical settings this was indicated by 56 respondents (47.1%). The question on patient characteristics showed that for some physicians age, BMI and smoking status do play a role in bedside rationing decisions. Age was opted the most, BMI was considered the least. Lastly, the regression on the physician characteristic showed that only years of experience had a significant effect on bedside rationing decisions and this was only in emergency and critical situations.

Conclusion

This study showed that bedside rationing is present in the emergency and critical care in the Netherlands. Further research is necessary to determine the effect of bedside rationing on the quality of care. This is not only applicable for bedside rationing decisions in emergency and critical care but for bedside rationing decisions throughout the Dutch health care systems. Further research is also necessary to determine the influence of physician characteristics as well as patient characteristics on bedside rationing decisions.

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Chapter 1 Introduction

Since the outbreak of the corona pandemic health care rationing has never been a more relevant topic. The scarcity of intensive care beds were the talk of the nation. Protocols were in place for the situation that the patient overflow would become too much and choices between patients had to be made. Choosing which patient receives an intensive care bed is a form of health care rationing. Health care rationing is often seen as something that is to a point unavoidable. In this case because there are not enough intensive care beds and personnel but also because of the increasing health care expenditures. The last few decades health care expenditures have risen and this trend is not expected to stop. It is expected that by 2030 health care expenditure growth in almost every OECD country will outpace gross domestic product (GDP) growth. It is estimated that in 2030 10.2% of the GDP across OECD countries will be health care expenditure. In 2018 this was 8,8%. (*Health at a Glance 2019*, 2019). Increasing health care expenditure, shortage of resources and unlimited demands put more pressure on health care organizations to perform health care rationing (Keliddar et al., 2017).

Bedside rationing is a form of health care rationing. Bedside rationing is defined as withholding a beneficial course of treatment for cost reasons. In a paper by Ubel & Goold three conditions are described that a physicians action must meet in order to qualify as bedside rationing. The first condition is that a physician must withhold, withdraw, or fail to recommend a service that, in the physicians best clinical judgement, is in the patients best interest. Secondly, the physician must act primarily to promote the financial interests of someone other than the patient and the third condition is that the physician must have control over the use of the beneficial service (Ubel & Goold, 1997a).

The subject of bedside rationing is surrounded by debate. Whereas some believe that bedside rationing is unavoidable in the current cost containment climate, opponents of bedside rationing believe it is immoral and can harm the patient-doctor relationship. (Magelssen et al., 2016). In a paper written in 2001 by Sulmasy it is advocated that no physician should make unilateral rationing decisions. Three reasons are given to support this statement. The first reason is that it is difficult for a physician to prove that all the conditions necessitating the rationing are met. Secondly, rationing health care does not always mean effective redistribution. The surplus of money gained by rationing decisions does not automatically go to other health care problems. The money could be spent on something the physician does not regard as more important. Lastly, rationing decisions are subjective, different physicians rations different sorts of treatments. (Sulmasy, 1992).

Despite the controversy, research has shown that bedside rationing is present in the health care system in the Netherlands. A study performed in the Netherlands among internists showed that 64% of the participants had prescribed a cheaper course of treatment while there was another more effective but also more expensive option (de Ruijter et al., 2021). Another study performed in four European countries among general practitioners showed that 56.3% of the participants reported rationing of interventions in the prior 6 months. The most frequently rationed interventions were MRI's and screening tests, the least frequently rationed were ICU referrals and dialysis (Hurst et al., 2006). These studies show that it is very likely that bedside rationing occurs in the Netherlands and that it is probably not only among internists.

There is however little research done in the Netherlands to what extent and where bedside rationing takes place. It is for instance not clear if bedside rationing is also prevalent in emergency and critical cases. It is imaginable that in these cases there is little time to weigh treatment options and therefore bedside rationing could be not ideal. Hurst et al. showed that the least frequently rationed interventions were ICU referrals and dialysis (critical care), but Hurst et al. also showed that ICU

referral and dialysis rationing is nonetheless present (Hurst et al., 2006). It could be questionable if it is in the patients best interest if physicians feel the need to think about cost containment in critical and emergency situations. Patients and their families in these situations probably want their physicians to use all measures despite the costs. This does, however, not automatically mean that opting for a less expensive and less effective option is never justified. In Keliddar et al. it is mentioned that in some OECD countries technological advancements are used that have less marginal effect than existing treatment options. By using these advancements, more money is spent that cannot be spent elsewhere (Keliddar et al., 2017). Furthermore, there has also been little research done to which extent certain patient characteristics play a role in bedside rationing. It is imaginable that age but maybe also BMI of patients could play an important role in bedside rationing decisions. In

The aim of this study is to find out if bedside rationing is present in cases where patients need emergency or critical care and to find out what patient characteristics play an important role in bedside rationing decisions. If bedside rationing is present in these critical and emergency cases, this could inspire further research to find out if this has an effect on the quality of healthcare and how big this effect is. With this information an assessment can be made if the tradeoff between quality and cost containment is necessary and acceptable. Furthermore, it is important to research if bedside rationing decisions are dependent on patient characteristics because this could affect the equality in healthcare.

Readers guide

In the next chapter the background of the research question will be described. It will be focused on defining and recognizing bedside rationing, opinions among physicians, previous research on the topic of bedside rationing in critical and emergency care and certain patient characteristics. In the third chapter the method of the study will be explained. It will zoom in on the data collection and data analyses. In the fourth chapter an overview of the results will be presented. The following chapter is the conclusion and discussion of the results. In this final chapter the key findings and the strengths and limitation of the study will be discussed. In this chapter the implications of this study will also be described and it mentions what further research is necessary.

Chapter 2: Background

Defining and recognizing bedside rationing

Bedside rationing is defined by Ubel et al. as “the withholding by a physician of a medically beneficial service because of that service’s cost to someone other than the patient” (Ubel & Goold, 1997). In this paper ‘Recognizing Bedside Rationing: Clear Cases and Tough Calls’ Ubel & Goold give multiple cases where bedside rationing is present. In some cases it is easier to recognize bedside rationing than in other cases. In one of the described cases a county hospital that does not own a MRI scanner has to set money aside every year to give 6 patients a MRI in another hospital. When a physician from the county hospital sees a patient with ‘a soft indication’ for a MRI and therefore tells the patient a MRI is unnecessary, this qualifies as bedside rationing. By denying the MRI for one patient in order to save it for a patient that will need it more, the physician has made a bedside rationing decision (Ubel & Goold, 1997). This example shows that bedside rationing is not always a decision between two treatments, one of which is cheaper and less effective but that it contains every decision made in order to contain cost and material.

