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## Abstract

We know that existing professions in the health care sector value work environment and job conditions to a great extent. However, we are also witnessing an expansion of new roles into the health care sector, many of which substitutie the tasks of existing professions. This may be efficient, in that it releases professionals' time. However, there is little understanding of what motivates these new professions in entering or remaining in these newly created roles. This study tries to evaluate the preference structure of one of these new staff groups, surgical technologist, through examining the preferences of trainees, defined over a number of attributes, in this group. The DCE study covers 80% of the target population. The results show a vigorous disfavour towards any perceived nursing job characteristics such as caring activities, hierarchical work environment or shift types. The results inform policy makers and hospital manager about the importance to focus not only on the nursing profession but also to take into account the existence of a group of people who is willing to work within the health care system however, associated with strong preferences against nursing activities, especially caring. Implementing and further development of new and specialised profession through reallocating former nursing tasks- should be considered while coping with labour shortage.

## **JEL-Classification:**

I18, J08, J30, C93, C90

## Keywords:

DCE, labour shortage, specialised health care profession, job preferences

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## 1. Introduction

Germany, like many other OECD countries, faces a shortage of nurses, at least at the level of the individual hospital. In 2016, 51% of all German hospitals were unable to fill open nursing positions, an increase of 14% in vacancies since 2011 (Blum et al. 2016). Affected hospitals lacked on average 6.6 positions. Within specialised units, like the operating room (OR), the shortage of (specialised) certified nurses is especially problematic as 44% of the German hospitals were, on average, not able to staff their open OR positions (Blum et al. 2016). Therefore, two positions on average are open in German ORs (Blum et al. 2016). To curb this problem in the OR, German hospitals started to train a new profession, "surgical technologists" from 1997 on (German Association of Surgical Technologists 2017). Surgical technologists are specialised health care workers who act as substitutes for OR nurses in Germany, but they are not certified and not allowed to work on the general ward. In contrast to Anglo-Saxon and Scandinavian countries, Germany's hospital system is de-centralised and the development of a specialised health care workforce to assist or replace nurses has been comparatively slow.

Surgical technologists are substitutes for certified nurses in the OR (or sometimes in the endoscopy unit of the emergency room) but lack the flexibility of certified OR nurses who can work also on the general ward or in other units like intensive care. The education process to become a nurse or a surgical technologist is nearly similar regarding the timeframe. Both occupations undergo three years of training. The training for both professions includes regular school attendance and working in different areas throughout the hospital. The surgical technologist trainee is limited to the operation room, the emergency room and the endoscopy unit. An approximately six-week internship on a ward is included though. In contrary, the nurse's trainee is allocated throughout the entire hospital.

The main difference of the training lies within the range of duties. Whereby the nursing education focuses on a broad range of skills, including caring activities, the surgical technologist's education aims to interfere solely special OR tasks such as preparing the OR room and assisting the physician/surgeon. Due to the high versatility of a nurse, the nurse can choose whether to work on the ward or in specialised units such as the OR. However, the tasks of a nurse or a surgical technologist within the OR are identical. A formal key determination of both occupations is the official certification of a nurse<sup>1</sup>, which is missing for the surgical technologists. What does this mean for the parties involved? From a hospital provider position, financing the education of nurses in Germany is shared by the federal states as well as the sickness funds, which are reimbursing hospitals the educational costs. However, this is not the case for surgical technologists; the hospitals face all educational costs on their own. From the regulation side, hospitals have a wide range of freedom when it comes to train these specialists, as legally in the end the physician is responsible for their actions. All certified professions are regulated and underlie special requirements by law, such as a standardised educational curriculum. Moreover, certified professions are associated with a secured occupational title, which allows only people with the relevant training to carry the official (job) title (German Bundestag 2016). Furthermore, in line with the EU directive (2005/36/EG) certified professions

<sup>&</sup>lt;sup>1</sup> Government approved and regulated occupation.

are acknowledged EU wide, which acknowledges that a health care profession is associated with having direct impact on people's life.

Surgical technologist is a non-certified profession and discussions are going on whether surgical technologist is a health care profession at all. Even though, surgical technologists substitute OR nurses, it is claimed that a surgical technologist has less contact to a patient and thus a low risk potential compared to other health care professions. What does this mean from a surgical technologist's point of view? Due to the lack of flexibility and national and international certification, one could argue that surgical technologists are a "dead end" job which gives the employer adverse advantages. Career perspectives are also limited, as further trainings often require certified degrees. In addition, it is still legally challenging how surgical technologists will be treated in the German social systems as they are officially classified as "unskilled" which might cause disadvantages in Germany's social safety net. Moreover, the nurse's payment sticks to pay-scales supported by the labour union and binding for the respective hospital. Again, this is not the case for surgical technologists due to the missing certification. Thus, payment of a surgical technologist may vary depending on the hospital provider (private, public etc.); however, on average the salary of a surgical technologist and a nurse is nearly similar.

The number of surgical technologists has been steadily increasing. Therefore, one could conclude that hospitals obviously are taking the costs of training, which they must cover completely themselves, as a profitable investment. Another indicator for this is that the biggest surgical technologist training schools are run by private hospitals. The larger economic question is why people are deciding to opt for this career path when certified nurse spots are vacant? Therefore, we derive two main research questions: 1) What motivates surgical technologists to choose a non-certified health care profession? 2) How important is the official certification to the surgical technologists themselves?

Understanding health care workers preferences, respectively the trade-offs that they face whilst choosing a job, is crucial to enhance current recruiting strategies to cope with labour shortage. A suitable method to measure preferences and trade-off decisions is the discrete choice experiment (DCE). This method collect data using surveys and simplifies data analysis because factors of interest can be experimentally manipulated and tested in a controlled experimental environment. Instead of relying on ratings or rankings that are artificially translated into preferences, discrete choice experiments ask respondents to repeatedly make choices between a carefully designed set of alternatives. Given the similarity to real-world purchase decisions, discrete choice experiments are able to explain actual purchasing behaviour well, and they have a firm foundation in sociology and behavioural research (Swait and Andrews 2003). More specifically, with random utility theory, these experiments are backed-up by a long-standing, well-tested theory of choice behaviour that can take inter-linked behaviours into account (see (McFadden 1974)<sup>2</sup>. For a review of the literature regarding DCE in health economics see Clark et al. (2014).

