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January 2020

Economics Group

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Working Paper 20/01
January 2020
ISSN 2511-1159

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Abstract

The profession of anaesthesia technologist is a relatively new profession in Germany. The German hospital Association published the first training guideline in 2011. Likewise the surgical technologist profession, the profession of anaesthesia technologists are not officially certified. Hence, similar disadvantages such as further career restrictions and uncertainties in case of unemployment exist. Even the hospitals need to cover the full training expenses. The training of an anaesthesia technologist lasts three years, containing of practical work experience within the anaesthesia units such as the post-anaesthesia caring unit and a theoretical education. The action site is limited to the anaesthesia units only. An anaesthesia technologist is an assistant to the doctor and takes care of the patient before, during and after the anaesthesia. Since the anaesthesia technologist profession is a very young profession group, little is known about the preferences of this group. However, hospital manager need to understand the individual preferences to be able to provide a target group tailored recruitment.

The motivation was to provide results to inform the human resource management of hospitals about the preferences of the very young profession group of anaesthesia technologist with respect to contribute to a successful development of this profession in order to cope with the current labour shortage crisis.

JEL-Classification:

I18, J08, J30, C93, C90

Keywords:

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

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1. Introduction

OECD countries appear to be increasing the amount of non-physician health care workers. To attract more people to work within the health care system, it may be increasingly necessary to develop job positions other than the classic nursing or physician role. Canada for instance introduced the position of physician assistant in order to increase the efficiency of health care through the substitution of lower skilled workers for physicians, allowing physicians to concentrate on higher level skills and increase higher quality outcomes (Delucas 2014). In Europe, at least three countries introduced the physician assistant recently, among them Germany (Merkle et al. 2011). The trend of these specialised professions expand in many areas. Different positions within the operating room or the public sector for instance are available in UK aiming to support or to substitute current professions (NHS 2018).

Indeed the German hospital system appears to implementing a range of new health care positions. One example is the position of anaesthesia technologist, a relatively new field in Germany and comparable to the anaesthesia technologist in the US (America Society of Anesthesia Technologist and Technicians 2018) and Canada's anaesthesia technician (Tipping 2018). In 2011, the German hospital association published the first training guideline to become an anaesthesia technologist (German Hospital Association 2011). The tasks of an anaesthesia technologist in Germany include being a direct support to the responsible anaesthetist by e.g. monitoring the patient during narcosis as well as taking care of the patients within the post-anaesthesia care unit. The training takes three years and includes a practice part within the hospital and theoretical education in school. An anaesthesia technologist is able to work in the operation theatre area and the included units such as the post-anaesthesia care unit; however, is not able to work on the intensive care unit as the training do not involve learning any caring or nursing activities. The training is thus aiming to educate a much specialised profession group. There are currently approximately 250 training positions in Germany available, compared to the 1500 surgical technologist training in Germany. Hence this young profession is still developing¹.

All this progress in the health care labour market seems beneficial in terms of attracting and developing the optimal composition of the future workforce. Hospital managers therefore require a deeper knowledge over each staff group's preferences to be able to provide maintain an optimal recruitment process. In general, the recruiting process is part of the human resource management and is characterised by providing the appropriate quantity combined with pertinent quality of labour force in a decent timeframe to satisfy the company's needs (Staehle 1989). Human resource management is easily described as "...management of work and management of people to do the work." (Boxall and Purcell 2011, p.3). However, one key challenge, especially in health care is to attract the appropriate workforce to do the work.

The image of health care profession is currently not good. The nurse's profession appears to suffer from low self-esteem as well as a stereotype public image such as the unskilled

¹ It is not yet a fully official certified profession/ training of health care professions such as nursing, Anaesthesia technician are an apprenticeship not university studies.

handmaiden or being sexualised (Fletcher 2007; Hammer and Tufts 1985; Ó Lúanaigh 2017). Emeghebo (2012) outlines the negative image of nurses as perceived by other nurses within the hospital sector; the perception of senior nurses towards young nurses is also negative. Only nurses within child-/maternal care nurses appear to retain high levels of perceived image (Emeghebo 2012). In line with these perceptions, Fletcher (2007) stated that the negative image of nursing is a result of the negative self-image of nurses which is interdependent with the public image. However, a survey by Seago et al. (2006) in the US shows that the public perceive nursing income to be good. Yet they also found that the general image professional image tended to be negative, as a nurse's job was seen to afford little independence and this was partly attributable to the nursing post being a "female" job.