Bedside rationing is, however, a broad concept. As mentioned in a paper by Ward and Levy research into rationing and bedside rationing is hindered by the broad variability of the concept used in different papers. Whereas some studies define rationing as when something essential or important is denied, others define rationing as withholding any potentially beneficial service (Ward & Levy, 2007). Furthermore, the difference between a medical decision and a rationing decision is sometimes small. If a physician does not want to order an extra test or prescribe a course of treatment because of low or no expected benefit this can be considered a medical decision. However, when the ordered test or course of treatment is also very expensive and this is a factor in the decision it becomes a rationing decision (Ward & Levy, 2007).

Opinions of bedside rationing among physicians and the public

When researching bedside rationing it is important to keep in mind that it is not always a topic that is easily discussed. Opinions about bedside rationing are scattered and there is conflicting evidence in the literature about how physicians regard bedside rationing. A systematic review performed by Strech et al. showed a wide range of percentages of respondents willing to accept bedside rationing. The sixteen included studies showed a range from 94% to 9% of willingness to accept bedside rationing (Strech et al., 2009). The broad range was partly due to the heterogenous phrasing of items, the different types of respondents (general physicians, consultants and other medical specialties) and the high standard deviations. But Strech et al. also showed that the more explicit an item was phrased and if it contained uncomfortable or specific words as ‘rationing’ or ‘denying’, respondents were less likely to accept bedside rationing (Strech et al., 2009). This is important information to keep in mind when interviewing physicians or designing a survey.

Studies have also shown that bedside rationing is not a subject that is easily discussed with patients. In a paper by Hurst et al, more than half of the respondents indicated rationing decisions could interfere with the doctor and patient relationship (Hurst et al., 2007). Lauridsen et al. showed in a postal survey under GP’s in Denmark that only half of the respondents would disclose to their patients that they find cost-quality trade-offs important in their decisions making (Lauridsen et al., 2008). In the paper of the Ruijter et al. only 12% of the respondents always disclosed to the patient that they prescribed a cheaper, less effective treatment option (de Ruijter et al., 2021). These results could possibly indicate that even though sometimes resorting to bedside rationing decisions,

physicians are not always comfortable with their decision or are somewhat afraid of the reaction of patients.

Studies into the preference of the public regarding rationing decisions have also been performed. A quantitative study performed in Germany by Schwappach and Koeck showed that patients strongly preferred physicians disclosing rationing of care to patients (Schwappach & Koeck, 2004). A qualitative study by Owen-Smith et al. held in depth interviews with patients that were treated for morbid obesity and breast cancer. They also conclude that nearly all patients wanted their physician to inform them about rationing decisions. Furthermore, they showed that patients had high expectations of their physicians to provide all relevant information of all possible treatment options. They do, however, acknowledge that disclosing rationing information can be distressing for both the physician and the patient (Owen-Smith et al., 2010).

Bedside rationing in critical and emergency care.

It would be interesting to find out if bedside rationing happens in emergency and critical situations because it is very probable that these decisions have to be made in a short amount of time and under stressful conditions. Because of the emergent and critical nature of these situations it is very likely that there is more at stake than a bedside rationing decision made by a for example a general practitioner. Furthermore, it is imaginable that patients in an emergency or critical situation want their physicians to be focused on the medicine and not on the costs. Additionally, emergent or critical patients that are unconsciousness or very sick are not always able to make decisions for themselves. They often cannot ask for a second opinion or a referral. They are dependent on the physician who is on call and are therefore very dependent on the opinion of that physician on bedside rationing.

In order to research bedside rationing in critical and emergency care there has to be a definition of this care first. Emergency care entails all immediate care that is necessary to prevent death or serious impairment of the health of a patient (*Emergency Care: Definition*, n.d.) and critical care exists of all long term care that is given to patients that are facing life threatening injuries or illnesses (*Critical Care: MedlinePlus*, n.d.). There already has been a lot of research done into the rationing decisions of general practitioners, consultants and other medical specialties but less among E.R. doctors and trauma surgeons. Studies have been performed among intensivists and into rationing in intensive care units but most of this research was either done into the allocation of intensive care beds, was qualitative or not specifically into bedside rationing.

In a paper from Halvorsen et al. a qualitative approach was used to research the professional challenges of bedside rationing in intensive care units. This study showed that Norwegian ICU clinicians faced moral dilemmas at bedside caused by insufficient staffing and resources. The participants had to ration basic medical treatment, nursing care and comfort for ICU patients (Halvorsen et al., 2008). In a study by Ward et al. it was concluded that in intensive care units in the United States nurse managers had a larger role in cost containment than physicians. They also showed that according to the physicians and nurse managers excessive care was more commonly seen than health care rationing.

Truog et al. found that intensivists have little to guide them through rationing decisions and provided them with a taxonomy to use during those decisions. They developed three categories in which rationing decisions can be placed. Placing a decision in one of the categories does not automatically mean that the decision is ethical but does help the physician to determine which evidence is appropriate to support their decision (Truog et al., 2006). The first category consists of decisions made based on external constraints. For example a type of medicine is not in a hospital's formulary

or the costs are not covered by insurance. In the second category decisions are placed that can be justified by clinical guidelines. Not in every clinical guidelines the most expensive treatment is advised. Individual clinical judgement is the third category. For this category they give the example of one ICU bed left and two patients who need it. In this case there is often no evidence based guidance and a physician needs to make a decision relying on experience and judgement. (Truog et al., 2006)

Other research on bedside rationing in the intensive care unit is mostly done on triaging and allocating beds. In a systematic review by Sinuff et al. it was found that refusal of a ICU bed was associated with an increased risk of hospital death. Factors that played a role in refusal were age, illness severity and medical diagnosis. In this study it was not clear which of these factors played a more important role (Sinuff et al., 2004). Other studies developed frameworks for ICU bed rationing in reaction on the COVID-19 pandemic. In a study by White et al. a framework is discussed that is used in the United States. In this allocation framework patient get a priority score based on their condition and other criteria. This score can be used to decide which patient gets the ICU bed (White & Lo, 2020).

Apart from the studies on triaging and bed allocation, there were no quantitative studies found in which intensivists were asked if they ever performed bedside rationing. There were also no studies found that researched bedside rationing in emergency situations and emergency care.

Patient characteristics in bedside rationing decisions.

Multiple studies, although in varying degrees, have shown that bedside rationing is prevalent in health care systems around the world. Important to research is if these decisions are patient neutral or if certain patient characteristics play a role in these decisions. In the study performed by Hurst et al. several criteria for bedside rationing are mentioned. The respondents reported most often small expected benefit, low chance of success, life prolonging interventions if the quality of life was bad and age of 85 or higher (Hurst, 2006). With the exception of age, all the mentioned characteristics have a direct link with the outcome. It is questionable if a service can be regarded as medical beneficial or as medical necessary when there is a small expected benefit, low chance of success or bad quality of life. Medically more and more is becoming possible, but the question is whether extraordinary measures are always justified.

