

MASTER THESIS

THE EFFECT OF TEAM PERSONALITY
COMPOSITION ON THE TEAM
PERFORMANCE OF TEAMS
PRACTICING CARDIOPULMONARY
RESUSCITATION IN A SIMULATION
ROOM

An Exploratory study on the effect of team
personality composition, overlap in speech, and
team performance of simulated medical
emergency teams

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MASTER THESIS

Title

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Summary

In previous studies, the importance of non-technical skills of cardiopulmonary resuscitation (CPR) teams have already been established. Of these skills, communication is the most important predictor for efficient task execution in such teams. Furthermore, it has been established that the composition of personality in the team is an important element in influencing team performance. Understanding the relation between team personality composing of teams practicing CPR in a simulated setting and team performance might help to raise awareness of pitfalls in communication when certain members have to work together. To empirically examine this, 14 teams of Technical Medicine students participated in this research. The study gathered data by assessing a personality test, by using sociometric badges, and by using a team performance measurement. On basis of a multiple linear regression analysis and a mediation analysis insight could be obtained on whether and which team personality composition influences team performance and whether communication mediates this relation. The findings from this research illustrate that team personality composition does not influence the team performance of CPR teams. Practical implications, strengths and limitations of the research are discussed. Moreover, future research directions include the mediating role of amount of speech, and controlling for gender are given.

Keywords: Team personality composition – cardiopulmonary resuscitation – simulation – team performance – overlap in speech

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ACKNOWLEDGEMENT

For me, this research experience was one of the greatest and most valuable learning moments in my education. I couldn't have done it alone, so I would like to take this moment to show my gratitude to all of those who supported me during these past months.

I would like to thank my first supervisor, Marcella Hoogeboom, for her critical feedback, suggestions, ideas, and engagement through this learning process. Every time you helped me write a better thesis. I would also like to thank my second supervisor, Marleen Groenier, for her enthusiasm for the field of Technical Medicine and for her enthusiasm about quantitative research. Your great energy is very contagious. Finally, I would like to thank my external supervisor, Stijn de Laat, for always being willing to answer my questions, small or big, and for just listening to my insecurities about the research. I never had the feeling that there were problems I couldn't address. Thank you for that!

Furthermore, I want to thank my co-students Bryce Cherry, Joscha Friedrich, and Aniek Poort for the cooperation during this project. You all made me feel like I wasn't alone in this, we did it together.

Finally, my personal thanks go out to family and friends who helped me relax after working hours. And of course to Pim for keeping me grounded, and for listened to my frustrations.

Thank you all!

Fabienne Lok

Enschede, July 2018

1. Introduction

Cardiac arrest and cardiovascular diseases are two causes of death that take more than 135 million lives every year (Meaney et al., 2013). Performing high-quality cardiopulmonary resuscitation (CPR) is a lifesaving action that is vital to the survival rate of people suffering from a cardiac arrest and is one of the most frequently executed medical actions in hospitals (Hazinski & Field, 2010). Hazinski and Field (2010) refer to CPR as lifesaving actions that increase the chance of survival after suffering cardiac arrest. To improve the survival rate in cardiac arrest, following the internationally accepted guidelines for CPR is warranted (Nolan, Deakin, Soar, Böttiger, & Smith, 2005), since the quality of the performance of the CPR team is the primary factor for patient survival (Nolan et al., 2005). However, the outcomes of the performance of CPR have not improved over the last 30 years and are not optimally managed by medical staff members (Hunziker et al., 2009). Hence, there is an urgent need to practice and optimize the performance of CPR.

In order to increase the quality and subsequently the success rate of CPR, it is important to improve the performance of the CPR team. This can be accomplished by practicing. However, for a variety of medical, practical, and ethical reasons it is impossible to practice on real patients (Hunziker et al., 2009). Medical simulations allow practicing CPR without putting real patients at risk. Hence, using simulation based training is an effective way to practice and improve CPR (Mundell, Kennedy, Szostek, & Cook, 2013). To enhance the effectiveness of actual CPR teams, especially the content of the training is a crucial aspect. Many practice sessions focus on the technical aspects of CPR (e.g. chest compressions, delivering shock), and although this is important, especially the non-technical aspects of CPR (e.g. teamwork) strongly influence the team's performance (Hunziker et al., 2011).

In cardiac arrest, the survival rate of the patient decreases by 10% every minute (Hunziker et al., 2011). For this reason, efficient and effective team functioning is a key factor to quickly respond to and execute cardiac arrest (Hunziker et al., 2011; Marsch et al., 2004). Hence, the importance of non-technical skills, such as teamwork and communication, are acknowledged as important predictors of CPR performance (Hunziker et al., 2011). Of such non-technical skills, poor communication is the prime reason for up to 70% of all errors in patient care (Kohn et al. 2000), which makes it the number one cause for patient complications (Leonard, Graham, & Bonacum, 2004). Several studies established that especially communication, and more specifically listening and not interrupting each other, is an important predictor for team performance (Castelao, Russo, Riethmuller, & Boos, 2013; Bergs, Rutten, Tadros, Krijnen, & Schipper, 2005). How teams communicate is dependent on multiple aspects, one of them being the personality of the team members. The relationship between how team members communicate and their personality is widely acknowledged in literature.

Different variables affect team performance. The importance of communication for team performance in the CPR context has already been established widely in literature (Castelao et al., 2013; Bergs et al., 2005; Juhász, 2010; Leonard, Graham, & Bonacum, 2004). One ineffective form of communication is talking simultaneously or overlapping in speech. For this reason, overlap in speech should be avoided. It is furthermore expected that this form of communication negatively affects the team performance of teams performing CPR. Apart from communication, personality also affects the team performance of a team. A positive relationship between personality traits and team performance, both on the individual level and the team level, have already been established in literature (e.g. Barrick, Mount, & Judge, 2001; Barrick, Stewart, Neubert, & Mount, 1998; Neuman & Wright, 1999; Neuman, Wagner, & Christiansen, 1999; Bell, 2007; Prewett, Brown, Goswami, & Christiansen, 2016). In this study we will examine how personality in CPR teams influences team performance, by looking at team personality composition (TPC). We will also try to explain this relation by

looking at communication, more specifically overlap in speech, as a mediating variable. In this research two aspects of the personality composition will be taken into account, namely: team personality elevation (TPE), and team personality diversity (TPD). A better understanding on what makes a CPR team effective can lead to improvements of the CPR procedure, which is important for improving the quality of the CPR and on its turn the outcome of the CPR procedure. Team personality composition (TPC) might explain why CPR teams communicate in a certain way and why some teams perform better than others. Therefore, the goal of the present research is to examine whether and how TPC as well as overlap in speech play a role in a simulated CPR environment. In this study we aim to provide an answer to the following research question: *How does team personality composition influence team performance in a medical simulation setting and is overlap in speech mediating this relation?* In the present research we will test whether and how the hypothesized independent variables and the mediating variable have an effect on team performance. This relation is depicted in Figure 1. Heterogeneity of a specific personality trait is hereby tested based on the teams that scored high on this personality trait.