Morris-Thompson et al. (2011) described the negative public image as a recruitment hurdle which needs to be removed to enable recruitment of an appropriate workforce. While Buchan and Aiken (2008) stated that the origins of nurses shortage may not lay with a lack of qualified nurses but within the amount of nurses not be willing to work in current conditions. Poor working conditions are associated with job dissatisfaction and a higher intention to leave nursing. Working conditions consist of a wide range of variables such as payment, working hours as well as the relationship between nurses and physicians. Shields and Ward M. (2001) found a nurses perception of poor payment compared to other profession linked to job dissatisfaction as well as the importance of the work environment quality. Kankaanranta and Rissanen (2008) concluded a long-term strategy, which focuses on work environment such as schedules that are more flexible, is needed to keep nurses within their job. In another paper, Kankaanranta and Rissanen (2009) found that solely wages cannot increase labour supply as working conditions need to be taken into account. Similar results were found by Eberth et al. (2016) who identified that flexible working conditions as well as better career perspectives may increase labour supply. Dall'Ora et al. (2015) stated that nurses who work extensive long shift (≥ 12 hrs.) tend to be dissatisfied with their job and have a higher intention to leave. Heinen et al. (2013) found a higher intention to leave associated with a poor relationship between the nurse and the physician. The role of the relationship between the nurse and the physicians has been discussed within the literature and stated as a main source of conflict and stressful work environment (Rosenstein 2002; Greenfield 1999; Heinen et al. 2013).

Hence, key human resource management obstacles are self-perception of nurses and the public image as well as to provide an appropriate work environment. Studies like the NEXT study, a EU financed project to identify the job exit behaviour of nurses (Simon et al. 2005) is useful to understand why an individual leaves the job or the profession altogether to provide appropriate retention strategies. However, hospital manager's should be aware of why someone choses the profession in the first place to be able to provide adequate recruitment strategies. The literature mainly covers the job preferences of the classic health care profession of nurses and doctors. We know that especially nurses value work environment and job satisfaction to a greater degree compared to high wages (Di Tommaso et al. 2009; Kankaanranta and Rissanen 2009; Buchan and Aiken 2008; Kankaanranta and Rissanen 2008; Shields and Ward 2001). However, as response to the labour shortage of nurses we experience a change away from the classic nursing profession towards more specialised professions. These newly created roles within the health care markets seem efficient in terms of unleashing professional time but little is known about

the preferences of this new profession groups (Saunders et al. 2018). However, the preferences of a nurse cannot be compared to the preferences of, a surgical technologist for instance as the sample population and the target group differs in background, training and many other characteristics. A previous study on job preferences on surgical technologist's trainees shows a high disutility against caring activities, giving one preference-based explanation as to why this group self-selects into surgical technology instead of becoming a nurse (Saunders et al. 2018).

This study of the job preferences of anaesthesia technologist trainees aims to identify the motivation of the very young profession group of anaesthesia technologist in Germany to enter this profession. No study could be identified which focuses on anaesthesia technologist. Hence, our study is the first discrete choice experiment (DCE) to analyse the preferences of anaesthesia technologists. Besides, this is the first study, which collects data of anaesthesia technologist in Germany, as the profession is not official certified thus not considered by the Federal Office of Statistics. The results should support hospital managers and policy makers to understand the choice behaviour of this very young professional group in order to develop appropriate recruitment strategies in favour of the further development of this profession.

2. Method

2.1 Discrete choice experiments

To obtain the relevant primary data we relayed to discrete choice experiments which are increasingly used in health economics to estimate the choice behaviour and thus to identify the preferences and willingness to pay for health care of individuals. The preferences are estimated through a defined number of attributes with different levels. Regarding to Lancaster K.J. (1966) the different levels represent the value, thus, the difference in utility of each level. The survey usually contains of a number of choice sets, based on hypothetical scenarios. The respondents can choose their preferred scenario between two or more possible alternatives, whereby all choice possibilities are linked to a price. Generally, respondents choose the scenario with the highest expected utility (Ryan et al. 2007). For a recent review of the literature regarding to discrete choice experiments in health economics please see Clark et al. (2014).

2.2 Experimental study

We contacted trainings centres via Email and after a formal approval process thirty training centres agreed to participate². It is worth noticing, that the Anaesthesia Technologist training is still developing in Germany and not many training centres offer this training at present. Only approximately 250 training positions are available at present³. We included trainees from all training levels (1st-3rd year) and provided paper-based surveys as well as an online survey.

² The study on job preferences of Anaesthesia Technologist trainees took place in Germany from January to July 2017. This study was in cooperated within a DCE on job preferences of surgical technologist trainees (Saunders et al., 2018). We used two different target groups, Surgical Technologist trainees and Anaesthesia Technologist trainees, but provided a similar questionnaire. Due to the heterogeneity of both groups as well as the fact that Anaesthesia Technologist is a rather new profession with yet a small total population of Anaesthesia Technologist trainees in Germany compared to Surgical Technologists we treat them separately.

³ Compared to 1342 surgical technologist trainee places.