Age, however, does not always have a direct link with the outcome of a treatment. An active 85 year old can be healthier than an inactive 60 year old with diabetes. It is questionable whether making bedside rationing decisions on perceived health status is something that is desirable. Furthermore, if age is a criteria for bedside rationing it could be possible that other factors that influence perceived health status also play a role. In that case BMI and smoking status could also be a criteria for bedside rationing. Research has shown that people who have severe obesity are more likely to experience health care stigmatization with an increase in BMI. (Hansson & Rasmussen, 2014). This stigmatization could also have an effect on bedside rationing decisions. As for smoking, multiple studies have shown that lung cancer patients who are smokers, afraid of stigma, seek help less timely than nonsmokers (Carter-Harris et al., 2014). It could be possible that this stigma is also present in physicians and influences bedside rationing decisions.

Chapter 3: Research methods

Research design and data collection

In order to say something about bedside rationing in the emergency and critical care in the Netherlands it was decided to conduct a quantitative study. The quantitative data was collected by the means of a cross sectional survey. This survey was distributed among physicians working as trauma surgeons, intensivists or as emergency room doctors. Doctors in training were also considered for this study. Only physicians working in the Netherlands were eligible. Both academic as peripheral hospitals were approached in order to yield a more representative sample. All seven academic hospitals in the Netherlands were approached as well as six peripheral hospitals. The academic hospitals are distributed throughout the Netherlands. Therefore, the six peripheral hospitals that were approached were chosen in a way that they were roughly in the same regions throughout the Netherlands. Another inclusion criteria for the peripheral hospitals was that they needed to have a 24 hour open emergency room.

The seven included academic hospitals were the Amsterdam UMC location VU and AMC, UMC Utrecht, UMC Groningen, Academic Hospital Maastricht, UMC Radboud Nijmegen, Erasmus Medical Centre and Leiden UMC. The six peripheral hospitals that were included are the OLVG in Amsterdam, the Medical Centre Leeuwarden, the Haga hospital in the Hague, the Maasstad hospital in Rotterdam, the St Antonius hospital in Utrecht and the CWZ hospital in Nijmegen. From each hospital the trauma surgery department, the intensive care department and the ER were contacted. The first step in the data collection was emailing physicians per department if individual email-addresses or contact forms were found. If no individual email addresses or contact forms were found, either secretariats or department heads were approached via email. Departments who did not have any email address provided were contacted by phone. The goal was to reach the departments by phone in order to receive a general email address to send the survey to. It was hoped that department heads or secretariats would forward the survey to their colleagues. The initial goal of respondents was 73 respondents.

Cross sectional survey

The cross sectional survey that was developed and distributed can be found in appendix A. The survey was made via enquetemaken.nl (*Maak Gratis Online Enquêtes & Vragenlijsten Met Enquêtes Maken*, n.d.). The survey was completely anonymous. The cross sectional survey was construed in a way that it took a small effort to participate. Considering the COVID-19 pandemic during the data collection of this study and the high pressure on the ICU's in the Netherlands at the time it was chosen to limit the survey time to around three minutes. By minimizing the time that physicians had to spent it was hoped more physicians would fill out the survey. The minimized survey time was clearly mentioned in the email sent to the physicians. Minimizing the time did however mean that the survey consisted mostly out of close-ended questions and not too many items. The survey had 11 questions in total. The first five questions regarded the respondents characteristics. Respondents had to fill out their gender, age category, specialty, years of experience and the type of hospital they worked at.

The other questions were on the topic of cost responsibility, cost awareness and bedside rationing. Question seven had respondents fill out how much they agreed on the viewpoint that doctors are partly responsible for cost savings in the health care system on a scale from 0 to 100. In the following four questions physicians had to indicate how often they performed a certain action. They were asked if they had ever opted for a cheaper, less effective course of treatment in normal

situations and if they ever did this in emergency or critical situations. They were also asked if they were aware of treatment costs when prescribing a certain treatment and if they ever thought about treatment cost in emergent or critical situations. For this four items they could choose never, very occasionally, occasionally, often, always and no answer. The last question consisted of three sub questions. In these sub questions physicians had to show how much certain patient characteristics had influenced their decisions. The patient characteristics were age, BMI and smoking status and respondents could choose played no role, played a little role, played a role, played a very big role, was decisive, no answer and not applicable.

As mentioned in chapter 2 Background, bedside rationing can be a sensitive subject among physicians. That is why during developing the survey there was attention paid to phrasing and choice of words. For example the words bedside rationing and rationing itself were used as little as possible. In the questions where physicians had to indicate if they ever opted for a cheaper course of treatment it was stated clearly that the cheaper course of treatment was indeed effective, just less effective than the more expensive course of treatment. Furthermore, it was compulsory to fill out every question but it was possible to choose the answer option 'no answer'. If physicians did not want to answer certain questions they would still be able to take part in the survey.

Variables

The main dependent variable is bedside rationing in the critical and emergency care. Physicians could indicate how often they performed bedside rationing in critical and emergency situations. The outcome is ordered and categorical, the categories were never (1), very occasionally (2), occasionally (3), often (4) and always (5). Respondents were also asked if they ever opted for cheaper, less effective treatments in normal situations. This is the second dependent variable. The same categories apply as in the question about bedside rationing decisions in emergent and critical situations. For both dependent variables a regression was performed in order to estimate which of the independent variables had an effect on the outcome.

The independent variables used were gender, years of experience, type of hospital and specialty. The independent variable gender is a binary variable, the respondents were either male or female. Respondents could also indicate 'other' or 'prefer not to answer' but these options were not chosen by a single respondent. Type of hospital is also a binary variable, respondents either worked in a peripheral hospital or in an academic hospital. The independent variable specialty is an ordinal variable. There were three different specialties, the trauma surgeons, the intensivists and the ER doctors. The last independent variable years of experience is a ratio variable. It is a variable on scale and it has a clear definition of zero.

Respondents had also indicated to which age group they belonged but age was eventually not used in the regression. This had three reasons. The first reason was that age and years of experience are not independent from each other. Years of experience is often linked to the age category someone belongs. Secondly, years of experience was chosen instead of age because the variable age was obtained in five categories. These categories were too small to yield statistically correct results. Thirdly, years of experience was expected to be linked more directly with the outcome bedside rationing than age.

Data analyses

IBM SPSS statistics 26 was used to perform the data analyses. SPSS was first used to translate the data gained from the survey into descriptive statistics. This was done for all eleven items of the survey. Item one to five were translated into descriptive statistics on the respondent characteristics.

For item seven to eleven histograms were generated. Alongside the descriptive statistics it was chosen to perform a multivariate binary logistic regression to study the effect of the independent variables on the dependent variables. In order to be able to perform a binary logistic regression, the dependent variables had to be made into binary variables. It was chosen to make a distinction between never having performed bedside rationing and having ever performed bedside rationing. This meant that the category never was coded as zero and the other categories very occasionally, occasionally, often and always were coded as one. Furthermore, there was one categorical independent variable. It was chosen to indicate the intensivist as the reference group because they were the largest.