Previous research on nurse's shortage and nurse labour supply aimed to understand the nurses' choice behaviour. These studies mostly investigated the elasticity of the supply curve responding to changes in wages or non-monetary characteristics. Di Tommaso et al. (2009) investigated the importance of wages for nurses in Norway in order to increase labour supply. The authors found labour supply rather inelastic and concluded a generic wage increase solely

<sup>&</sup>lt;sup>2</sup> More detailed information on DCE as a method can be found elsewhere Train 2009; Louviere et al. 2000.

could not solve the labour shortage since non-pecuniary characteristics need to be taken into account. Shields and Ward M. (2001) found the opposite, namely that absolute pay is the main driver of job satisfaction. Hanel et al. (2014) found similar results as they identified the labour supply elasticity tend to be higher than previous research suggested. Hence, an increase in wages to increase labour supply is more promising than expected. Phillips (1995) also found respondents to be highly responsive to wage changes. Yoo and Doiron (2013) set up a best worst scaling experiment (Case 2) to compare preferences on nursing jobs and found stronger monetary preferences. In comparison, Kankaanranta and Rissanen (2008) found a rather small wage elasticity, however identified a strong and significant impact on the working hours supplied. The authors concluded a wages increase as inefficient to increase labour supply as non-monetary characteristics play a major role. Heyes (2005) linked a nurse with a poor wage to higher performance on the job as the nurse experiences a stronger vocation towards the job. For a detailed information on these studies, please see Table A1 in the appendix.

Taken together, we know that existing professions in the health care sector value work environment and job conditions to a great extent (Scott et al. 2015; Heyes 2005; Di Tommaso et al. 2009; Blaauw et al. 2010; Kankaanranta and Rissanen 2008). However, we are also witnessing an expansion of new roles into the health care sector, many of which substitute the tasks of existing professions. This may be efficient, in that it releases professionals' time. However, there is little understanding of what motivates these new professions in entering or remaining in these newly created roles. This study tries to evaluate the preference structure of one of these new staff groups, surgical technologist, through examining the preferences of trainees.

No study could be identified which focuses on specialised health care worker such as surgical technologists during a literature research. Our study is, therefore, the first DCE to analyse surgical technologists, with a particular geographical focus on Germany. In addition, we are the first to collect data of surgical technologist on an academic basis, as the profession is not considered within the annual public statistical elicitation of profession due to the missing official certification. Moreover, we believe it to be the first DCE to study the job preferences of specialised health care workers in general. Therefore, our paper has not only have academic value but is also providing information for policy-makers for questions such as an official certification of the ongoing debate about nurse's shortages.

## 2. Methods

## 2.1 Overview of the study

The study on surgical technologist's trainee preferences through DCE took place across Germany between January and July in 2017. We decided to target surgical technologist trainees rather than to survey fully trained surgical technologists as we suggested the mind-set to be less biased through work experience regarding the decision why someone decides to opt for a non-certified position. Moreover, the personnel investment costs to undergo the training are not that high at this stage and thus might not be considered much on entry to the profession. Moreover, the choice of career and appropriate education is a fundamental individual professional entry choice.

This study included trainees of all training levels (year 1-3). We contacted training centres via email, of which thirty training centres agreed to participate. A formal study approval process

took place, as every training centre required at least the approval of the CEO as well as of the head of education. Within the majority, approval of the staff council as well as the data security manager were also mandatory. Most training centres requested paper-based surveys as they acknowledged distributing the survey during class to maximise the responds rate. Paper-based surveys with a reply-paid envelope attached were sent out as well as an online-link to training centres with appropriate email access for the trainees.

The survey was generated using the software DISE (Schlereth and Skiera 2012). Initially, participants were provided with general background information regarding the survey content and structure. We divided the survey into three parts. First, respondents answered socio-demographic characteristics followed by the DCE part with fourteen choice sets. The DCE instruction for the participants stated to imagine the time before starting the training and asked in each choice set to choose among two possible provided positions the most favourable one. The survey finished with specific questions regarding the training. Respondents needed 15-20 min to finish the survey. As an incentive for the respondent, we followed a common practice and donated one euro to cancer research organisation for each completed survey. The authors privately funded the donation. No third parties were involved; hence, no conflict of interest exists.

## 2.2 Selection of attributes and levels

For the empirical study, we followed the approach suggest in Helter and Boehler (2016) and primarily identified attributes through literature search as well as additionally experts' talks with politicians, teachers and health care professionals followed. After generating a draft of ten possible attributes and levels, focus group interviews took place. All over, thirty surgical technologists' trainees participated. Attributes and levels were discussed regarding realism as well as wording and comprehensibility. Subsequently, the focus group participants were asked to rank the possible attributes and levels in order to identify their importance. We identified eight attributes and their respective levels. In a pre-test study, which we ran with thirty participants, we examined the feasibility as well as the tangibility of the questionnaire. One attribute had to be rejected completely as it led to massive confusion and thus the danger of a broaden bias within the results was too high. Furthermore, some changes in wording were required. Eventually, we identified seven final attributes and their respective levels as presented in Table 1. After updating the survey, a second test round ran with ten participants, which resulted into the eventually used questionnaire.

Attributes	Attribute levels	Reasoning
Officially	L 1: yes	Attribute is of major interest and a key political issue. As the surgical
certified	L 2: no	technologist profession is not officially approved, some disadvantages
profession		for the trainees as well as the hospitals arise. Hence, the attribute was
		included to evaluate the value of a government-approved position from a trainee point of view.
Shift types	L 1: no weekend shifts	Shift types, especially the night shift can have negative effects on a
	L 2: three-shift operation	person's health (Harrington 2001). In comparison to nurses, surgical
	L 3: on-call duty	technologists are normally used to on-call duty after finishing time (amount of on-call duties depending on the size of the team); nevertheless, undesirable working hours are unavoidable. Work-life
		balance seemed highly correlating with control over the working schedule (Tausig and Fenwick 2001);hence; this attribute was included
A	I 1. low responsibilities	Ush satisfaction is associated with a highly autonomous working
Autonomy	L 1: low responsibilities	any satisfaction is associated with a highly autonomous working
	2. distinct responsionales	attribute was rather of a general nature to provide the respondents with more flexibility through their own interpretation (Scott et al. 2015).
Work	L 1: friendly and open relationship	A positive workplace environment can lead to a lager job satisfaction as
environment	between physicians and other health	well as to higher motivational level (Nordin et al. 2017). In high
	care workers	demanding jobs, like nursing, a positive workplace environment could be
	L 2: respectful and very professional	essential to cope with stress and other challenges more effectively. We
	relationship between physicians and	used "workplace environment" as an indicator for teamwork between all
	other health care workers	sort of health care professions.
	L 3: impersonal and formally	
	relationship between physicians and	
<b>11</b> 7 1	other health care workers	
WOrk	L 1: none to very low nursing	I his attribute is of high relevance for our study as it is the most important
conieni	L 2: mostly pursing activities	consists of two level, which allow us to evaluate if someone is in favour
	L 2. mostry nursing activities	of nursing or not. Hence, if one is also prope to become a nurse instead
		of a specialised health care worker without any pursing activities
Earnings	L 1: 2.500€	This attribute reflects recent average salary (before taxes) of a surgical
	L 2: 2,900€	technologist as well as two changes in the salary, which were aligned
	L 3: 3,300€	with experts to provide a realistic scenario.
Workload	L 1: low	Workload is also a major determinant of job satisfaction. We kept the
	L 2: middle	attribute more general with room for own interpretations as the workload
	L 3: high	quiet differs depending on the hospital's medical speciality and it's actual size.
1		

### Table 1: Summary of employed attributes and levels

## 2.3 Experimental design

For the 14 choice sets in the DCE, we employed the techniques in Street and Burgess (2007) and created a d-optimal  $(2\cdot3\cdot2\cdot3\cdot2\cdot3\cdot3)$  fractional factorial design. These designs provide a high degree of efficiency (for our design 98% d-efficiency) and they are suitable for a diverse range of research questions. In our study, each choice set showed two different positions, which we illustrated in Table 2 and subsequently asked the respondent in which of the two positions they rather prefer to work.