However, training centres preferred to allocate paper-based surveys due to data security. We used the software DISE in order to develop the survey.(Schlereth and Skiera 2012). In the first place, we provided the respondents with a brief introduction to the survey in order to inform them about the sequence of the survey. The survey contained of three parts in total, whereby the first part included questions about the sociodemographic background of the respondents. The second part contained of the discrete choice experiment with fourteen choice alternatives. Initially, we asked the respondents to imagine themselves a time back before applying for the training. Afterwards, respondents were asked to pick their optimal choice out of two alternatives fourteen times. The final third part of the questionnaire provided some training specific questions. The average time to answer the whole survey took approximately fifteen to twenty minutes.

For the development of our survey, we needed to define the attributes and attributes levels in the first place. In order to do so we referred to the procedure of Helter and Boehler (2016). Hence, we determined relevant attributes and attributes levels based on literature search as well as during discussion with experts of the nursing field. The next step included focus group interviews which took place in two different school in different federal states in Germany. During the focus group interviews a list of ten possible attributes were discussed regarding comprehension and regarding the importance reflecting real world issues. Afterwards, the list of attributes was reduced to seven attributes, which were identified as most relevant to the target group. We performed a pre-test of our survey whereby we identified some comprehensible issues regarding the wording. After editing the survey, we ran a successful second pre-test. Our survey included seven attributes. The first attribute was classified as “officially certified profession” with two levels (yes/no). Since the profession of the anaesthesia technologist is not officially certified some disadvantages for this profession group exists. For instance, the access to further education such as university studies is generally limited to profession groups with an official certification. Besides, some uncertainties exist if the individual experience unemployment as the employment agency may grant the individual with the status “unskilled worker” which can affect the social payments. Hence, we included this attribute to figure out the importance of this attribute to the respondents. The second attribute was “shift types”, hence linked to working hours. This attribute consisted of three levels (free weekends/ three shift operation/ on-call duty). Previous literature stated the relevance of schedule flexibility (Tausig and Fenwick 2001) and a higher intention to leave the nursing profession due to dissatisfaction with the working schedule (Dall’Ora et al. 2015). Besides, evidence suggested the link between negative health outcomes of the individual and extensive shift work (Harrington 2001; Dall’Ora et al. 2015). Work-life balance is a key factor in our modern society; to understand the preferences regarding working hours, especially in a health care setting is crucial to retain staff. The third attribute was “autonomy” with two levels (low responsibilities/distinct responsibilities). Previous studies showed that low autonomy can cause a higher intention to leave the current position due to dissatisfaction (Han et al. 2015). Besides, during the focus group interviews respondents stated their extent affection towards positions with distinct responsibilities. Relating to Scott et al. (2015), we decided to provide a more openly worded attribute to obtain the respondents flexibility in interpretation of the levels. The fourth attribute was “work environment”. We interpreted work environment as the relationship between the respondent, the physicians and other health care worker within a hospital. We know that a

troubled relationship between nurses and physicians can contribute to a stressful work environment and a higher intention to leave the profession (Heinen et al. 2013; Rosenstein 2002; Greenfield 1999). During the focus group interviews, the nursing profession was associated with a hierarchical relationship between nurse and physician. The attribute consisted of three levels (friendly and open relationship/ respectful and professional relationship/ impersonal and formal relationship). Attribute number five was stated as “work content”. We interpreted work content as positions consisted of mainly nursing activities and positions with minor nursing activities. We did not identify another study, which incorporated work content as we did. The aim was to estimate if someone is also willing to fulfil nursing tasks, hence, if someone is also willing to switch a strictly specialised position such an anaesthesia technologist towards a more versatile position such as nursing. The sixth attribute was “workload” with three levels (low/middle/high), again rather of a more general nature to retain the respondents freedom of interpretation. This is necessary as the workload could depend on the hospital provider (small, rural hospital versus large, intercity hospital). Workload is also associated with high stress level and low job satisfaction (Lo et al. 2018; Ishihara et al. 2014). Finally yet importantly, attribute was “earnings”. We provided three levels based on the current average wage gross (2,500€) as well as a level with 2,900€ gross and 3,300€ gross, aligned with experts to provide a real world scenario.

Our survey contained of 14 choice sets in the DCE. We decided to opt for 14 choice sets as the literature stated that respondents are mentally capable of answering even a higher number of choice set without any problems (Bech et al. 2011). Results of our pre-test suggested that 14 choice sets are an adequate number of choices for our target group. We created a D-optimal (2·3·2·3·2·3·3) fractional factorial design by deploying the approach suggested in Street and Burgess (2007). These designs are characterised by a high degree of efficiency (98% d-efficiency in our study) as well as they are adaptable for a versatile ranch of research tasks. Each choice set contained of two possible positions and the respondents were asked to choose which of the two positions they prefer to work in.

2.3 Analysis

For the analysis, we used the wiely applied hierarchical Bayes approach provided by Train (2009) to estimate the preferences in Matlab. The estimation was based on the random utility theory (Thurstone 1927). Detailed information regarding the model used in this study are published elsewhere (Saunders et al. 2018).