Regression model

A multivariate binary logistic regression was used to generate answers to the question which physicians characteristics play a role in bedside rationing decisions. A multivariate binary regression generates coefficients. Together with a constant and error term the coefficients form the regression equation. The equation for the multivariate binary regression used in this study can be found underneath and is drawn up to illustrate the meaning of the coefficients.

$$BR = \beta_0 + \beta_1 * G + \beta_2 * SP + \beta_3 * YE + \beta_4 * H + \varepsilon$$

In which:

- BR = Bedside rationing
- G= Gender
- SP= Specialization
- YE= Years of experience
- H= Type of hospital
- β_0 = Intercept parameter (constant)
- β_1 = Coefficient for gender
- β_2 = Coefficient for specialization
- β_3 = Coefficient of years of experience
- β_4 = Coefficient of type of hospital
- ε = Random error term

The outcome bedside rationing (BR) and the coefficients (β) are expressed in the logarithm of the odds, the log-odds. A regression coefficient describes the size and the direction of the relationship between an independent variable and the dependent variable. The coefficient describes for each unit change in the independent variable, the change in the link function of the model. The other independent variables are held constant. In general, the greater the log-odds, the more likely it is that a certain event will happen. In this case the event is bedside rationing. This means that the greater the log-odds of a coefficient, the more likely it is that bedside rationing occurs. This is applicable to positive coefficients. Naturally, there are also negative coefficients. A negative coefficient means that the log-odds of the outcome become smaller and therefore reduces the likeliness of the event happening.

Alongside the coefficients the regression also produces standard errors (SE). The standard error is a combination of the standard deviation and the sample size. The smaller the standard error, the more precise the estimation of the coefficient. For every coefficient there is also a p-value generated. The p-value tests the probability of finding the coefficient in the sample if the null hypothesis is true. If the p-value is below a certain threshold, in this study 0.05 is maintained, the null hypothesis can be rejected.

Chapter 4: Results

Data collection

The data collection started on the 25th of April 2021 and closed on the 2nd of June 2021. A total of 122 respondents filled out the survey. Three were excluded because they only filled out their characteristics and answered none of the other items. 119 respondents remained. In the first half of the data collection only departments and physicians with an email address provided were approached. If individual email addresses were found, the physicians were contacted individually. This was only the case for the OLVG in Amsterdam, the Erasmus hospital in Rotterdam and the Amsterdam UMC location VU and AMC. For the remaining hospitals department heads or secretariats were emailed if their email addresses were provided. They were asked to fill out the survey and to distribute the survey to their colleagues. This approach yielded 66 respondents. It was hard to say which departments were reached because the survey was anonymous. Many filled out the survey but it was not clear which respondent came from which department. After all departments with email addresses were contacted, the rest of the departments were contacted by phone. This brought the total of included respondents up to 119.

Sample characteristics

The sample consisted of 119 respondents. The complete sample characteristics can be found in table 1. In total 65 men responded versus 54 women. More academic than peripheral doctors filled out the survey. The smallest physician group were the trauma surgeons with nineteen respondents included. This was not unexpected because there are far fewer trauma surgeons in the Netherlands in regards to the amount of intensivists and ER doctors. The groups of intensivists and ER doctors were fairly even. Furthermore, the smallest age group were the 21-30 years old with only 2,5% of the respondents and the second smallest was the group of 61+ with 5,9% of the respondents. The largest age group were the 41-50 year olds (42,0%). The mean years of experience reported was 11.04 years with a standard deviation of 7,59 years. The smallest amount of years of experience reported was one year and the largest amount reported was 44 years.

Table 1:
Sample Characteristics

Characteristics	N (%)
Gender:	
Men	65 (54,6%)
Women	54 (45,4%)
Type of hospital	
Academic	86 (72,3%)
Peripheral	33 (27,7%)
Specialty	
Trauma surgeon	19 (16,0%)
Intensivist	53 (44,5%)
ER doctor	47 (39,5%)
Age category	
21-30	3 (2,5%)
31-40	43 (36,1%)
41-50	50 (42,0%)
51-60	16 (13,4%)
61+	7 (5,9%)

Years of experience	
Mean	11.04
Standard deviation	7,59

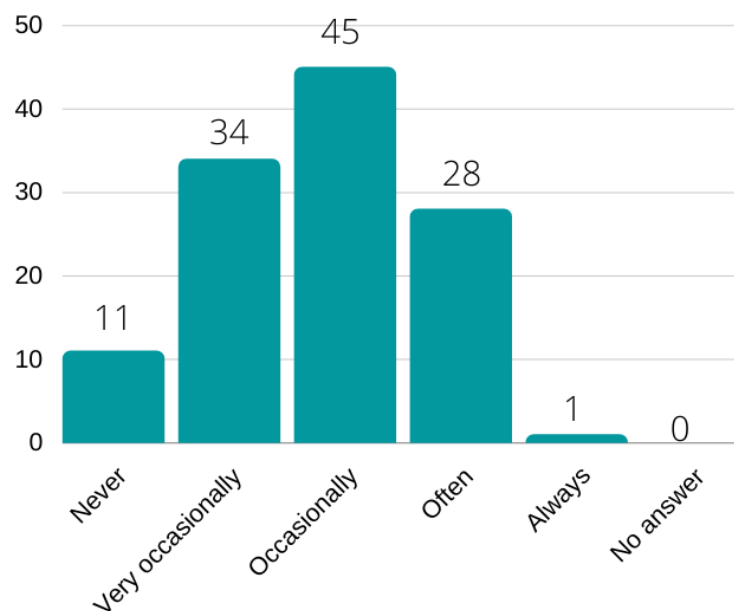
Notes: N is sample size

Cost responsibility and awareness

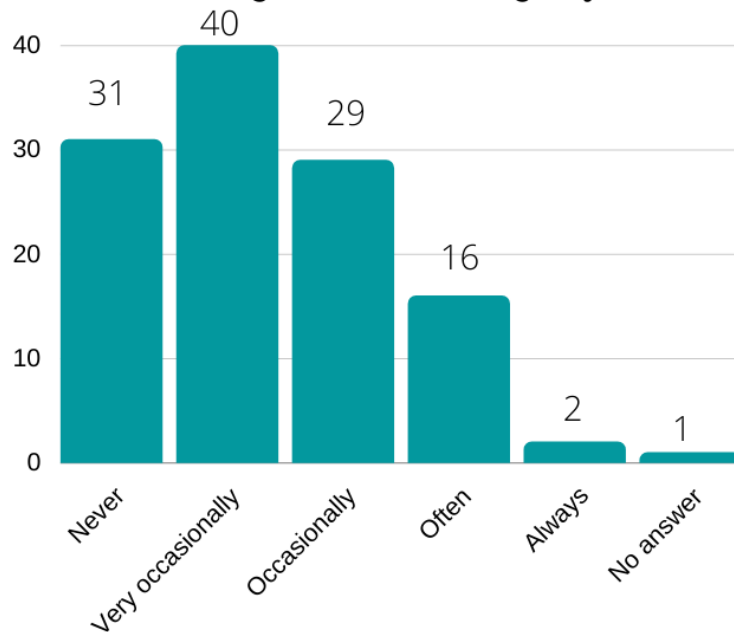
Respondents were asked to rate on a scale of one to 100 how responsible they felt about cost savings in health care. The mean of the reported answers was 70,68 with a standard deviation of 19,39. The highest reported responsibility was 100 and a total of 10 respondents chose this answer. The lowest reported responsibility was indicated by one respondent and was 0. Respondents were also asked whether they were aware of the costs when prescribing a treatment. 11 respondents (9.2%) said to be never aware of treatment costs, 34 (28,6%) indicated they were very occasionally aware of treatment costs, 45 respondents (37,8%) reported that they were occasionally aware, 28 (23,5%) were often aware and 1 (0.8%) respondent was always aware of the costs. Every respondent filled out this question.