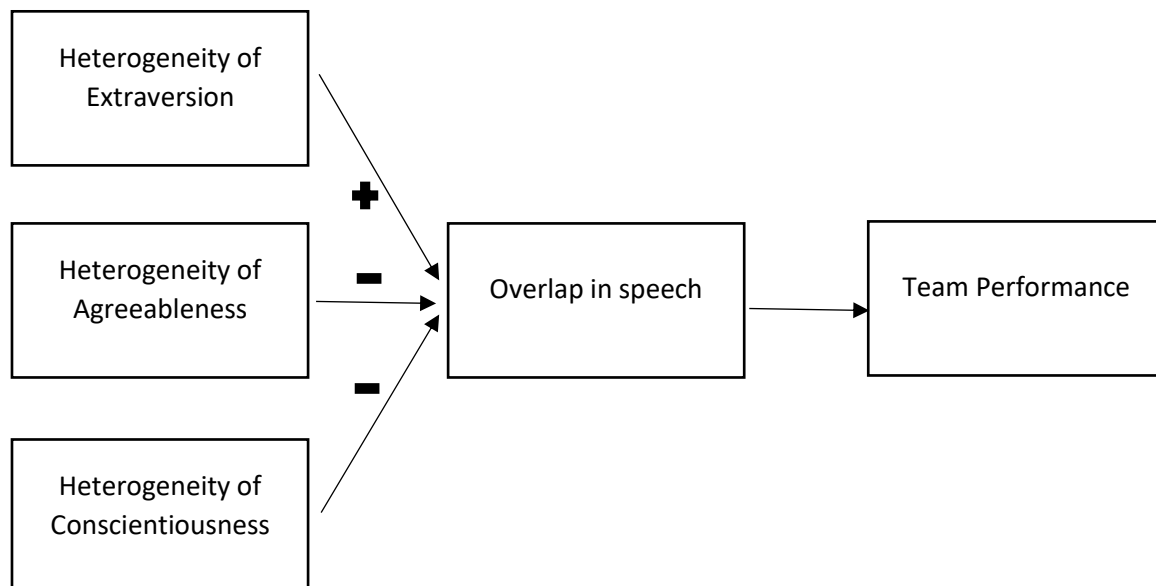


Figure 1. Research model

2. Theoretical conceptual framework

2.1 Team performance

The performance of CPR is dependent on both simple and complex technical skills (Wik, Myklebust, Auestad, & Steen, 2002). Simple technical skills refer to tasks that are performed by an individual (e.g. chest compressions), and complex technical skills are skills that involve interaction and cooperation between the CPR team members. An example of a complex technical skill is delivering a shock in which all team members must effectively work together: The team leader analyses electrocardiogram rhythm, the CPR provider pauses CPR and resumes CPR, and the defibrillator operator charges the defibrillator.

Currently, especially non-technical skills are being acknowledged as crucial factors for CPR effectiveness (Hunziker et al., 2011; Marsch, Müller, Marquardt, et al., 2004). This might be due to the fact that most CPR actions are performed by a medical team, rather than by individuals. Research shows that a lack of teamwork results in poor outcomes of the CPR (Schenarts & Cohen, 2010; Stockwell, Slonim, & Pollack, 2007). To accomplish a team's goal the members of the team are dependent on each other in terms of information sharing, synthesizing this information, and integrating it (Salas, Cooke, & Rosen, 2008). Therefore, the right actions need to be performed as effectively as possible, at the right moment, and in a certain period of time (Hunziker et al., 2011).

2.2 Overlap in speech

In CPR effective communication¹ is an important variable in predicting the effectiveness of a CPR team (Castelao et al., 2013; Bergs et al., 2005; Juhász, 2010; Leonard, Graham, & Bonacum, 2004). In order to act effectively it is important for the team to communicate effectively. It is important that information is shared with all team members of the resuscitation team, to ensure high quality patient care. Effective communication is important for team adaptability, building structure during the procedure, cooperation among team members, for task performance, and for leadership (Cooper & Wakelam, 1999). Since the quality of the performance of CPR can literally make the difference between life and death, ineffective communication should be avoided at all times. One ineffective form of communication is talking simultaneously or overlapping in speech. Overlap in speech is shown to be negatively related to the quality of the conversation (Schegloff, 2000), and shown to negatively affect automatic processing (Shriberg et al., 2001). However, overlap in speech has not been investigated in the setting of CPR performance. Furthermore, no studies have investigated the relationship between TPC and overlap in speech, and how this affects team performance. In this research, this relationship will be investigated.

2.3 Personality as a predictor for team performance

One of the most used models to examine personality is the "Big Five", consisting of five main personality traits (Chamorro-Premuzic & Furnham, 2009; McCrae & Costa, 1992). Next to the Big-Five questionnaire, the HEXACO is another valid instrument to measure personality (Ashton and Lee, 2001; De Vries, Ashton, and Lee, 2009). These instrument measures six dimensions of personality, which are extraversion (i.e., someone who is social and assertive), agreeableness (i.e. a gentle and cooperative person), emotionality (i.e., a vulnerable and independent person), conscientiousness (i.e., someone who is self-disciplined and responsible), openness to experience (i.e., being imaginative and curious) and honesty-

¹ Communication is defined as the transfer of information between two people or a group of people (Castelao et al., 2013)

humility (i.e. a person that is sincere and modest) (De Vries et al., 2009). Someone's personality can be characterized by these six personality traits and is rather constant over time and across situations (McCrae & Costa, 1992).

In a team multiple personalities have to work together effectively. Defining the composition of a team by their personality is referred to as team personality composition (TPC). The composition of personality traits in the team determines the climate and cooperation among team members and thus might influence their performance (Neuman, Wagner, and Christiansen, 1999).

Although no definitive answer is available with regard to the relation between TPC and team performance, earlier studies did establish that certain personality traits are more effective in a team than others and that it is highly dependent on the task and the context of the team which personality types are most effective (Hackman, 1987). Even though teamwork is very important in CPR, no literature addresses the effect of TPC on team performance in a medical emergency setting. TPC is directly related to how teams communicate, and thus how teams work together, which is an important predictor in this context. Understanding the relation between TPC, communication, and team performance might help us to create more effective teams in hospitals, or at least raise awareness of pitfalls in communication when certain members have to work together. For this reason, this research will make a start by investigating the effect of the personality traits extraversion, agreeableness, and conscientiousness in relation to team performance in a simulated medical emergency setting.

In this research the personality traits openness to experience, emotionality, and Honesty-humility are not taken into account, since it is expected that diversity in the personality traits extraversion, agreeableness, and conscientiousness explain team performance scores in these contexts best. In extraverted teams people tend to be more dominant (Kickuk and Wienser, 1997), which makes them very talkative. It is expected that for this reason extraverted people will talk simultaneously more often. People high in agreeableness tend to be more tolerant (Costa & McCrae, 1992), for these reasons it is expected that teams high in agreeableness will less likely interrupt each other. Lastly, people high in conscientiousness are very precise (Costa & McCrae, 1992). It is expected that for this reason they listen to suggestions from other teammates and ask questions. Openness to experience is the personality trait that has not generally appeared as a significant predictor for individual performance or the performance of a team (Barrick & Mount, 1991; Hough, 1992). Furthermore, Research from Kickuk and Wiesner (1997) stated that emotionality was not found to be correlated with future performance. Lastly, people high in honesty-humility are empathetic, patient and forgiving. It is hypothesised that these people possess the qualities important for the job of caregiver (Worthington, 1998). However, for the performance of CPR these qualities are not of immediate, and most importance. For these reasons these three remaining personality traits were not taken into account in this research. Below the three personality traits investigated in this research: extraversion, agreeableness, and conscientiousness, and their relation to team performance and communication will be further investigated.

2.4 Operationalization of team composition in terms of personality

Individual personality scores need to be transformed into a measure which represents the whole team in terms of personality, in order for it to be able to study the effect of personality on a team level instead of an individual level. A distinction is made in the personality composition of the team between: the team personality elevation (TPE), and team personality diversity (TPD).

TPE is measured by taking the mean level of a certain trait in the team. This would for example mean, that when a team is characterized as high in extraversion, that for the team as a

unit, members are sociable and assertive. This does not have to mean that all members score high on extraversion. It just means that there are at least some members in the team whose score on extraversion elevates the average. A lot of research has been done regarding elevation of personality traits in groups and its predictive value for team performance (Driskell et al., 1998). A team's personality is of importance in determining how groups work and perform (Hackman & Morris, 1975). However, it is difficult to state which personality composition has the most predictive value for team performance in general. One of the reasons that it is difficult to generalize these findings has been the failure to consider the effect of task type (Prewett et al., 2016). The type of task which a team needs to perform is critical for determining which personality composition will be predictive of team performance (Hackman, 1987).

TPD is measured by taking the variance (i.e. standard deviation) of personality traits in the team (Neuman, Wagner, & Christiansen, 1999). The TPD of a team can be characterized by homogeneity or heterogeneity of a certain personality trait. Homogeneous teams are teams low in TPD. This means that in teams that are homogeneous with respect to conscientiousness, all of the members of the team assume a similar level of responsibility. Furthermore, teams high in TPD are often referred to as heterogeneous teams. This means that in heterogeneous teams with respect to conscientiousness there could be some members in the team that are feeling really responsible for the task, while there are others in the team that do not. Muchinsky and Monahan (1987) described two distinct ways in how TPD influences team performance: the supplementary and the complementary model. The supplementary model implicates that homogeneous teams are more effective than heterogeneous teams, since team members are compatible with one another, which will result in better and more effective communication, which will in turn stimulate collaboration. However, the complementary model suggests that teams are more effective when the team is heterogeneous, since all members of a team bring different aspects that are important for the success of the team, and a mix of these aspects is important (Muchinsky and Monahan, 1987). One other study supports these two models (Hoffman and Maier, 1961).