3. Results

3.1 Respondent characteristics

Fifty-seven anaesthesia technologist trainees completed the survey. This covers approximately 23% of the total anaesthesia technician trainee population (n=250). 97% of the respondents used the paper-based survey and only 3% participated online⁴. Hence, we do not report online-based results as an independent group. We recorded 63% female respondents. This result supports the clear drift of a female work force in health care (WHO 2008; OECD 2017). Nevertheless, compared to the population of health care worker in Germany where 24.2% are men and 75.8% are female, the amount of men taking part in the anaesthesia training is relatively high (Destatis 2018). Respondent's average age was calculated as 21.3 years (female) and 23.5 years (male). For further sociodemographic characteristics, see Table 1.

Table 1: Respondents characteristics

	<i>Survey respondents</i>	<i>Percentage share⁵</i>
<i>Number of trainees</i>	57	Total population 250 ⁶ (23%)
<i>Personal resp. characteristics</i>		
<i>Female</i>	36	63.2%
<i>Male</i>	21	36.8%
<i>Average age female</i>	21.3 years	
<i>Average age male</i>	23.5 years	
<i>Educational background</i>		
<i>Secondary modern school qualification</i>	2	3.5%
<i>High-school diploma</i>	20	35%
<i>vocational baccalaureate diploma</i>	12	21%
<i>A level</i>	23	40.4%
<i>University studies</i>	0	0%
<i>Years of training</i>		
<i>1st year of training</i>	29	50.1%
<i>2nd year of training</i>	20	35%
<i>3rd year of training</i>	8	14%
<i>Current workplace</i>		
<i>University hospital</i>	14	24.6%
<i>Private hospital</i>	15	26.3%
<i>Public hospital</i>	14	24.6%
<i>Ecclesiastical hospital</i>	10	5.7%
<i>Not sure</i>	4	7%

⁴ Solely some training-centre host email accounts for their trainees. Besides, using private e-mail accounts to send the surveys is not allowed due to data security.

⁵ Numbers were rounded.

⁶ German Government, 2014.

3.2 DCE results - Parameters and importance weights

The internal and predictive validity (first choice hit rates) were calculated to examine the benevolence of our estimation. Therefore, we removed two choice sets from our estimation in order to calculate the internal validity⁷. The predictive validity was calculated by using the same percentage for the two choice sets, which we did not consider for our estimation. The internal first choice rate is 99.71% and the predictive first choice hit rate is 79.82%. Every first choice hit rate greatly exceeded the 50% threshold of a random choice. For the detailed results of the averages over respondents' parameter estimates for each attribute level as well as the associated importance weights for each attribute see Table 2. The parameters are all of the expected sign.

Earnings with an average important weight of 34% seemed to be the most important attribute to the surgical technologist trainees. Of second most importance, with 21%, the work environment appeared to be of great importance to the respondents, with a friendly and open relationship between physicians and other health care workers is preferred over an impersonal and formal relationship, which is associated with a utility loss. In third place of the attribute ranking was work content at 13%. This encompassed caring activities, which tend to lead to disutility. However, the total share of 13% within the third place compared to the first place with 34% and second place with 21% demonstrated a massive drop of the respondent's importance towards the other attributes. Autonomy with 9.4% as well as workload with 7.8% seemed to be of similar importance, whereby distinct responsibilities are preferred as well as moderate workload (middle). An official recognised profession was the least important attribute to the respondents with an average important weight of 4.4%.

⁷ This is about the percentage of choice sets, whereby the picked alternative is characterised by the utmost deterministic utility as per the individual's respondents parameter estimates.

Table 2: HB estimation

<i>Attribute Level</i>		<i>Parameters (standard deviation across household- specific posteriors)</i>	<i>Importance Weights (IW)</i>
<i>Official recognised profession</i>	- Yes	0.175 (0.539)	4.4%
	- No	-0.175 (0.538)	
<i>Shift types</i>	- No weekend shifts	0.429 (0.344)	9.2%
	- Three-shift operation	-0.298 (0.263)	
	- On-call duty	-0.130 (0.270)	
<i>Autonomy</i>	- Low responsibilities	-0.372 (0.510)	9.4%
	- Distinct responsibilities	0.372 (0.510)	
<i>Work environment</i>	- friendly and open relationship between physicians and other health care workers	0.706 (0.560)	21%
	- respectful and very professional relationship between physicians and other health care workers	0.259 (0.404)	
	- impersonal and formally relationship between physicians and other health care workers	-0.965 (0.901)	
<i>Work content</i>	- none to very low caring activities	0.536 (0.778)	13%
	- mostly caring activities	-0.536 (0.778)	
<i>Earnings (=price factor, per 1,000€)</i>	- 2,500€	2.668 (2.101)	34%
	- 2,900€		
	- 3,300€		
<i>Workload</i>	- low	0.172 (0.326)	7.8%
	- middle	0.223 (0.201)	
	- high	-0.396 (0.353)	

N=57

Even though, we are aware of the small data set due to the fact we observed a young profession with limited numbers of training spaces, we provide results through splitting the data set into gender, training level and previous work experience in other fields than anaesthesia or the health care sector at all. Again, due to the small number of observations the statistical significance is limited though the results can demonstrate quite a trend for these groups.