It was also asked if respondents every thought of treatment costs during emergency and critical situations. 31 of the respondents (26.1%) reported that they never thought of treatment cost during these situations. Very occasionally was reported 40 times (33.6%). 29 of the respondents (24.4%) indicated that they occasionally thought about treatment costs during emergency and critical situations. Often was reported 16 times (13.4%) and 2 respondents (1.7%) indicated that they always thought about treatment costs in emergency and critical situations.

7. When you prescribe a treatment you are aware of it's costs



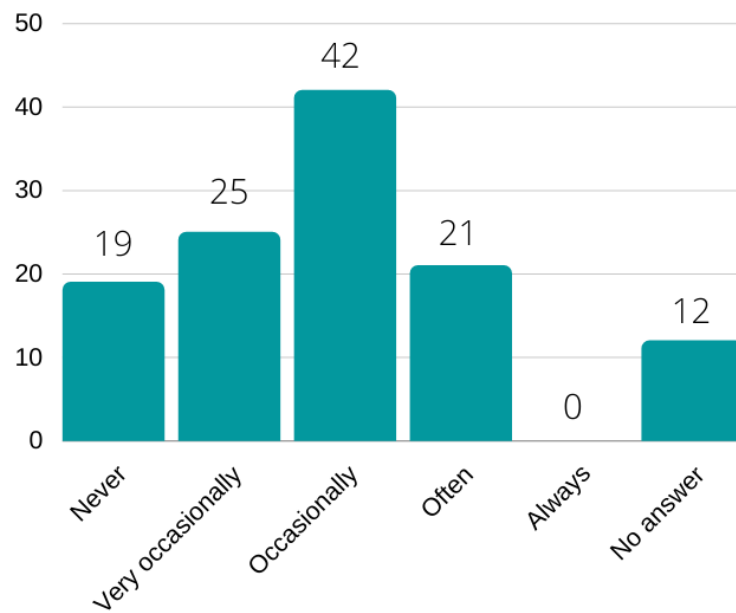
9. How often have you thought about the costs of a certain course of treatment during a critical or emergency situation?



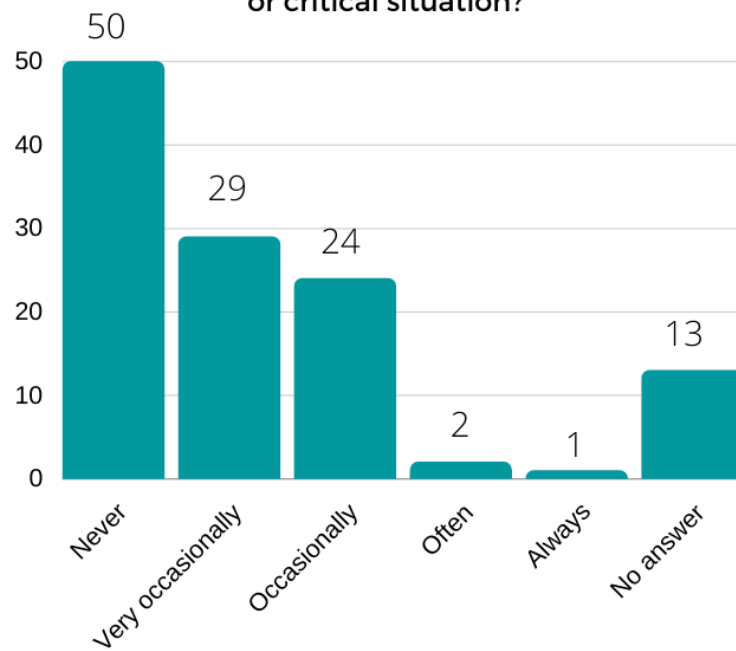
Bedside rationing in normal and in emergency and critical settings

Respondents reported if they ever prescribed a cheaper, less effective treatment option in a normal setting and if they ever did this in an emergency or critical setting. 19 respondents (16%) indicated that they never had rationed in a normal setting as opposed to 50 respondents (42%) in an emergency or critical situation. Very occasionally was reported 25 times (21.0%) in the normal situation and 29 times (24.4%) in emergency or critical situations. Often was reported 21 times (17,6%) and 2 times (1.7%) in respectively the normal situation and in emergency and critical situation. Always was never reported in the normal situation but once (0,8%) in the emergency and critical situation. Both in the normal situation as in the emergency and critical situation some respondents did not want to answer, 12 respondents (10.1%) indicated no answer in the normal situation, 13 (10.9%) in emergency and critical situations

8. How often did you opt for a cheaper, but still effective course of treatment while there was a more expensive and more effective option?



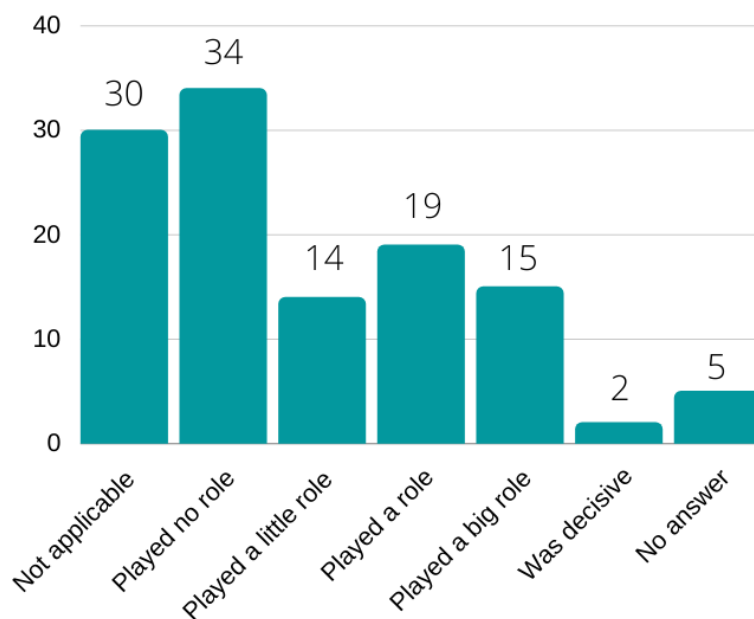
10. How often did you opt for a cheaper, but still effective course of treatment while there was a more expensive and more effective option in an emergency or critical situation?