1 OUT OF 14	JOB A	JOB B
OFFICIALLY CERTIFIED PROFESSION	yes	no
SHIFT TYPES	three shift operation	on call duty
AUTONOMY	low responsibilities	distinct responsibilities
WORK ENVIORNMENT	friendly and open relationship between physicians and other health care workers	impersonal and formally relationship between physicians and other health care workers
WORK CONTENT	none to very low caring activities	mostly caring activities
EARNINGS	2,500€	3,300€
WORK LOAD	middle	high

#### Table 2: Illustration of a choice set

We decided for the two alternatives, without an opt-out option as our target group consists of trainees who already decided for the profession of a surgical technologists. An opt-out option bears the risk of massive information loss (Louviere et al. 2000) as the respondent could use it as a quick way to finish the survey and the researcher is left to none information regarding the prior utility (Schlereth and Skiera 2017).

## 2.4 Analysis

We estimated preferences using a hierarchical Bayes procedure developed by Train (2009) in Matlab. We based our estimation on random utility theory (Thurstone 1927), thereby, making the implicit assumption that respondent *h* maximises his or her utility  $u_{h,i} = v_{h,i} + \varepsilon_{h,i}$  for the profession *i*, where  $v_{h,i}$  is the deterministic part of the utility function, which contains observable information, such as the attributes and levels shown in the choice sets and the observed covariates of respondents. The error term,  $\varepsilon_{h,i}$ , is stochastic and explains unobserved behaviour. Louviere et al. (2000,p.8ff.) discussed related assumptions regarding the cognitive processes of respondents and the extent to which these assumptions are typically fulfilled.

We used an additive model for the utility of the profession  $v_{h,i}$ , consisting of a vector of parameters  $\beta_h$  to be estimated times the effects-coded design vector  $X_i$ ; (i.e.,  $v_{h,I} = \beta_h \cdot X_i$ ). For the error term  $\varepsilon_{h,i}$ , we followed the work of McFadden (1974), and assumed an extreme valuedistribution. This distribution has a similar functional form as the normal distribution, but it provides appealing mathematical properties, such that computers can quickly calculate probabilities in a closed form. For each choice set *a*, the probability that respondent *h* chooses profession *i* is:

(1) 
$$\Pr_{h,a}(i) = \frac{\exp(v_{h,i})}{\sum_{i' \in C_a} \exp(v_{h,i'})} \qquad (h \in H, i \in I, a \in A),$$

where *H* refers to the set of respondents, *A* to the set of choice sets and  $C_a$  to the set of shown professions in choice set *a*. Train (2009, p.34ff) provided the full mathematical derivation for the logit model, and discussed the underlying assumptions. Furthermore, Chandukala et al.(2007) summarised related work to the logit model, which challenged its mathematical properties. They concluded that even though some of the assumptions are violated (e.g., the extreme value distribution of the error term) that the estimated parameters captures the underlying preferences very well.

Despite observing just 14 choices, we were able to obtain a vector of individual parameter estimates  $\beta_h$  for each respondent through the use of hierarchical Bayes estimation techniques (c.f., Rossi and Allenby, 2005 for an exhaustive, statistical introduction and Train, 2009 for its use in case of discrete choice experiments). Hierarchical Bayes estimates the results on two layers: The higher level captures the aggregated behaviour of households, i.e., it assumes that the behaviour of all households can be described by a distribution, which is multivariate normal in our case. At the lower level, we captured household specific behaviour. Thereby, we assumed that, given an individual's parameters, the multinomial logit model governs his/her probability of choosing a particular alternative.

To obtain the parameter estimates, hierarchical Bayes uses an iterative process, the Monte Carlo Markov Chain: the estimates in each iteration are determined from those of the previous iteration by a constant set of probabilistic transition rules that are described in Train (2009). The iterative process is quite robust, and its results do not depend on starting values. In our case, we used 40,000 iterations, of which we removed the first 30,000 burn-in iterations. The remaining 10,000 iterations served as input for the estimation. Each draw is one point forming together a distribution, i.e., the posterior distribution.

In contrast to classical estimation, we did not interpret significant levels, such as t-test statistics, when estimating with hierarchical Bayes. The reason is that the posterior distribution nearly always is significant, because of the high number of iterations that is commonly used.

We tested for robustness of the results. In particular, we wanted to avoid that average values of parameter estimates were affected by parameter estimates of very few respondents. Therefore, we randomly assigned respondents into two data sets, and re-ran the estimation again, where we found similar results. We also tested, whether online surveys provided substantially different results compared to the surveys from the classroom, but again, found qualitative similar results.

## 3. Results

## 3.1 Respondent characteristics

One thousand and sixty four surgical technologists' trainees completed the survey. This is a response rate of ~89%<sup>3</sup> and covers approximately 80% of the total surgical technologists trainee population (n=1342). Given that we covered nearly the whole target population, we argue that the results are representative without any selection bias. Compared to other studies, we were able to examine a very large share of the population (see appendix, Table 1). We do not provide online results and paper-based results separately since 95% of the respondents filled out the paper-based survey, and only 5% took part online<sup>4</sup>. 82% of the respondents were females which clearly emphasises the dominance of female population of health care workers (WHO 2008;OECD 2017). The average age was 22 years, independent of gender. Respondent's trainings level as well as the current workplace provider were equally distributed. Nearly half of the respondents, i.e., 49%, have high school certificates equivalent to university entrance in Germany<sup>5</sup>. For detailed information about the respondent's characteristics, see Table 3.

#### Table 3: Respondent characteristics

	Survey respondents	Percentage share <sup>6</sup>
Number of ORT trainees	1,064	Total population 1,342 <sup>7</sup> (80%)
Personal resp. characteristics		
Female	876	82%
Male	188	18%
Average age female	22.3 years	
Average age male	22.4 years	
Educational background		
Secondary modern school qualification	14	1.3%
High-school diploma	314	30%
vocational baccalaureate diploma	201	19%
A level	526	49%
University studies	9	0.8%
Years of training		
1 <sup>st</sup> year of training	392	37%
2 <sup>nd</sup> year of training	350	33%
3 <sup>rd</sup> year of training	322	30%
Current workplace		
University hospital	206	19.3%
Private hospital	207	19.3%
Public hospital	244	23%
Ecclesiastical hospital	303	28.5%
Not sure	104	10%

<sup>&</sup>lt;sup>3</sup> 1200 paper-based survey were distributed.