In the literature inconclusive results are shown regarding whether a team should be homo- or heterogeneous in order for them to perform effectively. Some research suggests that a heterogeneous team is more effective (Pitcher, 1993; Neuman, Wagner, & Christiansen, 1999). However, other research contradicts this statement and suggests that homogeneous teams are more effective (Kichuk & Wiesner, 1997). Results from a study conducted by Kirkman, Tesluk, and Rosen (2004) states that homogeneous teams tend to develop stronger norms than diverse teams. This finding is further supported by social psychology research which shows that teams tend to show their opinions more openly, when the team members notice that the same opinions are shared (Goethals & Zanna, 1979). It can be argued that not only the diversity in personality impacts performance, but that the specific personality characteristics that compose a team also impact performance. In this study we will try to explain the contradicting results of literature regarding homogeneous and heterogeneous teams by considering the homo- and heterogeneity of each of the personality characteristics in the context of teams performing CPR in a simulation room.

2.5 Extraversion

A person high in extraversion is social and talkative (Barrick and Mount, 1991). On an individual level, research has shown that extraverted people in the team contribute to a positive attitude towards teamwork (Mohammed, Mathieu, & Bartlett, 2002), and to a positive attitude towards the team itself (Kristof-Brown, Barrick, & Stevens, 2005). Also, people who are characterised as more extraverted contribute to discussion (Mohammed & Angell, 2003) and a work environment in which team members feel free to express themselves (Barry &

Stewart, 1997). This environment is important for the decision making in the team (Schultz, Ketrow, & Urban, 1995), which is especially important in the environmental context of CPR. Team members should be able to feel free to express themselves whenever they feel that a certain decision is the wrong one or when they feel that something should go differently.

On a team level results show that if the team is homogeneous with respect to extraversion, this can result in conflict (Neuman et al., 1999), since extraverts tend to be more dominant (Kickuk & Wiesner, 1997). This claim is being supported by research from Barry and Stewart (1997) and research from Neuman, Wagner, & Christiansen (1999) which shows that extraverted members within the same team often compete for status, such as the role of leader, and neglect other relevant roles in the team (Mohammed & Angell, 2003). Their researches show that a high level of extraversion within a team has a negative effect on team performance. These findings are in line with research from Humphrey, Hollenbeck, Meyer, and Ilgen (2007) who state that team heterogeneity (teams high in TPD) is preferred to over homogeneity in terms of extraversion.

Competition for leadership, and possible neglect of other roles in the team are crucial mistakes that can't be made in the context of CPR. For this reason it is hypothesised that elevation of this trait in the team might be harmful for the performance of CPR teams. On the basis of the above, I propose:

Hypothesis 1: In teams high in extraversion, heterogeneity of this trait positively influences team performance.

We will try to explain a part of this relation between extraversion in the team and team performance by communication. Effective communication is an important variable in predicting the effectiveness of a CPR team (Castelao et al., 2013; Bergs et al., 2005; Juhász, 2010; Leonard, Graham, & Bonacum, 2004). Communication is a broad construct. In this research we will examine overlap in speech as a construct of communication and as the mediating variable between personality and team performance in the context of CPR. Overlap in speech is shown to be negatively related to the quality of the conversation (Schegloff, 2000). It is suggested that extraverted people cause more overlap in speech during the performance of team tasks, since extraverted people tend to be more dominant and like to speak their mind (Kickuk and Wienser, 1997). This may cause disruption of the process and/or content of the conversation (Schegloff, 2000) which on its turn can have a negative effect on team performance. It is suggested that teams high in extraversion have more overlap in their conversations.

Hypothesis 2: Teams high in extraversion have a high percentage of overlap in their speech which negatively influences team performance

2.6 Agreeableness

The personality trait agreeableness relates to the characteristics of being flexible, cooperative, and tolerant (Barrick and Mount, 1991). On an individual level, literature suggests that the personality trait agreeableness is positively related to team performance. Team members high in agreeableness are friendly, tolerant, helpful, altruistic, modest, trusted, straightforward (Costa & McCrae, 1992). Furthermore, they are not competitive (Graziano, Hair, & Finch, 1997).

On a team level, elevation of this trait in the team facilitate a positive effect on the team processes, since they help to minimize conflict and negativity in the team (Tekleab &

Quigley, 2014), which influences members motivation and the morale in team tasks (Driskell, Goodwin, Salas, & O'Shea, 2006). It is established by Ashton and Lee (2007) that when more team members score high on agreeableness this will create a team environment in which team members are expected to interact constructively and courteously, which contributes to high quality relationships between team members and is related to high cohesion within the team (Bradley, Klotz, Postlethwaite, & Brown, 2013). Other characteristics that are of great value to an action team are flexibility and cooperativeness. Since these action teams need to perform under highly stressful and time pressing circumstances, homogeneity of agreeableness in the team creates a team with good team players, which is important in this context. Furthermore, homogeneity of agreeableness contributes to interpersonal attractions (e.g. liking) (Barrick et al., 2001), while heterogeneity of this personality trait in the team was negatively related to these team processes or interpersonal attractions (Tekleab & Quigley, 2014).

Moreover, it is stated that heterogeneity in agreeableness or even having one disagreeable member in the team can cause the team to cooperate ineffectively (Barrick et al., 1998; Tekleab & Quigley, 2014). Results of other research confirmed the expectation that homogeneity of agreeableness in the team leads to higher team performance (Barrick et al., 1998; Graziano et al., 1997; Neuman, Wagner, & Christiansen, 1999). Considering these findings from literature, it is expected that:

Hypothesis 3: In teams high in agreeableness heterogeneity of this trait negatively influences team performance.

Furthermore, we will try to explain this expected negative influence of team heterogeneity with respect to agreeableness on team performance by taking into account our mediating variable, overlap in speech. People high in agreeableness tend to be more tolerant and feel the need to please others (Costa & McCrae, 1992). For this reason it is expected that teams high in agreeableness will less likely interrupt each other and cause overlap during the performance of CPR, which has a positive effect on the outcome of their performance.

Hypothesis 4: Teams high in agreeableness have a low percentage of overlap in their speech which positively influences team performance.

2.7 Conscientiousness

Team members that are high in conscientiousness are thorough, hardworking, responsible, self-disciplined, organized, self-motivated and achievement- and task oriented (Costa & McCrae, 1992). On an individual level, research shows that conscientiousness is significantly correlated to coordinative behaviour, which means that people high in this personality trait tend to have a more structured ways of communicating (Juhász, 2010). This indicates that teams high in conscientiousness might have clearer communication which positively effects team performance. Research from Prewett, Brown, Goswami, and Christiansen (2016) furthermore show that conscientiousness is the personality trait that best predicts individual performance. This finding suggests that higher levels of conscientiousness in the team will have a similar effect on the performance of the team; teams with more members high on conscientiousness probably perform better. It is expected that these traits will result in more effort and determination towards the accomplishment of team goals (Mohammed & Angell, 2003; Neuman & Wright, 1999), more focus on and feeling responsible for the task (Barry & Stewart, 1997), and better cooperation. Furthermore, it is expected that this will result into better adjustment of the roles in the team to changes (in the team or the task) (LePine, 2003).

If these features are not present in the team, or if there is a lack of it, it can lead to laziness (Mohammed & Angell, 2003; Molleman, Nauta, & Jehn, 2004; Neuman et al., 1999).