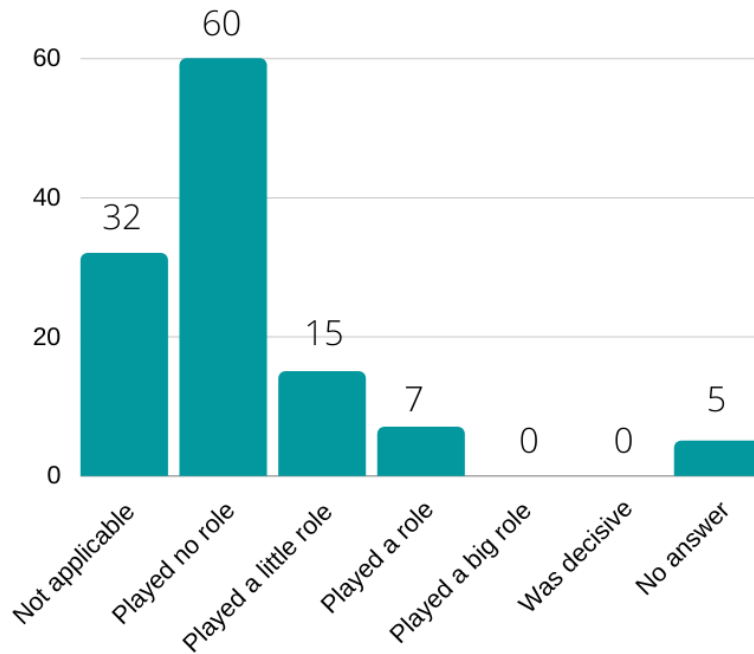
Patient characteristics

In the last item of the survey respondents were asked to what extent certain patient characteristic influenced their bedside rationing decisions. The first characteristic that was asked about was age. 30 respondents (25.2%) filled out that this sub question was not applicable. Played no role was indicated 34 times (28.6%) and played a little role fourteen times (11.8%). Nineteen respondents (16.0%) chose played a role and played a big role was opted by fifteen respondents (12.6%). Was decisive was indicated by only two respondents. The second characteristic was BMI. 32 respondents (26.9%) indicated that this sub question was not applicable. Played no role was reported 60 times (50.4%) and played a little role 15 times (12.6%). Seven respondents (5.9%) indicated played a role. Zero respondents chose played a big role or was decisive. The last sub question was on smoking status. Not applicable was indicated 33 times (27.7%) and played no role 61 times (51.3%). Thirteen respondents (10.9%) reported that smoking status played a little role and four respondents (3.4%) reported played a role. Played a big role was indicated three times (2.5%) and was decisive zero times.

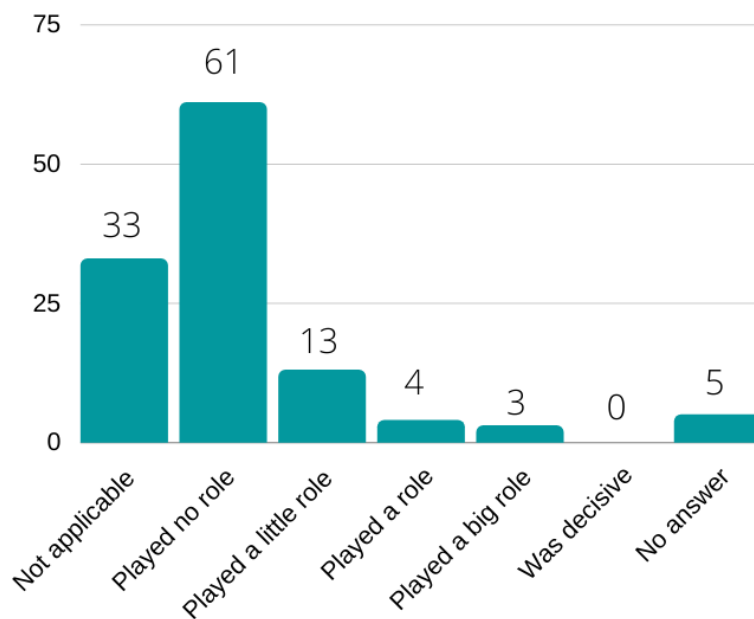
11. Age- In the case that there is ever chosen for a cheaper (less effective) course of treatment, to what extent did the following patient characteristics play a role?



11. BMI- In the case that there is ever chosen for a cheaper (less effective) course of treatment, to what extent did the following patient characteristics play a role?



11. Smoking status- In the case that there is ever chosen for a cheaper (less effective) course of treatment, to what extent did the following patient characteristics play a role?



Effect physician characteristics on bedside rationing decisions

The results of the performed multivariate binary regressions can be found in table 2 and 3. Focussing on bedside rationing in acute and emergency situations in table 2 first, it can be seen that only years of experience has a p-value below 0.05 and is therefore statistically significant. Years of experience has a positive coefficient indicating that when a physician has more years of experience, the physician is more likely to resort to bedside rationing. None of the other coefficients has a p-value below 0.05 and they are therefore not statistically significant. This does, however, not mean that the estimated coefficients have no value. Gender has a positive coefficient, this could indicate that women have a higher likeliness to perform bedside rationing. When looking at the coefficients for specialization, it can be seen that in reference to intensivists, ER doctors and trauma surgeons have a negative coefficient. This means that in comparison to intensivists, it is possible that ER doctors and trauma surgeons are less likely to resort to bedside rationing. Lastly, it is shown in table 2 that academic hospitals have in comparison to peripheral hospitals a negative coefficient. This possibly indicates that the likeliness of physicians resorting to bedside rationing in academic hospitals is smaller than for physicians in peripheral hospitals.

Focussing on table 3, bedside rationing decisions in normal situations, none of the coefficients have a p-value below 0.05 and are therefore not statistically significant. They will still be mentioned and explained. The coefficient of the independent variable gender is in the normal situation negative, possibly indicating that in normal situations men are more likely to resort to bedside rationing. It does however, have a very high p-value. ER doctors and trauma surgeons are just as in the regression for emergency and critical situations negative. The coefficient for academic hospitals is also just as in the first regression negative. Years of experience is in this regression not statistically significant but is as in the regression of the emergency and critical situations positive.

Even though all the coefficients were mentioned and explained, interpreting them has to be done with caution. Only years of experience was statistically significant in the first regression. For each of the remaining independent variables the coefficients were not statistically significant and therefore have no proven influence on bedside rationing decisions.