<sup>&</sup>lt;sup>4</sup> Only few training centre provide an email account for the trainees and distributing the survey via private email accounts is rather difficult in terms of data security.

<sup>&</sup>lt;sup>5</sup> Nursing training nor surgical technologist training is a university degree in Germany.

<sup>&</sup>lt;sup>6</sup> Rounded number.

<sup>&</sup>lt;sup>7</sup> German Government, 2014.

### 3.2 DCE results - Parameter estimates and importance weights

To test for goodness of our estimation, we calculated internal and predictive validity in terms of first choice hit rates. Thereby, we excluded two choice sets from the estimation and calculated for the internal validity, i.e., the percentage of choice sets, in which the chosen alternative actually had the highest deterministic utility according to the individual parameter estimates. For the predictive validity, we calculated the same percentage for the two choice sets, which we did not use for the estimation. The internal first choice rate is 99.65% and the predictive first choice hit rate is 82.01%. All first choice hit rates vastly exceed the 50% threshold of a random choice. Table 4 shows the averages over respondents' parameter estimates for each attribute level and their corresponding importance weights for each attribute (calculated for each attribute j as  $IW_{h,j} = (max(\beta_{h,j}) - min(\beta_{h,j}))/\sum_{j' \in J}(max(\beta_{h,j'}) - min(\beta_{h,j'})))$ . All parameters are of expected sign.

Earning was the most important attribute with an average importance weight of 28%; work content followed on second place with 25%, implying that nursing activities provided a high disutility for the choice of a profession. A friendly and open relationship between the team and the physicians, hence, an enjoyable work environment was also key to the respondents. However, when it comes to working hours, free weekends are privileged. In support of this conclusion, a three-shift system as well as an on-call duty regime are both not a favoured option to respondents. A three-shift system is commonly part of a nurse's job in Germany, where an on-call duty regime is often associated with working in a specialised unit within the hospital such as OR's. Autonomy, defined as distinct responsibilities being preferred over low responsibilities, however does not affect the respondents greatly with an average important weight of 8.1%. The official certification of the surgical technologist's profession seemed rather unimportant to the participants. This might derive from the outstanding labour market situation in health care, whereby people do not expect unemployment hence any disadvantages. Workload was the least important attribute, whereby high workload is associated with a utility loss. Interestingly, an average amount of workload (middle) was also preferred over a low amount of workload.

#### Table 4: Results HB estimation

Attribute	Level	Parameters (standard deviation across household- specific posteriors)	Importance Weights
Official recognised profession	- Yes	0.230 (0.186) -0.230 (0.186)	4.8%
	- No		
Shift types	- No weekend shifts	0.681 (0.457)	11%
	- Three-shift operation	-0.436 (0.476)	
	- On-call duty	-0.245 (0.418)	
Autonomy	- Low responsibilities	-0.389 (0.426)	8%
	- Distinct responsibilities	0.389 (0.426)	
Work environment	<ul> <li>friendly and open relationship between physicians and other health care workers</li> </ul>	0.733 (0.380)	18%
	<ul> <li>respectful and very professional relationship between physicians and other health care workers</li> </ul>	0.242 (0.323)	
	- impersonal and formally relationship between physicians and other health care workers	-0.975 (0.684)	
Work content	- none to very low caring activities	1.192 (1.026)	25%
	- mostly caring activities	-1.192 (1.026)	
Earnings (=price factor, per 1,000€)	- 2,500€ - 2,900€ - 3,300€	2.010 (1.457)	28%
Workload	- low - middle - high	0.178 (0.233) 0.098 (0.048) -0.236 (0.227)	4.2%

#### N=1,064

Furthermore, we divided the data set into five subgroups: (1) female / male, (2) training year, (3) age, (4) prior work experiences/ none work experiences and (5) type of hospital provider (employer). We found differences in preferences in the female / male group for the attributes work content and earnings. For detailed results, see appendix Table A 2. Females tend to face a larger utility loss when it comes to caring activities compared to their male colleagues. The male group however stated higher preferences in earnings compared to the female group. A small difference was also found for workload, where males value a low workload slightly more than females. However, earnings and none-caring activities were valued most in both groups compared to all other attributes.

We divided the subgroup "age" into four sections: (1) aged 16-20 years, (2) aged 21-24 years, (3) aged 25-29 years and (4) aged 30 years+. Age group one and age group four stated lesser preferences for an official recognition of the profession than age group two and three. Age group one also had lesser preferences for earnings compared to age group three with the highest preferences for earnings. The greatest utility loss if the job contains caring activities faced again age group three. Age group four however had lesser preferences for work environment, workload and autonomy compared to all age groups but especially compared to age group one. Age group one faced the highest utility loss compared to all age groups for an impersonal relationship with physicians and other health care workers but gained the highest utility, again compared to all age groups, out of distinct responsibilities. All remaining age groups gained more utility out of free weekends compared to age group one, whereby age group four faced

the highest utility loss when facing a three-shift operation. However, earnings and none-caring were again valued most in all four groups compared to the other attributes. For detailed results, see appendix, Table A 3.

We divided the subgroup "training years" in (1) training year one, (2) training year two and (3) training year three. Earnings were again valued most for all three groups, whereby respondents of the training year three gained the highest utility out of earnings. Respondents of the training year two faced the highest utility loss if the position contained caring activities, followed by year one and three. Again, respondents of training year two showed the highest preferences for the attribute work environment by facing a utility loss for an impersonal relationship with physicians and other health care workers and gaining utility out of a friendly and open relationship. Distinct responsibilities were also preferred the most by respondents of training year two, this preferences dropped for respondents of training year three. For detailed results, see appendix, Table A 4.

We found differences in preferences for the respondents with prior work experiences before starting the training compared to respondents without any work experiences mainly for the attribute earnings, whereby respondents with work experiences valued earnings more compared to the group without work experiences. Besides, respondents with work experiences had lesser preferences for an official recognition of the profession compared to the respondents without work experiences. Furthermore, respondents without work experiences preferred a lower workload than the comparison group with work experiences. Earnings and none-caring were again valued most in both groups, followed by work environment and compared to the other attributes. For detailed results, see appendix, Table A 5.

The final subgroup consisted of the hospital provider the individual respondent work for. All existent provider in Germany were included and the subgroup divided in (1) public hospital, (2) ecclesiastical hospital, (3) private hospital, (4) university hospital and (5) respondents who were not sure for which provider they work. The latter was included within the survey as some respondents within the pre-test struggled to answer the question for which hospital provider they work. Again, earnings and work content were valued most for all groups, however, respondents working for a university hospital and ecclesiastical hospital valued earnings the most, followed by respondents of public hospitals, private hospitals and respondents not sure which provider they work for. The greatest utility loss from caring activities suffered the respondents of public hospitals, followed by respondents of private and ecclesiastical hospitals. Distinct responsibilities were preferred the most by respondents from a university hospital and less preferred from respondents who were not sure about the employer. The same scenario was found for the attribute workload, whereby a low workload is preferred by university hospital respondent and less valued by respondents with unknown provider. Work environment was similar important to all respondents in the groups of hospital provider. For detailed results, see appendix, Table A 6.