Teams with members who score high on conscientiousness are characterised as being achievement-oriented. Research from Schneider and Delaney (1972) shows that teams who are achievement-oriented outperformed teams that are less oriented on achieving. It is therefore expected that teams high in conscientiousness are effective teams. This line of reasoning is supported by research from Thoms, Moore, and Scott (1996) which shows that the personality traits conscientiousness is positively related to self-efficacy, which in context of his research is a predictive variable for team performance. Furthermore, Van Vianen and De Dreu (2010) state that high levels of conscientiousness have a positive effect on group cohesion, while heterogeneity of conscientiousness in the team may cause conflict and can have a negative effect on a team's effectiveness (Mohammed & Angell, 2003; Molleman et al., 2004). This claim has been backed up by several empirical researches stating that heterogeneity of conscientiousness in a team has a negative effect on team performance (Barrick et al., 1998; Neuman, Wagner, & Christiansen, 1999, Neuman & Wright, 1999; Van Vianen & De Dreu, 2010). It is expected that in this highly dynamic context it is important for teams to be cohesive and not revolve in conflict during the performance of the task. Furthermore, feeling responsible for the task, and being a task- and achievement-oriented team are important characteristics for effective resuscitation teams. Considering the above mentioned empirical findings, the following hypothesis is stated

Hypothesis 5: In teams high in conscientiousness heterogeneity of this trait negatively influences team performance.

Furthermore, we will try to explain this expected negative influence of team heterogeneity with respect to conscientiousness on team performance based on our mediating variable, overlap in speech. The personality traits conscientiousness is characterized by self-discipline and achievement- and task orientation (Costa & McCrae, 1992), which suggests that they want to get to the bottom of the problem, and want to give and listen to suggestions. It is suggested that there is not much overlap in speech of teams high in conscientiousness, which positively effects the team performance of the CPR team. The following hypothesis is stated:

Hypothesis 6: Teams high in conscientiousness have a low percentage of overlap in their speech which positively influences their team performance.

3. Research design

3.1 Research design

During this research, three variables were assessed in order to test the relationships between the following variables; with (1) team personality composition, (2) communication of the team members, and (3) team performance. A mixed-method approach was used in a cross-sectional design. Three different data sources were used: (1) a personality questionnaire (HEXACO-SPI) to measure personality, (2) sociometric badges to measure communication, and (3) a scoring list with technical and non-technical team performance scores.

3.2 Respondents and sampling

The research is conducted at the ECTM, at the Master's program Technical Medicine. The data was collected from students following the ALS-course. 81 students followed the ALS-course, divided over 20 groups. 2 students did not give informed consent to participate in the data collection, and 2 students dropped out of the course. Eventually, 77 students participated in the research, which resulted into 20 teams (4 teams with 3 members, and 17 teams with 4 members). The group consisted of 28 males (36,4%) and 49 females (63,6%). Their age ranged from 20 to 26 ($M = 21,88$, $SD = 1,05$). Unfortunately, technical failure regarding the sociometric badge resulted in having to exclude another 3 teams from the data analysis. Eventually, the data of 14 teams was used for the present study.

3.3 Research context

The present study was conducted within the department of Experimental Centre for Technical Medicine (ECTM) at the University in Twente, located in The Netherlands. The ECTM is a centre for medical innovation. It offers opportunities regarding research and in educating students and professionals in the field, using state of the art simulation technology such as The Human Patient Simulator. Technical Medical students can improve their skills by practicing on the mannequin, without putting any real patients at risk. In the current study data collection was done in March and April 2018. The data was collected during the ALS (Advanced Life Support) course of the Master program of Technical Medicine. All data was collected and analysed at the ECTM. Two (simulator) rooms, an operation room (OR) and an intensive care unit (ICU) were used to facilitate the resuscitation scenarios. In each simulation room three cameras were present which video-taped every simulation session. Furthermore, there are microphones in the simulation rooms, which can send the audio signal to the control room. The goal of this course was to “enable students to adequately assess and treat a patient in resuscitation setting according to protocolled guidelines by making use of a systematic clinical approach and medical technology”. See appendix I for a more elaborate description of the course content.

3.4 Instrumentation

Team personality composition. Team personality composition was measured using an adapted version of the HEXACO-SPI, which is the simplified version of the HEXACO-PI-R (Hoekstra et al., 1996). The HEXACO-PI-R normally measures the six personality domains broadly, which results into a questionnaire, consisting of 60 items. However, since in this research only three personality traits were measured, namely: extraversion, agreeableness, and conscientiousness, the questionnaire consisted of 48 items. A 5-point Likert scale was used, ranging from *totally disagree (1)* to *totally agree (5)*. The students were asked to rate how well the statements given represented their opinion. The complete scoring list can be found in Appendix II.

Overlap in speech. The sociometric badge was used to measure overlap in speech. The participants wore the devices around their neck, taped to the chest in order to prevent the device from moving too much. The sociometric badge measures (1) speech features, such as volume, tone of voice, speaking time, (2) body movement features such as energy and consistency, and (3) the proximity to others that are wearing a Sociometric Badge (Kim, Chang, Holland, & Pentland, 2008). In the current study only the overlap in speech was measured. Overlap in speech is defined as a moment in which at least two people were speaking at the same time. The field researchers put on the device and gave it to the participants before the session started. Every sociometric badge has an individual badge number. The field researchers wrote down the badge number of the badge and the name of the badge wearer in order to identify which badge matched which person.

Team performance. Team performance was measured using two scales, divided into technical and non-technical skills. The first one was measured by using the team effectiveness scale of Gibson, Cooper, and Conger (2009), where a 7-point Likert scale was used ranging from *very inaccurate* (1), to *very accurate* (7) to measure 4 statements. The other scale measured the ALS performance, which was based on the ALS-course competencies. These competencies are: (1) following the ALS-protocol, (2) execution of technical skills, (3) diagnostics and clinical reasoning, (4) therapeutic plan, and (5) method. To measure the ALS performance a 5-point scale was used, ranging from *insufficient* (1) to *excellent* (5). A reliability analysis was conducted in SPSS in order to measure the reliability for the scales ALS performance and team effectiveness. Both scales showed sufficient internal consistency reliability, Cronbach's Alpha .97 for team effectiveness and .88 for ALS performance. No interrater reliability could be tested for these variables since only one teacher scored the team. A Pearson correlation analysis was conducted to test the correlation between the scales for team effectiveness and ALS performance. A significant positive correlation was measured ($r_s = .89, p < .001$ (two-tailed)). These results show that when the score for team effectiveness increases, the score for ALS performance increases as well, and vice versa. For this reason, and because the scoring list for ALS performance better represents the effectiveness of the team in this context, it was decided to only use ALS performance in further analysis. The complete scoring list can be found in Appendix III.

3.5 Procedure

Prior to the data collection in this study, approval was given by the Ethical Committee of University of Twente. Furthermore, a meeting between the researchers, the teachers of the ALS-course, and the supervisors was set in the beginning of the study in order to determine the goal of the research. Moreover, an instruction for scoring was written and presented to the teachers in order to resolve the problem of differences in scoring. Since data was already collected during a similar study last year, no other measures or alternatives were necessary in order to accomplish this.

During the start of the ALS-course a presentation was given to the students of the course to inform them about the research. The week after this presentation consent was asked for the collection and use of their data, and participants were asked to fill in a preliminary test (consisted of demographical questions (e.g. what age are you?, have you ever worked together as a group before?)) and the personality questionnaire (HEXACO-SPI).

In the 7 weeks that followed students followed theoretical and practical lessons. In total 6 practical lessons, consisting of the CPR simulations, were given. Each team eventually practiced 5 simulations. These simulation sessions consisted of two teams in the room where one team performed the simulation and the other team observed, after which the performing team received feedback from the instructors, team members, and the observing team. After the debriefing the teams switched. During the simulations the team members could pick

which role they wanted to adopt (leader, medicine giver, BLS1, BLS2), however during the assessment the roles were already assigned to them. Each leader of the second practice had to be the leader during the assessment in order to measure the learning curve.

There were 8 different scenarios for the simulation and one of the instructors explained the context of each scenario to the team leader before the simulation started. Subsequently, the resuscitation simulation was finished when the patient was resuscitated or when the instructor indicated the end of the simulation.

In each simulation room, two instructors were present, one of the ALS-course teachers and one person that worked in the field of CPR (field specialist). Together they filled in the scales after the team finished the resuscitation simulation. All researchers were present in the control room to observe the simulations and be present in order to detect and correct problems regarding the sociometric badges.