To observe potential gender effects, we separated the data set into “female” (n=36) and “male” (n=21) and reran the analysis. Again, earnings was the most important attribute to both groups, females (IW 34.7%) and men (IW 33.4%), and did hardly differ to the whole data set with an average important weight of 35%. Nevertheless, it is notable that men valued earnings lesser than females. The second important attribute was again, likewise to the whole data set, work environment (IW 21%) for females (IW 20.4%), for men (IW 22.3%). The importance of work environment, especially experiencing a disutility for an informal relationship with the physicians as well as gaining utility through a friendly relationship with the physician was of greater importance for men. Another difference in the importance of attributes between both gender groups was work content. Men seemed to suffer from a slightly greater loss in utility when a position involves caring activities compared to female. Caring activities and nursing are often linked to females, however both gender group tend to face a similar loss of utility when the position involves caring activities. The relevance of the remaining attributes were relatively

similar for both gender groups compared to the whole data set. Detailed results can be found in Table 3.

Table 3: HB estimation gender

Attribute	Level	Parameters	Important	Parameters	Important
		(standard deviation across household-specific posteriors) Female	weights	(standard deviation across household-specific posteriors) Male	weights
Official recognised profession	- Yes	0.151 (0.565)	3.9%	0.217 (0.488)	5.3%
	- No	-0.151(0.565)		-0.217(0.488)	
Shift types	- No weekend shifts	0.437 (0.355)	9.4%	0.415 (0.325)	8.8%
	- Three-shift operation	-0.296 (0.289)		-0.302 (0.212)	
	- On-call duty	-0.141 (0.271)		-0.112 (0.267)	
Autonomy	- Low responsibilities	-0.419 (0.520)	10.7%	-0.291 (0.482)	7.2%
	- Distinct responsibilities	0.419 (0.520)		0.291 (0.482)	
Work environment	- friendly and open relationship between physicians and other health care workers	0.673 (0.566)	20.4%	0.763 (0.545)	22.3%
	- respectful and very professional relationship between physicians and other health care workers	0.246 (0.397)		0.282 (0.415)	
	- impersonal and formally relationship between physicians and other health care workers	-0.919 (0.892)		-1.045 (0.911)	
Work content	- none to very low caring activities	0.516 (0.816)	13.2%	0.571 (0.705)	14.1%
	- mostly caring activities	-0.516 (0.816)		-0.571 (0.705)	
Earnings (=price factor, per 1,000€)	- 2,500€	2.652 (2.042)	34.7%	2.697 (2.212)	33.4%
	- 2,900€				
	- 3,300€				
Workload	- low	0.159 (0.299)	7.4%	0.195 (0.366)	8.5%
	- middle	0.209 (0.193)		0.247 (0.212)	
	- high	-0.368 (0.340)		-0.442 (0.371)	

We divided the data set in absolute beginner (1st year; n=28) and advanced trainees (2nd-3rd year; n=29). Relevant differences appeared within work content. The beginner group suffered a much higher utility loss from an informal relationship with the physician than the advanced group of trainees. The important weights support these differences (IW 1st year 23.7%; IW 2nd 3rd year 19%). The striving for autonomy within the beginner group was quite higher. The beginner group also valued an official certification of the profession to a greater degree as the advanced group. The absence of caring activities was preferred to a similar degree of both groups. However, earnings played the major role and were of similar importance for both groups, also compared to the whole data set. For detailed results, see Table 4.