## 3.3 Monetary assessment of less favourable profession characteristics

It is clear from the analysis that monetary reward is an important attribute. However, there may be possible trade-offs across monetary and non-monetary characteristics of the job. Hospital manager require an understanding of how to monetary assess less favourable characteristics of the nursing profession. To gain such an understanding, we used the results of the DCE in a counterfactual simulation. Thereby, we considered a simplified case, in which a nurse has the choice between two hospital offers: the first hospital offers the most preferred attribute levels, however, the salary is only 2,500€ per month. The second hospital offers in one of the attributes a less attractive working condition. For each of the attributes, we aimed to identify the change in probability of choosing the second hospital ( $\Delta Pr$ ), if it does not compensate the less attractive attribute through, e.g., a higher salary, as:

(2) 
$$\Delta Pr = 0.5 - \frac{1}{|H|} \sum_{h} \frac{e^{v_{h,Hospital^2}}}{e^{v_{h,Hospital^1}} + e^{v_{h,Hospital^2}}},$$

where |H| is the number of respondents,  $v_{h,Hospital 1}$  refers to the deterministic utility of respondent h of choosing Hospital 1 and  $v_{h,Hospital 2}$  is the deterministic utility of the less attractive second hospital.

In a second step, we identify the required increase in salary  $(\Delta s)$  that would compensate for the less employee-friendly working environment. Therefore, we minimise

(3) 
$$\min_{\Delta s} \left( 0.5 - \frac{1}{|H|} \sum_{h} \frac{e^{\nu_{h,Hospital_2} + \beta_s \cdot \Delta s}}{e^{\nu_{h,Hospital_2} + e^{\nu_{h,Hospital_2} + \beta_s \cdot \Delta s}} \right)^2,$$

where  $\beta_s \cdot \Delta s$  specifies the required increase in earnings to compensate for the less attractive attribute level. Table 5 reports the percentage point decreases in choice shares as well as the earning equivalents.

#### Table 5: Compensation rates

Attribute	Level	Change in probability ∆Pr	Compensations in salary ∆s
Official recognised profession	No	10.98%	229.73€
Shift types	Three-shift operation On-call duty	22.63% 19.79%	553.97€ 463.25€
Autonomy	Distinct responsibilities	15.96%	372.04€
Work environment	-Respectful and very professional relationship between physicians and other health care workers -Impersonal and formally relationship between physicians and other health care workers	11.93% 30.39%	244.69€ 869.01€
Work content	Mostly caring activities	30.75%	1,145.79€
Workload	Middle High	3.19% 9.41%	64.50€ 201.04€

Baseline: not official recognised profession, no weekend shifts, distinct responsibilities, friendly and open relationship between physicians and other health care workers, low workload,  $2,500 \in$  salary

The highest compensation rate is related to work content. An extra payment of 1,146 gross per month is required if nursing/caring activities are demanded. Based on the current average starting surgical technologist's salary of  $2,500 \in$  per month before taxes, this means a massive salary increase of over 45.96%. According to the pay-scale in force, an average increase of 2.5% per year reflects the real world. Vice versa no monetary compensation is required if the position does not involve any nursing/ caring activities. A more unobservable factor is work environment. In our study, we characterised work environment as the relationship between the trainee and the physician and other health care worker. Even though, it is unrealistic to compensate for a tense relationship between the staff, we calculated a high compensation rate of 869€ to accept an impersonal and formal relationship instead of a friendly or respectful work environment. The large amount demonstrated once again the importance of a good work environment per se. A three shift operation needed to be compensated with 553.97, whereby an on-call duty will rather be accepted with a compensation rate of  $463.25 \in$ . Even though, low responsibilities and high workload seemed more of a subjective matter. The price tag of 372€ to accept low responsibilities and 201€ to accept a high workload exemplified the indifferent importance. The compensation to embrace a position without an official certification is 229.73€.

## 4. Discussion

It turned out, that earnings play a major role in choosing the job for a surgical technologist trainee. Even though, by dividing the dataset in subgroups, earnings gained the highest utility throughout. At a first glance, this seems natural as in the end a job enables a living. However, several studies showed the importance of other attributes to implement policy interventions to cope with labour shortage. Blaauw et al. (2010) reported about better occupational opportunities in Africa as well as health insurance coverage in Thailand to attract nurses in rural areas. In

contrary, Scott et al. (2015) found out that autonomy is significantly important to nurses and midwifes in Australia. Our findings, of earnings to be most important to our target group might mismatch the common expression of health care worker, especially nurses, to be less focus on their wages but more motivated through different soft factors like a positive working environment (Di Tommaso et al. 2009). Morris and McGuire (2002) associated a negative net financial benefit of becoming a nurse with the tendency to decide for another career path. Likewise, McHugh and Ma (2014) described the relation between wages and job dissatisfaction with intent to leave the job, so did Shields and Ward M. (2001) as they linked job dissatisfaction to a low wage and higher intention to quit. A recent paper of Hanel et al. (2014) supported the increase of wages in order to increase labour supply as they stated it to be a more promising tool than previous research stated. As opposed to that, Heyes (2005) claimed that increasing wages to attracted more people for a nurses job, attracted the "wrong sort of person" (Heyes 2005) as an over-performing nurse is associated with a low wage and stronger vocations and vice versa.

Surgical technologists are specialised health care worker with the primary tasks to assist the physician as well as to prepare the OR before, during and after the surgery. They are responsible to coordinate the whole surgery procedure. The tasks are more of a technical nature and the direct and personal contact to the patient is limited. When the patient arrives in the OR, the narcosis is commonly already initiated and the patient is fast asleep. Caring activities such as nurses fulfil are hence limited to a minimum. In our study, we aimed to examine the impact of work whilst choosing a profession. We believe it to be the first DCE study including the attribute "work content" focusing on caring activities. We found the attribute work content had a major impact in the respondents' preferences. Positions, which involve caring activities seemed unattractive to the respondents. Hence, it derives from the results, that choosing a nursing training seems not to be an option compared to the more technical position of surgical technologists. Within the survey, 738 respondents emphasised this assertion as they reported not to be willing to opt for a nursing (caring) profession or other health care profession other than what they already chose. Moreover, paying a monetary compensation rate of 1,145.79€ gross per month (+45.96% salary increase) in favour to accept caring activities is rather unrealistic as it is not affordable for the health care system to cope with this extra costs. To a greater degree, such a high increase in wages could emphasise a cascade effect as other health care workers could demand a pay rise as well.