3.6 Data analysis

During this research the data analyses was conducted by using the statistics programme IBM SPSS version 22. For the results we first determined the relationship between the dependent and the independent variables, namely team personality composition (using the HEXACO-SPI questionnaire) and team performance (using the ALS performance scale). In order to test the hypotheses 1, 3, and 5, a multiple linear regression analysis was conducted. To test hypothesis 2, 4, and 6, the regression analysis to test mediation was used. These analyses were used to analyse the data and reject or adopt the hypotheses formulated based on the theoretical framework. All the hypothesis were tested on a team level. A multiple linear regression, and a regression analysis for testing mediation, using Process v2.13, were used to test the hypotheses. Furthermore, for the analyses teams were divided in high or low in a certain personality trait by conducting a mean split analysis. Teams were divided by taking the mean score of the teams on a certain personality trait and then dividing them according to this mean score. This was done in order to create the distinction between teams high in a certain trait and teams low in that trait (all groups above the mean where characterized as high, and all groups below the mean where characterized as low). Only the data of the teams high in a personality trait were used to calculate a mediation analysis. For the linear regression analysis the standard deviation for all groups high in a personality trait was calculated. These measures were used in the analysis to test whether heterogeneity of this trait influenced team performance.

4. Results

4.1 Descriptive Statistics

As shown in Table 1, the mean score of overlap in speech was 16.98% (SD = 4.40). With a minimum of 8.96 and a maximum of 26.51. The mean score for all personality traits doesn't vary largely. The mean is smallest for the personality traits agreeableness (M = 3.13). The mean score of conscientiousness has the largest range (min. 2.13, max. 4.56), while extraversion has the smallest (min. 2.75, max. 4.44), with a small standard deviation (SD = .36). The sample size for all variables is 14.

Table 1. Descriptive statistics of all continuous variables

	N	Minimum	Maximum	Mean	SD
Mean score team effectiveness	14	4.25	6.75	5.79	.63
Mean score ALS performance	14	3.60	4.80	4.24	.37
Overlap in speech	14	8.96	26.51	16.96	4.40
Agreeableness	14	2.06	4.13	3.13	0.43
Extraversion	14	2.75	4.44	3.86	0.36
Conscientiousness	14	2.13	4.56	3.56	0.47

Note. All measures are on team level. Team effectiveness was measured on a 7-point Likert-scale, and ALS-performance was measured on a 5-point Likert-scale.

Table 2 shows the correlation between all variables. A strong negative correlation was observed between heterogeneity of extraversion and overlap in speech ($r_s = -.63$ [-.94, .17]). However, the correlation wasn't significant. This was the same for the correlation between heterogeneity of agreeableness and overlap in speech $r_s = -.74$ [-.99, -.47]), where the correlation was also strong and negative, but not significant. For the other variables no significance, nor strong correlation with other variables was noticeable.

Table 2. Correlation table

	1.	2.	3.	4.	5.
1. Team performance	-				
2. Heterogeneity in extraversion	.17 [-.57, .82]	-			
3. Heterogeneity in agreeableness	.33 [-.84, .95]	.31 [-.97, .96]	-		
4. Heterogeneity in conscientiousness	.42 [-.51, .98]	.19 [-.75, .97]	.30 [-.46, .84]	-	
5. Overlap in speech	.08 [-.34, .49]	-.63 [-.94, .17]	-.74 [-.99, -.47]	-.48 [-.91, .17]	-

Note. N = 14. ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed). Values in squared brackets indicate 95% confidence intervals for each correlation. Bootstrap results are based on 1000 bootstrap samples. Unless otherwise noted. Pearson's correlation was used.

The distribution of all continuous variables was checked by looking at skewness and kurtosis values, z-scores and by the use of the Shapiro-Wilk test to check for normality. Since the sample size in this research is small the Shapiro-Wilk test is considered appropriate (Field, 2013). Normality was accepted for all variables, meaning that the assumptions for parametric tests were met. For this reason, all hypothesis were tested using parametric tests.

4.2 Hypothesis 1, 3, and 5: Multiple linear regression analysis

First, the relation between the dependent variable (i.e. team performance), independent variables (i.e. extraversion, agreeableness, and conscientiousness), and mediating variable (i.e. overlap in speech) was determined. As shown in Table 2 a Pearson correlational analysis was conducted, showing the correlation for the above mentioned variables.

Hypothesis 1: In teams high in extraversion, heterogeneity of this trait positively influences team performance, was tested. As can be seen in Table 2, no significant correlation was observed between heterogeneity of extraversion and team performance ($r_s = .17$ [-.57, .82]). A multiple linear regression was calculated to test hypothesis 1. These results are shown in Table 3. No significant regression equation was found ($p > .05$). Table 3 furthermore shows that 2,9% of the variation in teams performance can be explained by the predictor, heterogeneity of extroversion in the team high in this trait. It is show that based on these results we can't expect that higher team performance occurs when teams high in extroversion are heterogeneous.

hypothesis 3: In teams high in agreeableness, heterogeneity of this trait negatively influences team performance was tested. As can be seen in Table 2, no significant correlation was observed between heterogeneity of agreeableness and team performance ($r_s = .33$ [-.84, .95]). A multiple linear regression was calculated to predict team performance based on heterogeneity of agreeableness in the team. These results are depicted in Table 3. No significant regression equation was found ($p > .05$). Table 3 furthermore shows that 10,8% of the variation in team performance can be explained by our predictor, heterogeneity of agreeableness in the teams high in this trait. These results show that we can't expect that heterogeneity of agreeableness in the team negatively influences team performance.

Hypothesis 5: In teams high in conscientiousness, heterogeneity of this trait negatively influences team performance was tested. A correlation analysis (Table 2) shows that no significant correlation was observed between heterogeneity of conscientiousness and team performance ($r_s = .42$ [-.51, .98]). A multiple linear regression analysis was done to test hypothesis 5. No significant regression equation was found ($p > .05$). It is furthermore shown in Table 3 that 17,8% of the variation in team performance can be explained by our predictor, heterogeneity of conscientiousness in the teams high in this trait. These results show that we can't expect that heterogeneity of conscientiousness in the team negatively influences team performance.

Table 3. Results of multiple linear regression analysis that tested the direct relation between heterogeneity of the personality traits and team performance.

Variables	B	SE_b	β	R²
<i>Heterogeneity in extraversion</i>	,413	,909	,169	0,029
<i>Homogeneity in Agreeableness</i>	,805	1,037	,328	,328
<i>Homogeneity in Conscientiousness</i>	,824	,793	,422	,178

Note. * $p < .05$; ** $p < 0.01$; *** $p < 0.001$; B = unstandardized regression coefficient; SE_b = Standard error of the coefficient; β = standardized coefficient

4.3 Hypotheses 2, 4 and 6: Mediation analysis

In order to determine the relationship between the dependent variable, the independent variable, and the mediating variable, and to check whether the corresponding hypotheses (2, 4, and 6) are correct, a mediation analysis was conducted. For this mediation analysis the program Process was used. Table 3 depicts the results of a regression analyses that tested the hypothesized mediation effects.

The results showed no significant direct and indirect relation between high levels of extraversion in the team and team performance. Similarly, high levels of extraversion in the team did not significantly influence overlap in speech $F(1,7)= 2.78, p > .05$, with an R^2 of .28. The CI of the indirect effect of high level of extraversion in the team and team performance (mediated by overlap in speech) include zero, $ab = -.132$, BC CI [-4.864, .907]. Based on these results, no evidence for the mediating role of overlap in speech in the relation between high levels of extraversion in the team and team performance was found and therefore hypothesis 2 was rejected.

Furthermore, the results showed no significant direct and indirect relation between high levels of agreeableness in the team and team performance. Similarly, high levels of agreeableness in the team did not significantly influence overlap in speech $F(1,5)= 0.09, p > .05$, with an R^2 of .39. The CI of the indirect effect of high level of agreeableness in the team and team performance (mediated by overlap in speech) include zero, $ab = .003$, BC CI [-5.725, 2.209]. Based on these results, no evidence for the mediating role of overlap in speech in the relation between high levels of agreeableness in the team and team performance was found and therefore hypothesis 4 was rejected.

Lastly, the results showed no significant direct and indirect relation between high levels of conscientiousness in the team and team performance. Similarly, high levels of conscientiousness in the team did not significantly influence overlap in speech $F(1,5)= 0.61, p > .05$, with an R^2 of .11. The CI of the indirect effect of high level of conscientiousness in the team and team performance (mediated by overlap in speech) include zero, $ab = .418$, BC CI [-.710, 3.313]. Based on these results, no evidence for the mediating role of overlap in speech in the relation between high levels of conscientiousness in the team and team performance was found and therefore hypothesis 6 was rejected.