Table 2

Physician characteristics in bedside rationing decisions in acute and emergency situations

Physician characteristics	β	SE	P<0.05
Gender (Ref: male)	0.653	0.487	0.180
Specialization (Ref: Intensivists)			
ER doctors	-0.777	0.519	0.135
Trauma surgeons	-0.710	0.633	0.262
Years of experience	0.083	0.033	0.012
Hospital (Ref: Peripheral)			
Academic	-0.267	0.497	0.591

Notes: SE = Standard Error, β = Coefficient

Table 3

Physician characteristics in bedside rationing decisions in normal situations

Physician characteristics	β	SE	P<0.05
Gender (Ref: male)	-0.156	0.574	0.785
Specialization (Ref: Intensivists)			
ER doctors	-1.025	-0.636	0.107
Trauma surgeons	-0.835	0.832	0.315
Years of experience	0.040	0.044	0.361
Hospital (Ref: Peripheral)			
Academic	-0.472	0.614	0.624

Notes: SE = Standard Error, β = Coefficient

Chapter 5 Conclusion and discussion

Key findings

From the extracted data, multiple conclusions can be drawn. The first conclusion is that the results show that physicians feel on average partly responsible for cost containment in health care. This is important knowledge because when physicians feel that they have a duty in cost control, they are probably more likely to turn to health care rationing and thus to bedside rationing. This was also showed by Hurst et al. They showed that perceived pressure to ration was positively associated with the degree of rationing (Hurst et al., 2006). Secondly, in order to be able to resort to bedside rationing, physicians need to be aware of treatment costs. If a physician does not know what a certain treatment costs, it is impossible to make an informed bedside rationing decision. On the question if respondents were aware of treatment costs while prescribing a treatment only one respondent chose the option always. 45 respondents chose never or very occasionally. This is in line with previous performed studies. A study among Belgian emergency physicians showed that they had limited knowledge on costs of treatment, tests and investigations they performed on daily basis (Gervais et al., 2011). If health care rationing and thus bedside rationing will become indeed unavoidable, physicians should be more aware of treatment costs.

Respondents were asked about bedside rationing decisions in emergency and critical situations as well as in normal situations. When comparing the numbers it is noticed that in both situations physician make bedside rationing decisions. It can be seen that in the normal situation almost three quarters of the respondents indicates to have ever bedside rationed whereas in emergency and critical situations this is just below half of the respondents. It shows that bedside rationing does happen in emergency and critical situations but that it happens less than in normal situations. Respondents were not asked to indicate why they rationed in normal situations and not in emergency or critical situations, but it is conceivable that this is because of time constraint and the severity of the emergency and critical situations. Furthermore, on the question if physicians ever thought about bedside rationing decisions in emergency and critical situations only around a quarter of the respondents indicated never or no answer. The remaining three quarters of the respondents have all thought to some extent about treatment costs in emergency and critical situations.

The results on the questions on certain patient characteristics show that some physicians do take age, BMI and smoking status into account when making a bedside rationing decision. In the results can be seen that age is taken more often into account than smoking status and BMI. The results also show that the criteria BMI is used the least in making bedside rationing decisions. Whereas in age 17 respondents indicated that age played a big role or was decisive, BMI was indicated by zero respondents to play a big role or to being decisive. Three respondents indicated smoking status as played a big role whereas was decisive was indicated zero times. This could either be because age is a more used criteria or it is also possible that BMI and smoking status are less accepted criteria and the respondents had more issues with reporting it.

The regressions on physician characteristic have shown that only years of experience in emergency and critical situation was statistically significant. More years of experience made it more likely to resort to bedside rationing. All the other variables were not statistically significant and therefore not associated with a higher or lower change on bedside rationing. The study by Hurst et al. also studied the association between certain physician characteristics and the degree of rationing but they studied it among general practitioners. They showed that the physicians gender, age, specialty, site of practice and years of experience had no association with the degree of rationing (Hurst et al., 2006). The study of the Ruijter et al. showed that among Dutch internists only type of hospitals and

resident versus internists was significant in an univariate regression. Their results indicated that physicians working in an academic hospital were more likely to ration and that residents were more likely to resort to bedside rationing than internists (de Ruijter et al., 2021). This last conclusion is contradictory with the findings in this study in years of experience. Residents have less experience than intensivists but showed to be more likely to resort to bedside rationing.

The last interesting conclusion that can be drawn is that there were relatively a lot of no answers given on the questions on bedside rationing in regards to the other questions. Between the two bedside rationing questions there was little difference. The question on the normal situation received 12 no answers and the question on emergency and critical situations 13. It was possible to indicate never if a physician had not participated in bedside rationing decisions but they chose instead no answer. This could indicate that for some physicians the topic of bedside rationing and prescribing cheaper treatments is somewhat taboo.

Strengths and limitations

This study has as every other study strengths and limitations. The first strength is that the initial goal of respondents was largely exceeded. A total of 119 respondents participated while the initial goal was 73. More respondents increases reliability of the study and the generalizability to the rest of the population. What contributed the most to the exceedance of the initial goal was the approaching of the departments by phone. Another strength of this study was that the combination of questions gave a broad insight into the topic of bedside rationing among trauma surgeons, intensivists and ER doctors. In the questionnaire physicians were asked about cost awareness, cost responsibility and bedside rationing.

A limitation of the study was that although the exceedance of the initial goal, the study population was still relatively small. A small study population causes a number of weaknesses. The first one is that the binary logistic regression that has been performed yielded only one statistically significant outcome. It is possible that the rest of independent variables have indeed no positive or negative effect and are therefore not statistically significant. It is, however, also very possible that the subgroups in the regression were too small to yield a significant association. The large p-values make this more probable. The second weakness is that with a relatively small study population it is more difficult to extrapolate the data to the entire population.

Another limitation was the fact that only around 25 percent of the respondents was employed in a peripheral hospital. This makes it more difficult to determine if there is a difference between the types of hospitals. It would also have been interesting to see if there is a difference in bedside rationing between salaried employment and private partnerships but that was not asked in the survey. Another thing that could have been interesting to ask is to what extent a patient's biological age plays a role in bedside rationing decisions. Someone's biological age is dependent on how old someone's cells are and in contrary to the chronological age it is reversible and dependent of life habits. It could have been interesting to compare the role of biological age to that of the chronological age in bedside rationing decisions.

The type of regression performed, the multivariate binary logistic regression, was also a limitation of this study. The data on bedside rationing was translated from ordered and categorical into binary data in order to fit the regression model. The binary logistic regression was chosen because using an ordered categorical regression made the subgroups even smaller. Furthermore, in the ordered categorical regression the independent variable specialty could not be interpreted properly. By translating the data into binary data valuable information on to what extent bedside rationing took place was not taken into consideration.