Things have come full circle regarding the two most important attributes. Earnings on one hand were most important to the target group simultaneously work content (attribute importance weight of 28%), directly followed by, whether nursing activities are included in the job description or not (25%). The willingness to accept nursing activities has its price in terms of a high compensation rate. Relating to Heyes (2005) to pay the high compensation rate would end up in a highly paid underperforming (less vocation) nurse. Obviously, positions with few to none nursing activities seem attractive to a special group of people, willing to work within the health care sector. This is a key finding within this study as it informs politics of gaining labour force through specialised position whereby otherwise this group of persons would not be available for the health system. Thus, focusing on attracting nurses is absolutely worth striving for; however, it seems necessary to evaluate for which tasks within a hospital nursing skills are mandatory and for which ones a specialised training is more favourable. Again, other countries,

for instance within the commonwealth and the US seem more efficient to reallocate nursing tasks by supporting specialised health care positions.

Another aspect for a surgical technologist's trainee was a friendly and open relationship between the staff, especially between doctors and other OR staff. A compensation rate of 869.01€ to accept an impersonal work environment highlighted these findings. Previous research has shown that the intention to leave nursing and the morale and job satisfaction of nurses is associated with a poor relationship between the nurse and the physicians (Heinen et al. 2013; Rosenstein 2002; Manojlovich 2005). During the focus group interviews, working on the ward was associated with a more formal and more hierarchical work environment between nurses and medical doctors. Finkelman and Kenner (2013) strengthened this view as an external factor of nurse's missing voice and self-esteem due to hierarchical structures within the health care system as well as the perceived authority of doctors. On the contrary, working in the operating room was associated with being an active and respected part of the whole team. It is an important finding as other studies linked an esteeming workplace culture to higher employee motivation (Tumulty et al. 1994). McHugh and Ma (2014) described the significant influence of the work environment for (good) nurses outcomes. To build a sophisticated and teamoriented work environment seems a relevant goal for every hospital, not only to attract labour force but also to be able to keep it. Image campaigns as well as team building trainings seem one possible way to invest in appreciated work environment.

Scott et al. (2015) concluded in his paper the striving for great autonomy is based on problematic relationships between the management and other health care workers. Nevertheless, autonomy with an average important weight of 8.5% was not valued in our study to such extend compared to the other attributes. One possible explanation is the differences between the study groups (nurse's vs surgical technologist's trainees) as well as the work environment (ward/OR). Working within the OR means to follow clearly the physician's order, whereby working on the ward means to be able to cope with situations even though without a doctor immediately on the side. Hence, the attitude and awareness of nurses compared to surgical technologists regarding autonomy may differ. Nevertheless, a compensation rate of 372.04 for accepting low responsibilities however indicates that autonomy is not trivial but anyway valued to a lower extend.

When it comes to shift types, obviously, free weekends are highly preferred. Nevertheless, it is common practice in Germany to operate either an on-call duty or a three-shift regime. Usually, nurses on the ward in Germany stick to a three-shift system, whereby the working schedule of an OR worker depends on the hospital. Large hospitals with a huge amount of patients can generate revenues by operating a 24/7 surgery regime, hospitals with a smaller number of patients or other limited resources might not be able to do so. Hence, an on call-duty is widely used. Nevertheless, both options had a negative impact to the respondents, as both is associated with undesirable working hours. However, a three-shift operation – and again a nurse's job characteristic- faced a utility loss to a greater degree than an on-call duty regime linked to a compensation rate of 553.97€. Work-life balance correlates highly with control over the working schedule (Tausig and Fenwick 2001) hence, offering an flexible working schedule compared with an attractive payment seems to be mandatory to attract labour force. Besides, previous research showed higher burnout rates through extensive long shifts (Dall'Ora et al. 2015) as well as decreasing job satisfaction (Han et al. 2015). Burnout and job dissatisfaction are main drivers for nurses to quit their job or to leave the nursing profession altogether

(Flinkman et al. 2010). To keep in mind, personnel costs are the main cost driver within companies, however, downtime for instance in the OR would not only effect the health outcome of a patient but also generate a revenue loss which might trumps personnel costs.

Interestingly, an official recognised profession was less important to the respondents also associated with a low compensation rate of  $229.73 \in$  to accept a missing official certification. Due to the labour shortage in health care, the labour market situation is excellent. Facing unemployment appears to be unlikely. Nevertheless, this practice involves personnel disadvantages for the surgical technologists as well as monetary disadvantages for the hospitals. However, Hayek (1944) argued against government regulations within the markets, thus anybody would be able to work in a profession one likes. Eventually, demand induces supply and transparency and market interactions secure quality. Particularly, this seems comparable to the special surgical technologist's case, the demand prevails the supply and hospitals helped themselves by creating a new profession.

Briefly, the importance of earnings is obvious and matches with previous research (Elliott et al. 2007; Shields and Ward M. 2001; Phillips 1995; Morris and McGuire 2002; Hanel et al. 2014) and should be considered by policy makers as one instrument to attract further staff and in order to retain staff. Increasing wages, however is seen as short term solution (Phillips 1995).To implement adequate recruitment and retaining strategies policy makers need to face the market in a long run (Phillips 1995) and taking other, non-monetary attributes into account (Di Tommaso et al. 2009). In our study, we showed how the preferences of a surgical technologist trainee demonstrate a vigorous disfavour towards any perceived nursing job characteristics such as caring activities, hierarchical work environment or shift types. On one hand, our results inform policy makers about the importance to focus not only on the nursing profession but also to take into account the existence of a group of people who is willing to work within the health care system however associated with strong preferences against nursing activities, especially caring. In addition, those people accept rather a job without official certification than taking advantage of an official certified nursing degree. Thus, implementing new and specialised profession through reallocating former nursing tasks- what hospitals already did with the surgical technologists- should be considered while coping with labour shortage. Previous studies reported an increase of resource allocations between physicians and nurses within hospitals, whereby the tasks shifted from physicians to nurses in order to optimise the labour force (Aiken et al. 2009; Maier et al. 2018). Hence, the hospital landscape is constantly changing in order to cope with labour shortage and to adapt to current restrains. Therefore, task shifting by implementing specialised and more attractive professions seems promising. On the other hand, policy maker and hospital provider can also benefit from our results relating to the nursing profession in general. Interventions to enhance the external and internal awareness of the nursing profession seems necessary. Work content, in our study caring activities, could be considered as non-optional for a nurse; hence, people need to be willing and able to full fill caring tasks. Whereby hospital provider and policy maker could influence attributes such as shift types, work environment and earnings. It is worth to add our target group were composed of 80% women; hence, no gender effect observable. Since our study is representative for the group of trainees, we are able to show a clear trend against caring activities from this profession group.

Future research could extend our study of the health care labour market to observe the preferences of graduated and experienced surgical technologists. Moreover, involving nurses

with specialised trainings e.g., OR nurses would be advantageous to reflect their willingness to go back to perform nursing duties such as caring tasks on the ward. Besides, measuring the job preferences of nursing trainees could also be worth striving for. If quality of care is affected due to a missing official regulated standard training of surgical technologists is not considered within this paper, however is as well indicated as further research potential.