Table 4. Mediation Analysis: Indirect Effect of Independent Variables on Team Performance Through Overlap in Speech

	Products of Coefficients		BC Percentile 95% CI	
	β	se	Lower	Upper
E → OV → TP	-.132	1.161	-4.864	.907
A → OV → TP	.003	1.848	-5.725	2.209
C → OV → TP	.418	1.002	-.710	3.313

Note. E = extraversion; A = agreeableness; C = conscientiousness; OV = overlap in speech; TP = team performance; CI = confidence interval; BC= bias correlated; 5000 bootstrap samples. * $p < .05$

5. Discussion and conclusion

5.1 Discussion of results

The goal of the present study was to investigate the effect of team personality composition on team performance and whether overlap in speech mediates this relation in the context of simulated CPR. To test these hypothesized relationships, a personality questionnaire, team performance scale, and sociometric badges were used. Multiple linear regression analysis and mediation analysis provided insight into this relation.

The results of a regression analysis conducted for all variables showed no relation between heterogeneity of these traits and team performance. All results were not in line with the hypotheses formulated based on previous literature. However, research from Hackman (1987) states that it is dependent of the task and the context of the team which personality types are most effective, and these constructs were never investigated in the context of simulated CPR. Furthermore, the CPR team is working according to guidelines and protocol. The performance of CPR by student teams requires them to systematically work towards goal completion. Since no significant results were noticeable for any of the personality traits, it could be that in this context, where the teams follow protocol, personality isn't relevant, or that these personalities, for that reason, weren't clearly present. It could be that other factors are of more importance in defining a well performing CPR team. One of these factors might be team coordination², which is widely acknowledged as an important predictive factor for effective teamwork in CPR, and the patient outcome (Manser, 2009). Furthermore, it is stated by McCrae and Costa (1992) that personality is rather constant over time. However, it could be that, since the CPR simulations are short sessions, there isn't enough time for the personalities in the team to really show during the performance.

Secondly, it was hypothesised that overlap in speech would mediate the relation between personality and team performance. No correlations between team personality composition (for any of the personality traits), overlap in speech, and team performance were found, nor was any correlation found between overlap in speech and team performance for any of the given personality traits. Therefore, hypotheses 2, 4, and 6 were all rejected. It is stated by Baron and Kenny (1986) that the sample size for a simple mediation analysis for field research must contain at least 100 samples. The fact that no significant results could be obtained could be due to the fact that our sample consisted of only 14 teams.

Furthermore, it is stated that communication in CPR settings is a complex construct (Bergs et al., 2005) and in this research only overlap in speech was measured. There is still a lot unknown about overlap in speech as a mediator. Overlap in speech may not have mediated the relation between personality and team performance since the context of the research is very stressful and there is little time for disagreements or talking about anything other than the case at hand. On the other hand, it could be that overlap in speech didn't mediate the relation between personality and team performance because all overlap that occurred wouldn't be typified as disruptive (e.g. agreeing with person talking while that person is talking). Apart from that, since many facets can be explored and only a small part was assessed in this study it could also be that a third variable influenced the results, like amount of speech. It would be interesting to measure the amount of speech of the teams, and their personality, to see how this affects team performance.

Also, it could have been that confounding variables influenced the results. In this research gender wasn't taken into account. It is scientifically proven that women do talk more

² Team coordination is defined as "the management of interdependencies of subtasks by regulated action and information flow in order to achieve a common goal, that is, the performance of high quality CPR" (Boos, Kolbe, Kappeler, & Ellwart (2011)).

than men (Kaplan, 2016). For this reason it could be that woman do overlap more during conversation. Furthermore, we didn't control for difficulty of the scenario of the CPR simulation. It could be that the difficulty of the scenario influenced the way that the team communicated, and thus their team performance.

5.2 Limitations, strengths, and future research

The present research provides relevant information on the effect of TPC on the team performance of a CPR team in a simulation setting, and opportunities for further research were created focussing on this topic. The measurements that were used had a high inter-item reliability. Nevertheless, this research also consists of inevitable limitations.

First, the sample size of this research was small (n=14 teams), which limited the statistical power of the analysis. Furthermore, the effect size is small/medium for the tested variables. More reliable results may be noticeable when a similar study is being conducted with a bigger sample size.

Second, the team performance of the teams was scored by two individual instructors. However, each team was assessed by only one instructor, due to practical reasons. This meant that we were not able to do an inter-rater reliability analyses and look at the inter-rater agreement between both instructors. Before the start of the practical simulations both instructors received instruction on how to assess the scoring scale. However, during the final practical scenario day (assessment day), which was used for this research, both the instructor together with the medical specialist graded the teams. It could be useful to let the instructor and the field specialist assess the teams individually to be able to measure their inter-rater reliability.

Furthermore, this study did not take into account the amount of practice the teams did on their technical skills in their free time. Each team had the opportunity to practice, and be assessed, five times during the practical simulations. However, the times the teams practice in their free time was not taken into account. In further research this should be controlled for.

Moreover, in dividing the teams in high or low personality traits, the mean of the sample was taken to divide the teams by. This means that for example the teams high in extraversion could be scoring moderately on average, but that they were marked as high in extraversion because of the fact that the whole sample may be moderately low on this trait. Therefore, the results of this research should be interpreted with caution.

Furthermore, there are multiple ways and multiple measuring methods available to measure the variables we measured in this study. Team performance was for example measured based on the ALS performance of the team, which included technical and non-technical skills. Overlap in speech for example didn't correlate with team performance. It might be possible that overlap in speech is relevant for variables other than team performance which were not taken into account in this study.

Last, the assumed mediating role of communication was only accounted for via overlap in speech, while the concept of communication is much bigger than this. It might be interesting to look at other forms of communication as a mediating variable, like amount of speech, as a mediator. Furthermore, the data from the Sociometric Badges only produced quantitative data. The badges didn't show what was said during these overlapping speaking turns. The quality of each overlap in speech (disagreement or agreement) therefore remains unknown. A qualitative view of the data could give insight in the quality of the overlap in speech.

5.3 Practical implications

This study explored the relation between team personality composition and team performance, with overlap in speech as a mediating variable. The results showed no significant relation between elevation of the personality traits extraversion, agreeableness, and conscientiousness and the dependent variable team performance. Furthermore, no relation was found between personality, team performance, and the mediating variable overlap in speech. However, these findings are relevant for CPR training, as they imply that having certain personality traits in a team does not directly relate to better or worse CPR performance. Instead other aspects may play a role in the team performance of teams practicing CPR. Moreover, the findings suggest that overlap in speech doesn't relate to neither elevation of a certain personality trait in the team, nor the team performance of a team. In the future it would be interesting to examine whether other forms of communication, such as amount of speech, mediate the relation between personality and team performance. Or to investigate whether for example team coordination affects team performance. With regards to the overlap in speech it would also be interesting to examine this variable in a more qualitative way, to see whether these overlaps are interruptive of nature. For the instructors of the ECTM, the findings of the present study mean that they do not have to take the personality composition of the teams in the ALS-course into account, when teams are being formed or when grades are being given. When looking at other contexts, it should be taken into account that the present study focused on a simulated setting, with the goal of improving CPR training. Therefore, generalizing these results to real-life emergency situations should be done with caution.

5.4 Conclusion

The goal of the study was to examine whether the team performance of teams practicing CPR was influenced by team personality composition, and whether overlap in speech mediated this relationship. Therefore, the following research question was posed; *How does team personality composition influence team performance in a medical simulation setting and is overlap in speech mediating this relation?*

It can be concluded that the present study did not provide evidence for a significant relation between team personality composition, overlap in speech as a mediator, and team performance. A link between the mediating variable and the dependent and independent variable was non-existing. There also was no link noticeable between the underlying link of overlap in speech and team performance. More research, on a larger scale, is needed since the regression analysis did not show significant results.

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APPENDIX I: ALS – LEARNING GOALS AND COURSE CONTENT

Goal

The course Advanced Life Support enables students to adequately assess and treat a patient in resuscitation setting according to protocolled guidelines by making use of a systematic clinical approach and medical technology.