Table 4: HB estimation trainings year

<i>Attribute</i>	<i>Level</i>	<i>Parameters (standard deviation across household- specific posteriors) Year 1</i>	<i>Important weights</i>	<i>Parameters (standard deviation across household- specific posteriors) Year 2/3</i>	<i>Important weights</i>
<i>Official recognised profession</i>	- Yes	0.236 (0.632)	5.9%	0.113 (0.413)	2.9%
	- No	-0.236(0.632)		-0.113 (0.413)	
<i>Shift types</i>	- No weekend shifts	0.396 (0.360)	6.2%	0.463 (0.325)	9.9%
	- Three-shift operation	-0.300 (0.303)		-0.297 (0.215)	
	- On-call duty	-0.096 (0.262)		-0.166 (0.272)	
<i>Autonomy</i>	- Low responsibilities	-0.313(0.410)	7.8%	-0.433 (0.591)	11.3%
	- Distinct responsibilities	0.313 (0.410)		0.433 (0.591)	
<i>Work environment</i>	- friendly and open relationship between physicians and other health care workers	0.768 (0.607)	23.3%	0.642 (0.499)	19%
	- respectful and very professional relationship between physicians and other health care workers	0.351 (0.434)		0.164 (0.347)	
	- impersonal and formally relationship between physicians and other health care workers	-1.119 (0.974)		-0.806 (0.788)	
<i>Work content</i>	- none to very low caring activities	0.541 (0.776)	13.6%	0.531 (0.780)	13.9%
	- mostly caring activities	-0.541 (0.776)		-0.531 (0.780)	
<i>Earnings (=price factor, per 1,000€)</i>	- 2,500€	2.393 (1.952)	33.9%	2.954 (2.220)	35.4%
	- 2,900€				
	- 3,300€				
<i>Workload</i>	- low	0.160 (0.295)	8.5%	0.185 (0.354)	7.2%
	- middle	0.260 (0.208)		0.184 (0.185)	
	- high	-0.421 (0.316)		-0.370 (0.386)	

Some of the respondents already obtained an apprenticeship as well as some respondents were interested in other trainings than the anaesthesia technologist training was. Therefore, we divided the data set into two groups: respondents with relevant work experience and interest in to work in different sectors (n=25) and respondents without any prior work experience (n=32). Earning was again the most important attribute for both groups, however respondents with work experience, valued earnings to a slightly higher extend (IW 34.4%) than the respondents without work experience (IW 33.9%). We found major differences between both groups for work environment. The group with work experience valued work environment to a much lesser extent than the group without any experiences. Besides, experienced respondents suffered a smaller loss of utility from an informal relationship with the physician. Work content (position with caring activities) had a negative impact to respondents without work experience compared to the respondents with work experience, as they do not suffer great utility loss from a position with caring activities involved. An on-call duty regime was less preferred for both groups; however, respondents without any experiences suffered a greater utility loss. Workload was nearly equally valued in both groups, whereby the official recognition of the profession was less valued of respondents without any work experience. For detailed results, see Table 5.

Table 5: HB estimation work experience

<i>Attribute</i>	<i>Level</i>	<i>Parameters (standard deviation across household- specific posteriors) Respondents with work experience before starting the training</i>	<i>Important weights</i>	<i>Parameters (standard deviation across household- specific posteriors) Respondents without work experience before starting the training</i>	<i>Important weights</i>
<i>Official recognised profession</i>	- Yes	0.267 (0.512)	6.8%	0.099 (0.549)	2.4%
	- No	-0.267 (0.512)		-0.099 (0.549)	
<i>Shift types</i>	- No weekend shifts	0.404 (0.300)	9.2%	0.405 (0.376)	9.2%
	- Three-shift operation	-0.319 (0.250)		-0.281 (0.273)	
	- On-call duty	-0.085 (0.293)		-0.169 (0.242)	
<i>Autonomy</i>	- Low responsibilities	-0.447 (0.597)	11.4%	-0.309 (0.413)	7.7%
	- Distinct responsibilities	0.447 (0.597)		0.309 (0.413)	
<i>Work environment</i>	- friendly and open relationship between physicians and other health care workers	0.530 (0.494)	15.7%	0.854 (0.569)	25.7%
	- respectful and very professional relationship between physicians and other health care workers	0.170 (0.334)		0.334 (0.441)	
	- impersonal and formally relationship between physicians and other health care workers	-0.700 (0.785)		-1.188 (0.932)	
<i>Work content</i>	- none to very low caring activities	0.552 (0.649)	14.1%	0.532 (0.871)	13.1%
	- mostly caring activities	-0.552 (0.649)		-0.532 (0.871)	
<i>Earnings (=price factor, per 1,000€)</i>	- 2,500€	2.880 (1.881)	34.4%	2.491 (2.263)	33.9%
	- 2,900€				
	- 3,300€				
<i>Workload</i>	- low	0.191 (0.382)	8.1%	0.157 (0.269)	7.5%
	- middle	0.224 (0.200)		0.222 (0.202)	
	- high	-0.415 (0.422)		-0.379 (0.283)	

The trend of these results demonstrated slight differences of preferences within the gender group, which leads to the conclusion that a gender effect is not existent. Nevertheless, quite relevant differences were present within the respondents group with relevant work experiences compared to the group without work experience.

We found that pecuniary characteristics were utmost important to the respondents. Nevertheless, we do not know if trade-offs between pecuniary characteristics and non-pecuniary characteristics exists. However, hospital manager need to understand if there is a way to monetary compensate for job attributes which are of less favour to the employee. To obtain this knowledge we set up a counterfactual simulation by using the results of the DCE. We created a scenario whereby the anaesthesia technologist has a choice between two job offers: One hospital advertises the utmost favourable attribute levels but in combination with a lower salary of 2,500€ per month. The other hospital provides a fewer favourable job characteristic in one of the existing attributes. Our goal was to examine the change in probability of choosing the hospital with the less favourable working conditions under the assumption that the hospital does not monetarily compensate the unattractiveness of the position by rising wages (ΔPr).