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# Appendix

#### Table A 1: Selected research on nurse's labour supply

Author (Year)	Topic	Type of data	Sample size	Country	Findings
Phillips (1995)	To measure the labour market participation elasticities with regard to wage rate, non- labour income, cost raised through work for nurses.	Quantitative secondary data from the Women and Employment Survey	5,588	UK	Respondents were highly responsive to wage changes.
Shields und Ward M. (2001)	The impact of job satisfaction and the intention to leave nursing.	Quantitative secondary data from the national survey of NHS nursing staff	9,625	UK	Absolute pay, good work environment is positively linked to job satisfaction. Dissatisfaction is associated with the intention to quit based on e.g., increased workload, pay, poor career possibilities.
Heyes (2005)	The impact of wages and vocation for the nurse's profession.	N/A	N/A	UK	A nurse with a poor wage has a likely higher vocation towards the job, thus is over-performing. A pay rise might attract people with less vocation, thus under-performing.
Elliott et al. (2007)	To estimate the relative competiveness of nurse's wages and its potential differences across local labour markets in Britain.	Quantitative secondary data from the Quarterly Labour Force Survey	64,525	UK	Wage differentials between nurses 'jobs and other sectors exists and has a significant impact on the attractiveness of a nurses 'job and retaining strategies for the NHS.
Kankaanranta und Rissanen (2008)	To estimate the labour supply of RN in Finland and the effect of wages and working conditions.	Quantitative primary data (survey)	3,407	Finland	Wage elasticity is rather small, however a significant effect was found regarding working hours applied. Wage increase solely cannot increase labour supply. Non-monetary characteristics need to be taken into account.
Di Tommaso et al. (2009)	To identify the importance of wages for nurses in order to increase labour supply with respect to the nurses shortage in Norway.	Quantitative secondary data	35,411	Norway	A generic wage increase cannot solve the nurse's shortage in Norway. The importance of non- monetary characteristics is highlighted.
Yoo und Doiron (2013)	To compare preferences on nursing jobs determined by profile and multi-profile case DCE.	Stated preferences DCE	526	Australia	Multi-profile case showed stronger preferences for monetary gains.
Hanel et al. (2014)	To identify if an increase in wages has an impact on the supply side (nurses).	Quantitative secondary pooled data	696	Australia	Labour supply elasticity tend to be higher than previous research stated. An increase in wages in order to increase labour supply is thus more promising than previous research shown.
Saunders et al. (2018)	To identify the job preferences of a Surgical Technologist trainee.	Stated preferences DCE	1,064	Germany	Earnings plays the major role whilst choosing a job followed by a decrease in utility if the job contains caring activities and a too formal relationship between the trainee and physicians and other health care worker. Compensation rates in order to accept poor attributes are too high.

### Table A 2: Results HB estimation female/male

Attribute	Level	Parameters (standard deviation across household- specific posteriors) Female	Parameters (standard deviation across household- specific posteriors) Male
Official recognised	- Yes	0.231 (0.184)	0.223 (0.195)
profession	- - No	-0.231 (0.184)	-0.223 (0.195)
Shift types	- No weekend shifts	0.685(0.460)	0.663(0.444)
	- Three-shift operation	-0.439 (0.480)	-0.425 (0.453)
	- On-call duty	-0.246 (0.421)	-0.237 (0.404)
Autonomy	- Low responsibilities	-0.386 (0.420)	-0.402 (0.454)
	- Distinct responsibilities	0.386 (0.420)	0.402 (0.454)
Work environment	- friendly and open relationship between physicians and other health care workers	0.736 (0.377)	0.717 (0.392)
	<ul> <li>respectful and very professional relationship between physicians and other health care workers</li> <li>impersonal and formally relationship between physicians and other health care workers</li> </ul>	0.248 (0.323)	0.251 (0.319)
	physicians and onior neurin care worners	-0.985 (0.683)	-0.932 (0.690)
Work content	<ul> <li>none to very low caring activities</li> </ul>	1.234 (1.021)	0.997 (1.031)
	- mostly caring activities	-1.234 (1.021)	-0.997 (1.031)
Earnings (=price factor,	- 2,500€	1.959 (1.425)	2.253 (1.572)
<i>per 1,000€)</i>	- 2,900€ - 3,300€		
Workload	- low	0.174 (0.232)	0.195 (0.236)
	- middle	0.046 (0.166)	0.056 (0.155)
	- high	-0.221 (0.301)	-0.252 (0.293)

#### Table A 3: Results HB estimation age

Attribute Level		Parameters (standard deviation	Parameters (standard deviation	Parameters (standard deviation	Parameters (standard deviation
		specific posteriors)	specific posteriors)	specific posteriors)	specific posteriors)
		Age 16-20yrs	Age 21-24 yrs.	Age 25-29 yrs.	Age 30+ yrs.
Official recognised profession	- Yes - No	0.222 (0.189) -0.222 (0.189)	0.236 (0.182) -0.236 (0.182)	0.231 (0.176) -0.231 (0.176)	0.216 (0.244) -0.216 (0.244)
Shift types	<ul><li>No weekend shifts</li><li>Three-shift operation</li><li>On-call duty</li></ul>	0.612 (0.456) -0.384 (0.435) -0.227 (0.428)	0.721 (0.458) -0.453 (0.498) -0.267 (0.422)	0.696 (0.425) -0.453 (0.473) -0.243 (0.358)	0.706 (0.474) -0.577 (0.468) -0.129 (0.405)
Autonomy	<ul><li>Low responsibilities</li><li>Distinct responsibilities</li></ul>	-0.402 (0.449) 0.402 (0.449)	-0.391 (0.430) 0.391 (0.430)	-0.351 (0.348) 0.351 (0.348)	-0.356 (0.370) 0.356 (0.370)
Work environment	<ul> <li>friendly and open relationship between physicians and other health care workers</li> </ul>	0.763 (0.380)	0.722 (0.374)	0.723 (0.395)	0.656 (0.380)
	<ul> <li>respectful and very professional relationship between physicians and other health care workers</li> </ul>	0.257 (0.329)	0.244 (0.320)	0.225 (0.320)	0.158 (0.300)
	<ul> <li>impersonal and formally relationship between physicians and other health care workers</li> </ul>	-1.021 (0.691)	-0.967 (0.677)	-0.949 (0.696)	-0.814 (0.654)
Work content	<ul><li>none to very low caring activities</li><li>mostly caring activities</li></ul>	1.146 (1.071) -1.146 (1.071)	1.209 (0.986) -1.209 (0.986)	1.290 (1.073) -1.290 (1.073)	1.107 (1.007) -1.107 (1.007)
Earnings (=price factor, per $1,000\epsilon$ )	- 2,500€ - 2,900€ - 3,300€	1.896 (1.433)	2.057 (1.451)	2.106 (1.494)	2.077 (1.538)
Workload	- low - middle - high	0.168 (0.236) 0.067 (0.165) -0.235 (0.302)	0.186 (0.235) 0.038 (0.160) -0.224 (0.300)	0.180 (0.219) 0.053 (0.166) -0.223 (0.297)	0.159 (0.212) 0.019 (0.174) -0.179 (0.293)
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### Table A 4: Results HB estimation training year