The following learning objectives are pursued:

1. The student can describe the underlying principles of therapies that are commonly used in a resuscitation setting
2. The student can describe the possibilities and limitations of diagnostic technologies that are commonly used in a resuscitation setting
3. The student is able to relate information derived from the anamnesis, physical examination, arterial blood gas values, venous laboratory values, echography, X-thorax and the patient monitor to an individual patient case.
4. The student can perform resuscitation in a team according to the protocol of shockable and non-shockable rhythms in a simulated resuscitation setting.
5. The student can adequately perform chest compressions, non-invasive ventilation techniques, medication administration, and electrical therapies that are part of the resuscitation protocol in a simulated resuscitation setting.
6. The student can adequately communicate and collaborate in a team in a simulated resuscitation setting.
7. The student can handover patients in a structured way according to the SBAR methodology.
8. The student can analyze a patient in a structured way according to the ABCDE methodology.
9. The student can propose an adequate diagnostic and therapeutic strategy based on the available clinical and contextual information of a patient case.

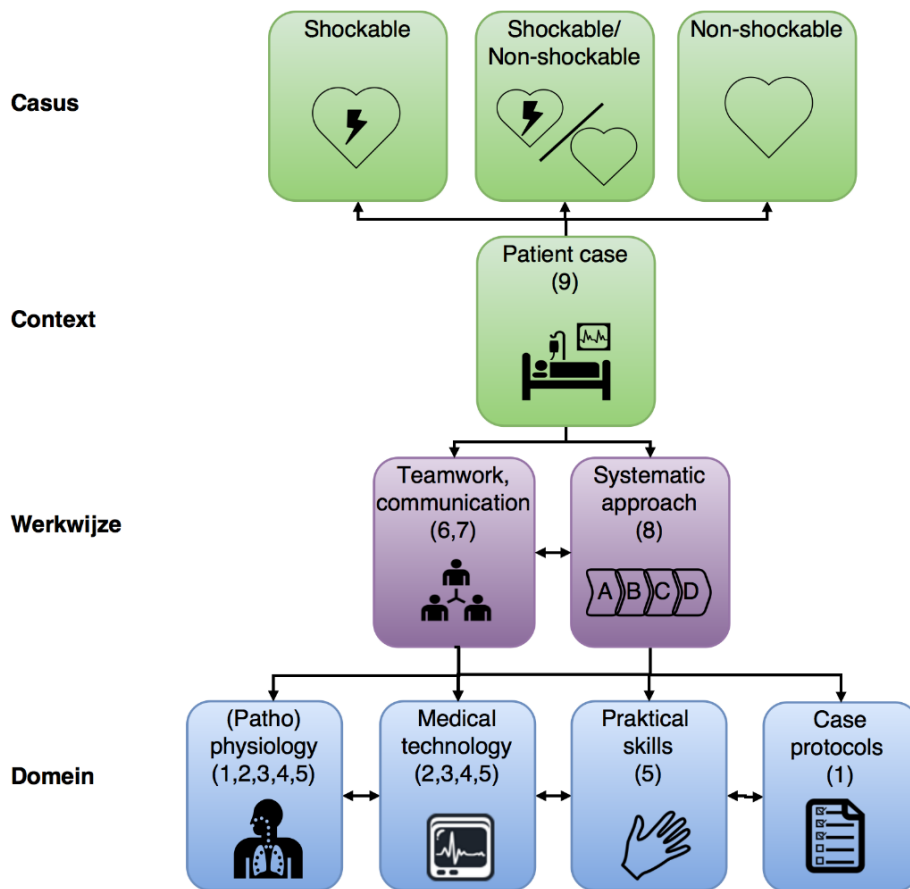
Content

In the course Advanced Life Support, we will follow the guidelines provided by the European Resuscitation Council. Yet, we do not intend to train resuscitation teams or to provide any certifications, but to create insight in medical technologies and procedures that are relevant in the management of patients with a circulatory arrest.

During the course, students will practice and become acquainted with medical technologies and skills, in which the underlying therapeutic and diagnostic principles are underlined. Next, specific attention is given to the clinical approach of patient assessment and the interpretation of critical body functions. The major part of the course consists of sessions in which knowledge and skills have to be integrated and applied on a simulated patient case in a resuscitation setting.

	Cognitieve vaardigheden (kennis)	Praktische vaardigheden (handelingen)	Interactieve vaardigheden (samenwerking, communicatie)	Intellectuele vaardigheden (Integratie)
Leerdoelen	1, 2, 3, 4	5	6,7	3, 5, 8, 9

Voorkennis	Basis kennis	BLS Injecteren	N.v.t.	N.v.t.
Onderwijs	Hoorcollege, Zelfstudie, Groepsopdracht	Skills practicum	Werkgroep	Groepspracticum
Toetsing individu	Theorietoets	BLS toets	N.v.t.	Theorietoets
Toetsing groep	Casus assessment (geïntegreerd in context)			



APPENDIX II: DEMOGRAPHICS AND PERSONALITY QUESTIONNAIRE

Demografische gegevens

Ten behoeve van het onderzoek, willen we onder andere enkele demografische gegevens van je weten. Vul dit zo nauwkeurig mogelijk in. Deze gegevens zullen direct worden overgegeven aan de onderzoekers en zullen NIET worden gedeeld met anderen.

Bij voorbaat dank voor je medewerking!

Studentnummer	S_____
Specialisatie van de master	<input type="radio"/> Medical Sensing and Stimulation <input type="radio"/> Medical Imaging and Interventions
Leeftijd	_____
Geslacht	<input type="radio"/> man <input type="radio"/> vrouw
In welk team zit je?	_____
Met hoeveel van je teamleden heb je eerder samengewerkt?	
<input type="radio"/> Ik heb met niemand samengewerkt <input type="radio"/> Ik heb met 1 persoon samengewerkt <input type="radio"/> Ik heb met 2 personen samengewerkt <input type="radio"/> Ik heb met 3 personen samengewerkt	
Hebben jullie al eerder in deze samenstelling gewerkt?	
<input type="radio"/> ja, al 1 keer eerder <input type="radio"/> ja, al meer dan 1 keer <input type="radio"/> nee, maar ik werkte wel al samen met het overgrote deel van dit team <input type="radio"/> nee	

Volgde je al eerder ALS of een soortgelijke team training?
<input type="radio"/> ja <input type="radio"/> nee

Persoonlijkheidsvragenlijst

Op de volgende bladzijden volgen enkele uitspraken. Sommige van deze uitspraken komen overeen met hoe je bent. Andere uitspraken komen juist niet overeen met hoe je bent. Wij vragen je de uitspraken goed te lezen en aan te geven in hoeverre deze uitspraken met jou overeenkomen.

Teken daarvoor een kruis in de desbetreffende cirkel, zie het voorbeeld:

Noteer ook op elke bladzijde je studentnummer.

Geef bij elke uitspraak een antwoord, zelfs als je niet helemaal zeker van je antwoord bent. Belangrijk om te weten: er is geen goed of fout antwoord. Alle gegevens worden enkel ten behoeve van dit onderzoek gebruikt.

Uitspraken		Helemaal mee oneens	Mee oneens	Neutraal	Mee eens	Helemaal mee eens
1	Ik ruim mijn kleren netjes op	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	Ik blijf onaardig tegen iemand die gemeen was	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	Mensen mogen mij graag	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	Ik werk harder dan anderen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	Ik geef vaak kritiek	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	Ik houd me in een groep op de achtergrond	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	Ik kijk mijn werk zorgvuldig na	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	Ik pas mijn mening aan die van anderen aan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	Ik werk liever alleen dan met anderen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10	Ik denk goed na voordat ik iets onveilig doe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11	Ik reageer soms erg fel als iets tegenzit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12	Ik heb altijd zin in het leven	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13	Ik kan door mijn eigen troep soms moeilijk iets vinden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14	Ik vertrouw anderen weer snel nadat ze mij bedrogen hebben	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15	Niemand vindt mij leuk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16	Als iets moeilijk is, geef ik het snel op	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17	Ik ben zacht tegenover anderen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18	Ik leg gemakkelijk contact met vreemden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19	Ik vind het zonde van de tijd om mijn werk op fouten na te kijken	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20	Ik geef gemakkelijk anderen gelijk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21	Ik ben het liefst in m'n eentje	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22	Ik doe wat in mij opkomt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23	Ik ben zelden kwaad op iemand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24	Ik ben vaak somber	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25	Mijn kamer is altijd opgeruimd	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		Helemaal mee oneens	Mee oneens	Neutraal	Mee eens	Helemaal mee eens
26	Ik ben lang op mijn hoede bij mensen die mij kwaad hebben gedaan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27	Niemand wil graag met mij praten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28	Ik stel ingewikkelde taken zo lang mogelijk uit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29	Ik reageer negatief als iemand fouten maakt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
30	Ik ben vaak de woordvoerder van een groep	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
31	Ik werk erg nauwkeurig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
32	Het is moeilijk mijn ideeën te veranderen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
33	Ik ga het liefst met veel mensen om	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
34	Ik kan mijzelf goed beheersen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
35	Zelfs als ik slecht behandeld word, blijf ik kalm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
36	Ik ben over het algemeen vrolijk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
37	Ik zorg dat dingen altijd op de juiste plek liggen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
38	Ik ben goed van vertrouwen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
39	Ik denk dat veel mensen mij onaardig vinden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
40	Ik luiert liever dan dat ik hard werk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