Detailed information about the model are published elsewhere (Saunders et al. 2018). For results, see Table 6.

Table 6: Compensation rates

<i>Attribute</i>	<i>Level</i>	<i>Change in probability ΔPr</i>	<i>Compensations in salary Δs</i>
Official recognised profession	No	6.39%	110.77€
Shift types	Three-shift operation	16.37%	272.87€
	On-call duty	12.77%	210.28€
Autonomy	Distinct responsibilities	14.11%	248.43€
Work environment	-Respectful and very professional relationship between physicians and other health care workers	10.62%	165.17€
	-Impersonal and formally relationship between physicians and other health care workers	27.30%	649.90€
Work content	Mostly caring activities	17.04%	382.07€
Workload	Middle	1.21%	19.14€
	High	12.50%	213.01€

Baseline: non official certified profession, no weekend shifts, distinct responsibilities, friendly and open relationship between physicians and other health care workers, low workload, 2,500€gross salary

The largest monetary compensation rate is linked to an impersonal and formally relationship between physicians and other health care worker. Even though, it is hardly possible to put a price tag on a rather unobservable factor such as work environment, in our study classified as the relationship between the staff, the large compensation sum of 649.90€ suggested however the extend importance of this attribute to the target group. A position containing of caring activities need to be compensated by 383.07€. This is an increase in salary of approximately 16% based on the baseline salary of 2,500€ gross. This high pay rise seems unrealistic for hospitals to fulfil as a pay rise of approximately 2% reflects the real world. Accepting a three-shift operation needs to be compensated by 272.87€ compared to accepting an on-call duty regime by 210.28€. A higher workload paid off with 213.01€, whereby a moderate (middle) workload seems rather irrelevant relating to the low compensation rate. The low compensation rate of 110.77€ for accepting a job without an official certification indicates the missing importance towards this attribute.

4. Discussion

Evidence from literature showed that the preferences of existing professions in the health care sector reflect more non-pecuniary characteristics such as an appropriate work environment and job satisfaction than focus on wages (Scott et al. 2015; Heyes 2005; Di Tommaso et al. 2009; Blaauw et al. 2010). However, since the labour shortage in health care, we are witnessing constant changes on the labour market. New professions are introduced to support or even to replace current occupations. Therefore, especially hospital manager and policy maker need to get an adequate understanding of the preferences of these new occupation groups in order to develop appropriate recruitment strategies as well as to tackle labour shortage. In our study, we investigated the preferences of the very young profession of anaesthesia technologist trainees to recognize their choice behaviour whilst choosing a job.

We found earnings as the most important attribute to the respondents. No relevant subgroup differences could be found. Even though, it is known, that health care professions do not value money to a greater extent compared to work conditions and job satisfaction, previous research showed the increasing importance of earnings (Zeytinoglu et al. 2006; Lum et al. 1998; Morris and McGuire 2002; Shields and Ward M. 2001; Hanel et al. 2014; Elliott et al. 2007). Hanel et al. (2014) stated that labour supply elasticity is higher than previous research suggested, thus increasing wages is a more promising tool to rise labour supply than expected before. Our results support this argumentation as the respondent's preferences demonstrated a high interest in earnings, which seemed one of the main driver whilst choosing a job. A previous study of job preferences of surgical technologist found similar results regarding the importance of earnings (Saunders et al. 2018).

However, Kankaanranta and Rissanen (2009) and Di Tommaso et al. (2009) suggested that wages solely would not increase labour supply sufficiently. This suggestion supports our finding that work environment had a strong impact through all respondents. Work environment in our study is characterised as the relationship between the anaesthesia technologist trainee, the physicians and other health care worker. The respondents suffered a great utility loss from a formal and impersonal relationship between the physicians and other health care worker. A massive compensation rate of 649.90€ per month for accepting a rather impersonal atmosphere highlighted our findings. Especially new trainees within their first year of training and respondents without any prior work experience suffered a utility loss more largely compared to the other subgroups. These findings indicate the need of extra support for young professionals within their first years. Literature already draws the link between a good work environment and job motivation (Moynihan and Pandey 2016; Tracey et al. 1995; Raziq and Maulabakhsh 2015). In the literature, the work environment of nurses is widely discussed. Work place violence including bullying, oral abuse or physical violence from all groups including patients, relatives or other health care workers tends to get more problematic (Jackson et al. 2002; Henderson 2003; Kwok et al. 2006; Hesketh et al. 2003). To focus on the relationship between health care staff, bullying is a big issue (Hutchinson et al. 2006). In a NHS trust 44% of nurses reported about experiences with bullying (Quine 2001); in another study 27.3% of the nurses reported workplace bullying in the last six month (Johnson and Rea 2009). Even though, a poor relationship between the nurse and the physician is a driver for a nurse to leave the job and/or