The last limitation of this study is the design and the relatively short and compact survey. As mentioned in the methods a short survey was chosen because it would lower the effort that physicians had to put in but also resulted in less data and no open questions. Furthermore, a quantitative approach ensures a larger study population but less insights in the mechanisms behind the bedside rationing decisions. This study established that bedside rationing is present in the emergency and critical care in the Netherlands but it is not clear how physicians make these decisions, what their opinion is and how it impacts the care. With a qualitative approach it is possible to go more in depth into the bedside rationing decisions.

Implications and further research

The results of this study show that bedside rationing is present among ER doctors, trauma surgeons and intensivists in the Netherlands in normal situations and in emergency and critical situations. Previous performed studies also showed bedside rationing to be present in the Netherlands and Europe. De Ruijter et al. produced evidence for bedside rationing among Dutch internists (de Ruijter et al., 2021) and Hurst et al. showed that in four European countries bedside rationing was present among general practitioners (Hurst et al., 2006). It is safe to say that bedside rationing is a phenomenon that is spread throughout the Dutch health care system. This is also in line with a systematic review of qualitative studies performed by Strech et al. Strech et al. showed that physicians themselves see rationing as a something that is a matter of fact and as something that is spread throughout the medical community.

As mentioned before, bedside rationing is not necessarily always a bad thing. Health care needs to stay affordable and that is not possible if every patient gets the most expensive treatment. Rising health care expenditures put a higher strain on physicians and hospitals to apply cost containment. Sometimes a treatment is substantially more expensive but the effectiveness of the treatment is only somewhat higher than the existing treatment. The money spent on the substantially more expensive treatment will only generate a small health gain and the money spent cannot be spent on another patient or treatment.

Although bedside rationing is not necessarily always a bad thing and in some cases justified, it is under researched what it's actual effect is on the quality of health care systems. This study showed that bedside rationing is present in emergency and critical situations. It is less present than in normal situations, but nonetheless present. Because this is a relatively new finding, there is little to no research into the effect of these rationing decisions on the quality of emergency and critical care. If it is possible to study the effect of bedside rationing decisions in emergency and critical situations on the outcomes of patients this could yield interesting results. Sinuff et al. did this for outcomes of patients and the rationing of ICU beds (Sinuff et al., 2004). It would however be a difficult study to perform. Furthermore, the results indicate that some physician ration in normal situations but not in emergency or critical situations. It would be interesting to study the motives behind these decisions. This could be studied by the means of a qualitative study.

Because bedside rationing can be found throughout the Dutch health care system it is also important to study the impact of bedside rationing on care outside of emergency and critical situations. This could be measured by looking into certain quality standards as patient satisfactory, number of referrals and patient outcomes. It is also important to study if bedside rationing negatively influences the fairness in health care systems. If two identical patients receive different care in different hospitals because of bedside rationing decisions, this could negatively impact the equality in health care. Especially in emergency and critical situations where patients often cannot opt for second opinion but also for patients who do not possess a lot of medical knowledge or are not able to stand

up for themselves. Furthermore, most patients do not know which treatment is the most effective or the most beneficial.

This is further complicated by the fact that according to the analyses of Strech et al. the majority of the physicians ration implicitly. Strech et al. finds that rationing should be performed explicitly, transparent and according to general standards in order for it to be consistent, medically rational and ethically fair. (Strech et al., 2008). As mentioned in the background of this study the general public has also a very strong preference for the disclosure of rationing decisions by physicians. This implicates for further qualitative research into the disclosure of rationing decisions. It is important to research why physicians do not want to disclose their rationing decisions and what the effects would be of a physician disclosing his decisions to his patients.

The first step in ensuring ethically fair bedside rationing decisions could be the taxonomy of bedside rationing decisions by Truog et al (Truog et al., 2006). It could help not only intensivists but all medical specialties to determine whether or not their rationing decision can be justified. If physicians feel like their decisions are justified it might become easier to disclose to patients. Furthermore, it ensures that for every decision a physician has to weigh the options either with clinical guidelines or his own experience and instincts. A second step could be investigating not letting physicians make the bedside rationing decisions but clinical guidelines and protocols. It might be easier for physicians if they have to stick to a protocol instead of making these decisions on their own.

This could also apply to the fact that this study showed that for some physicians certain patient characteristics played a role. This could also affect the equality in health care. Some patient characteristics have a direct correlation with the outcome and could be included in clinical guidelines and protocols. Examples of this type of characteristics are quality of life and the condition of the patient. For the other, not directly linked to the outcome characteristics, further research can be conducted to which extent and how they play a role.

Lastly, this study also showed that although bedside rationing is present, it is possible that some physicians regard it as a taboo. This could also mean that in departments itself, bedside rationing is not a topic that is easily discussed. Because bedside rationing decisions can be subjective and individual, it might be a good strategy to discuss these decisions among colleagues. Discussing the bedside rationing decisions could make the decisions more transparent and well substantiated. In order to find out how taboo the subject of bedside rationing is in Dutch hospitals it would be a good idea to perform a separate qualitative study. In this study physicians' opinions about bedside rationing decisions can be researched and it can be studied how comfortable they are in discussing them with colleagues. This study could however be hampered by the fact that the physicians you would want to research the most, are the physicians that regard bedside rationing as a taboo.

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Appendices

Appendices A

Question 1: What is your gender?

- Female
- Male
- I rather not say
- Otherwise, namely..

Question 2: What is your age category?

- 21-30
- 31-40
- 41-50
- 51-60
- 61+

Question 3: What is your specialty?

- Trauma surgeon
- ER doctor
- Intensivist
- Otherwise, namely..

Question 4: How many years have you been working in this specialty?
(Open question)

Question 5: Do you work in an academic or peripheral hospital?

- Academic
- Peripheral

Question 6: As doctor you are partly responsible for cost containment in the health care system.
Completely disagree 0 – 100 Completely agree (scale 1-100)

Question 7: When you prescribe a course of treatment, you are completely aware of its costs.

- Never
- Very occasionally
- Occasionally
- Often
- Always
- No answer

Question 8: How often did you choose a cheaper, but still effective course of treatment while there was a more expensive and more effective option?

- Never
- Very occasionally
- Occasionally
- Often
- Always
- No answer

Question 9: How often have you thought about the costs of a certain course of treatment during a critical or emergency situation?

- Never
- Very occasionally
- Occasionally
- Often
- Always
- No answer

Question 10: How often did you choose a cheaper, but still effective course of treatment while there was a more expensive and more effective option in an emergency or critical situation?

- Never
- Very occasionally
- Occasionally
- Often
- Always
- No answer

Question 11: In the case that there is ever chosen for a cheaper (less effective) course of treatment, to what extent did the following patient characteristics play a role?

- Age
 - Played no role
 - Played a little role
 - Played a role
 - Played a big role
 - Was decisive
 - Not applicable
 - No answer
- BMI
 - Played no role
 - Played a little role
 - Played a role
 - Played a big role
 - Was decisive
 - Not applicable
 - No answer
- Smoking status
 - Played no role
 - Played a little role
 - Played a role
 - Played a big role
 - Was decisive
 - Not applicable
 - No answer