Attribute	Level	Parameters (standard deviation across household- specific posteriors)	Parameters (standard deviation across household- specific posteriors)	Parameters (standard deviation across household-specific posteriors)
		Year 1	Year 2	Year 3
Official recognised profession	- Yes - No	0.227 (0.196) -0.227 (0.196)	0.229 (0.177) -0.229 (0.177)	0.234 (0.182) -0.234 (0.182)
Shift types	<ul><li>No weekend shifts</li><li>Three-shift operation</li><li>On-call duty</li></ul>	0.637 (0.464) -0.395 (0.453) -0.241 (0.428)	0.694 (0.452) -0.456 (0.481) -0.237 (0.417)	0.722 (0.450) -0.464 (0.493) -0.258 (0.407)
Autonomy	<ul><li>Low responsibilities</li><li>Distinct responsibilities</li></ul>	-0.346 (0.427) 0.346 (0.427)	-0.414 (0.426) 0.414 (0.426)	-0.351 (0.421) 0.351 (0.421)
Work environment	<ul> <li>friendly and open relationship between physicians and other health care workers</li> <li>respectful and very professional relationship between physicians and other</li> </ul>	0.727 (0.394) 0.231 (0.336)	0.722 (0.368) 0.281 (0.309)	0.696 (0.370) 0.214 (0.317)
	health care workers - impersonal and formally relationship between physicians and other health care workers	-0.958 (0.711)	-1.054 (0.659)	-0.911 (0.670)
Work content	<ul> <li>none to very low caring activities</li> <li>mostly caring activities</li> </ul>	1.189 (1.061) -1.189 (1.061)	1.216 (1.035) -1.216 (1.035)	1.170 (0.073) -1.170 (0.973)
Earnings (=price factor, per 1,000€)	- 2,500€ - 2,900€ - 3,300€	1.973 (1.498)	1.922 (1.356)	2.151 (1.499)
Workload	- low - middle - high	0.165 (0.231) 0.064 (0.165) -0.229 (0.301)	0.197 (0.224) 0.039 (0.166) -0.237 (0.299)	0.174 (0.243) 0.039 (0.159) -0.213 (0.301)

#### Table A 5: Results HB estimation work experience

Attribute	Level	Parameters (standard deviation across household- specific posteriors) Respondents with work experience before starting the training	Parameters (standard deviation across household- specific posteriors) Respondents without work experience before starting the training
Official recognised profession	- Yes - No	0.219 (0.190) -0.219 (0.190)	0.235 (0.183) -0.235 (0.183)
Shift types	<ul><li>No weekend shifts</li><li>Three-shift operation</li><li>On-call duty</li></ul>	0.679 (0.484) -0.442 (0.464) -0.236 (0.400)	0.683(0.443) -0.433 (0.482) -0.249 (0.428)
Autonomy	<ul><li>Low responsibilities</li><li>Distinct responsibilities</li></ul>	-0.374 (0.384) 0.374 (0.384)	-0.397 (0.447) 0.397 (0.447)
Work environment	<ul> <li>friendly and open relationship between physicians and other health care workers</li> <li>respectful and very professional relationship between physicians and other health care</li> </ul>	0.715 (0.373) 0.227 (0.329)	0.742 (0.383) 0.251 (0.319)
	<ul> <li>impersonal and formally relationship between physicians and other health care workers</li> </ul>	-0.943 (0.682)	-0.933 (0.685)
Work content	<ul><li>none to very low caring activities</li><li>mostly caring activities</li></ul>	1.176 (1.076) -1.176 (1.076)	1.201 (0.999) -1.201 (0.999)
Earnings (=price factor, per $1,000\epsilon$ )	- 2,500€ - 2,900€ - 3,300€	2.101 (1.499)	1.962 (1.431)
Workload	- low - middle - high	0.165 (0.238) 0.048 (0.165) -0.214 (0.292)	0.185 (0.230) 0.048 (0.163) -0.234 (0.304)

### Table A 6: Results HB estimation hospital provider

Attribute	Level	Parameters (standard deviation across household- specific posteriors) Public Hospital	Parameters (standard deviation across household- specific posteriors) Ecclesiastical hospital.	Parameters (standard deviation across household- specific posteriors) Private Hospital	Parameters (standard deviation across household- specific posteriors) University Hospital.	Parameters (standard deviation across household- specific posteriors) Not sure which hospital provider
Official recognised profession	- Yes - No	0.220 (0.196) -0.220 (0.196)	0.245 (0.176) -0.245 (0.176)	0.238 (0.177) -0.238 (0.177)	0.226 (0.188) -0.226 (0.188)	0.198 (0.199) -0.198 (0.199)
Shift types	<ul><li>No weekend shifts</li><li>Three-shift operation</li><li>On-call duty</li></ul>	0.669 (0.472) -0.456 (0.512) -0.213 (0.439)	0.718 (0.458) -0.481 (0.501) -0.237 (0.415)	0.635 (0.420) -0.375 (0.418) -0.260 (0.393)	0.717 (0.429) -0.416 (0.407) -0.300 (0.368)	0.626 (0.527) -0.424 (0.525) -0.202 (0.497)
Autonomy	<ul><li>Low responsibilities</li><li>Distinct responsibilities</li></ul>	-0.374 (0.405) 0.374 (0.405)	-0.415 (0.437) 0.415 (0.437)	-0.335 (0.380) 0.335 (0.418)	-0.433 (0.442) 0.433 (0.442)	-0.370 (0.413) 0.370 (0.413)
Work environment	<ul> <li>friendly and open relationship between physicians and other health care workers</li> <li>respectful and very professional relationship between physicians and other health care workers</li> <li>impersonal and formally relationship between physicians</li> </ul>	0.708 (0.365) 0.217 (0.309) -0.925 (0.658)	0.700 (0.385) 0.219 (0.318) -0.920 (0.686)	0.758 (0.380) 0.252 (0.318) -1.010 (0.680)	0.782 (0.394) 0.294 (0.336) -1.077 (0.710)	0.738 (0.351) 0.250 (0.339) -0.989 (0.668)
Work content	<ul> <li>none to very low caring activities</li> <li>mostly caring activities</li> </ul>	1.224 (1.010) -1.224 (1.010)	1.139 (1.002) -1.139 (1.002)	1.170 (0.073) -1.170(0.973)	1.081 (0.964) -1.081 (0.964)	1.126 (1.053) -1.126 (1.053)
Earnings (=price factor, per 1,000€)	- 2,500€ - 2,900€ - 3,300€	1.927 (1.501)	2.136 (1.523)	1.864 (1.344)	2.199 (1.439)	1.761 (1.314)
Workload	- low - middle - high	0.181 (0.247) 0.046 (0.167) -0.227 (0.310)	0.165 (0.218) 0.024 (0.163) -0.190 (0.287)	0.187 (0.239) 0.067 (0.153) -0.255 (0.297)	0.201 (0.223) 0.057 (0.154) -0.259 (0.293)	0.145 (0.240) 0.068 (0.189) -0.214 (0.319)