the profession (Heinen et al. 2013). In his research Greenfield (1999) previously stated that two-third of the nurses had been abused by physicians every two-three months. This massively contributes to a stressful work environment of nurse (Greenfield 1999; Rosenstein 2002; Heinen et al. 2013). Besides, the cliché of the unskilled doctors handmaiden still exists (Ó Lúanaigh 2017). Hence, our results demonstrate a strong need of the respondents to work in appropriate environment. This findings support hospital manager especially to invest in long term strategies to keep motivated staff and to prevent premature leaving due to miscommunication or inappropriate behaviour between the staff.

We believe to be the first DCE study included the attribute work content in association with caring activities. All respondents suffered a quite small utility loss when a position involves caring activities. In comparison, the study of job preferences of surgical technologist found a strict refusal towards caring activities associated with a very high compensation rate of 1,145€ additional payment per month (salary increase of approximately 49%) (Saunders et. al 2018) compared to an additional payment of 382.07€ per month for anaesthesia technologists. However, being an Anaesthesia technologist means having more contact to the patient than a surgical technologist does but less contact to the patient than a nurse. An anaesthesia technologist for instance needs to care for the patient within the post-anaesthesia care unit. Hence, the rather balanced attitude towards caring activities seems convincing.

The attributes shift types, autonomy and workload were of similar importance. However, respondents with prior work experience demonstrated slightly more importance towards shift types as well as autonomy. This might derive from prior work experiences they already endured. Free weekends were preferred which undermine the value of a work-life balance and control over the work schedule which is linked to more quality of life (Greenhaus et al. 2003; Tausig and Fenwick 2001). To accept a three-shift operation a compensation rate of 272.87€ was calculated and for accepting an on-call duty regime an extra payment of 210.28€ was estimated. Previous research linked extensive working hours to higher rates of burnout, thus to an decrease in job satisfaction and a higher intention to leave the profession (Dall'Ora et al. 2015; Kankaanranta and Rissanen 2008; Stimpfel et al. 2012; Heinen et al. 2013). Obviously, hospital manager cannot offer free weekends to all health care staff, however should develop a more flexible working schedule regime to enhance job satisfaction.

The respondents value autonomy to a moderate extent. We found the highest importance towards autonomy for respondents with work experience, which might be related due to this prior work experience and a clear picture of the own professional role. Our results of striving for autonomy matches with the study of Scott et al. (2015) who found the striving autonomy is based on dissatisfaction with the hospital management. Homburg et al. (2013) discussed a higher intention to leave the job and eventually the profession due to an increasing dissatisfaction with the management. It can be explained by the need of a good working environment such as having a responsible job as well as being trusted by other staff and the management can indeed support a good work environment due to being feel valued. Han et al. (2015) found nurses who quit their job experienced less autonomy and poor support from their peers. An indicator for hospital manager to offer responsibilities aligned with the performance on the job.

Since the profession of the Anaesthesia Technologist is very young, this profession is not yet official certified by the government. Without this certification, one can face some disadvantages when it comes to unemployment for any reasons as treated as an unskilled worker. Besides, further education like university studies for instance can get difficult as access is often limited to profession with an official certification. Besides, females value the official certification to a lower extend than men do as well as respondents. The importance of this attribute is also higher for respondents with work experiences, which can be related due to a more experienced and matured personality. However, the importance of an official certification seems the least important to the respondent. This finding matches again with the job preferences of a Surgical Technologist as they face the same problem but do not feel the importance either (Saunders et. al. 2018a). An explanation might be the excellent labour market situation where unemployment is unexpected as well as the relatively young age of the respondents, without thinking about future needs.

Briefly, our study presented the job preferences of a very young occupational group. The results highlighted the great importance of earnings within this target group. This finding informs policy-makers but also hospital manager of the possibility to attract and to keep staff through an appropriate payment scheme. However, as previous literature already stated, earnings do not top everything else. Working environment evidently has also a great impact on the respondents. A key information for hospital manager and policy maker is to set up an appropriate payment scheme in combination with an adequate consideration of non-monetary characteristics. In this regard, the Herzberg's dual factor theory of job motivation distinguished between the hygiene factor (e.g. payment) and motivational factors (e.g. responsibilities) which are both needed to stay motivated within the job (House and Wigdor 1967). Hence, our findings set a clear trend to hospital manager to develop tailored recruitment as well as retention strategies for the still growing and young profession of Anaesthesia Technologist.

Further research is needed to observe for instance the potential change in preferences of graduated Anaesthesia Technologist This study is also limited to some extend due to the small sample size, which however is due to the existing small number of training positions. Further research should be indicated within a growing population. Nevertheless, our study demonstrates as a pilot, a clear trend within this profession.

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