41	Ik laat het direct merken als ik iets stom vind	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
42	Ik voel me slecht op mijn gemak in een onbekende groep	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
43	Ik herlees wat ik schrijf om te zorgen dat het foutloos is	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
44	Ik ben het snel met anderen eens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
45	Ik praat graag met anderen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
46	Ik doe vaak dingen zonder echt na te denken	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
47	Mensen hebben mij wel eens woedend gezien	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
48	Ik ben zelden opgewekt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX III: TEAM EFFECTIVENESS AND PERFORMANCE SCALES

Team effectiveness and performance scales

Groep: _____

Datum: ___/___

Practicum: _____

Rater: _____

Hieronder volgen enkele uitspraken. Geef aan in hoeverre je het eens of oneens bent met de uitspraak of item. Teken daarvoor een kruis in de desbetreffende cirkel. Noteer ook je voorletters in de rechterbovenhoek van deze bladzijde.

Geef bij elke uitspraak een antwoord, zelfs als je niet helemaal zeker van je antwoord bent. Belangrijk om te weten: er is geen goed of fout antwoord. Alle gegevens worden enkel ten behoeve van dit onderzoek gebruikt.

Team performance

	Erg inaccuraat				Erg accuraat		
	1	2	3	4	5	6	7
1. Dit team is een consistent goed presterend team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Dit team is effectief	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Dit team maakt weinig fouten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Dit team verzet kwalitatief hoog werk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

ALS performance

1 = onvoldoende, 5 = uitstekend

	--	-	+/-	+	++
	1	2	3	4	5
5. ALS-protocol	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Uitvoering handelingen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Diagnostiek en klinisch redeneren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Therapeutisch plan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Werkwijze	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Leadership effectiveness

	1	2	3	4	5
	Volledig mee oneens			Volledig mee eens	
10. Vergeleken met andere leidinggevenden is deze leidinggevende niet erg efficiënt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. De manier waarop deze leidinggevende functioneert is een goed voorbeeld voor andere leidinggevenden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Deze leidinggevende slaagt er vaak niet in doelen te halen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Deze leidinggevende heeft succes binnen het team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Zeer ineffectief

Zeer effectief

14. Ik vind deze leidinggevende: zeer ineffectief (1) - zeer effectief (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Handleiding en uitleg effectiveness & performance scales

Team performance (Vertaald uit Gibson, Cooper, & Conger, 2009)

1. Met een consistent goed presterend team wordt bedoeld: Een team dat gedurende het hele reanimatie- scenario goed presteert.
2. Een effectief team wordt gedefinieerd als team dat doeltreffend werkt, zijn doelen behaalt, in de algemene zin. Een doel kan bijvoorbeeld zijn: het komen tot de juiste diagnose. De nadruk wordt hierbij gelegd op het behalen van het doel, en in mindere mate op het proces.
4. Met kwalitatief werk doelt men zowel op de technische als de niet-technische aspecten van het werk.

Origineel:

1 = very inaccurate, 7 = very accurate

1. "This team is consistently a high performing team."
2. "This team is effective."
3. "This team makes few mistakes."
4. "This team does high quality work."

ALS performance (ALS scorelijst, TG)

5. ALS protocol

Weging: 20%

Onder ALS protocol wordt verstaan:

- a. primaire diagnose: De patiënt aanspreken, schudden, respons afwachten, in mond kijken en/of voelen, chinlift, look/listen/feel (≥ 7 sec.), en pols voelen (≥ 4 sec) voor start compressies.
- b. Reanimatie cyclus: directe start na primaire diagnose, minimale interruptie, 30:2 ratio compressies: beademingen
- c. Snelle ritmecheck: vroeg en juiste interpretatie
- d. Indicatie defibrillatie: shock vs. non-shock
- e. Opvolging handelingen protocol: aanhouden 2 min. cycli

6. Uitvoering handelingen

Weging: 20%

Onder uitvoeringen handelingen wordt verstaan:

- a. Compressie techniek: juiste handplaatsing, frequentie (100/min)
- b. Kap beademing techniek: correcte mayo tube maat selectie + plaatsing, en correcte handpositie + teugtoediening.
- c. Ritmecheck methodiek: onderbreken compressies, pols voelen, en gezamenlijke interpretatieve ritme.
- d. Defibrillatie techniek: correct gebruiken defibrillator, waarschuwing omgeving ("bed vrij").
- e. Intubatie techniek: material selectie en controle, juiste intubatie techniek (max. 12 sec), en controle via look/listen/feel techniek.
- f. Medicatie toedieningswijze en dosis: juiste concentratie en juiste toegangsroute.

7. Diagnostiek en klinisch redeneren

Weging: 40%

Onder diagnostiek en klinisch redeneren wordt verstaan:

- a. ABCDE systematiek: volgorde en compleetheid
- b. Inzet anamneses: relevantie en compleetheid (algemene, speciële, aanvullende anamnese)
- c. Inzet lichamelijk onderzoek: relevantie en compleetheid (volgens ABCDE)
- d. Inzet diagnostische technieken: relevantie en compleetheid (monitor, lab, ECG, echo, X-thorax)
- e. Interpretatie diagnostische informatie: juiste interpretatie diagnostische uitslagen (anamnese, lichamelijk onderzoek, monitor, lab, ECG, echo, X-thorax)
- f. Diagnostische conclusie: correcte diagnose stelling
- g. Reassessment: herevaluatie bij verandering status

8. Therapeutisch plan

Weging: 10%

Onder dit item wordt verstaan:

- a. Behandeling onderliggende oorzaak: passende behandeling
- b. Post-resuscitation care: overdracht naar passende afdeling/specialist, en adequate follow-up strategie

9. Werkwijze

Weging: 20%

Onder werkwijze wordt verstaan:

- a. Closed loop communicatie: naam benoemen, bevestigen, heldere communicatie
- b. Onderling overleg en samenwerking: overleg en samen besluit nemen, en elkaar helpen bij onzekerheid.
- c. Overdracht volgens SBAR: SBAR componenten aanwezig

Leadership effectiveness (adapted from Hooijberg, 1996)

- 10. Met efficiënt wordt bedoeld: de doelen worden op de meest economische manier behaald. In deze context betekent het dat de leidinggevende handelt en zijn/haar doelen bereikt op de meest zuinige/nuttige/verstandige manier wat betreft tijd, inspanning en middelen.
- 11. Hier wordt gevraagd of de leidinggevende als een rolmodel voor zijn teamleden functioneert, zodat zij er in de toekomst een voorbeeld aan kunnen nemen wanneer zij in een leidersrol moeten staan.
- 12. Onder doelen wordt verstaan: de doelen die een leidinggevende moet behalen, zoals op een correcte manier communiceren, het protocol volgen, etc.
- 13. Met succes wordt bedoeld zowel op sociaal/emotioneel vlak, als succes in het redeneren, actie ondernemen etc.
- 14. Voor een definitie van effectiviteit: zie punt 2.

Appendix III: Encryption research data

Plan versleuteling data onderwijskundig onderzoek ALS (febr – aug 2017)

De data zou verzameld worden op basis van studentnummer. Dit valt onder de categorie persoonsgegevens, en wordt alleen toegestaan indien er geen andere mogelijkheid is om de data beschermd te verzamelen. We geloven dat dit inderdaad bij ons onderzoek van toepassing is, om de volgende redenen:

1. Het videomateriaal is gekoppeld aan studentnummer binnen een beschermde omgeving.
2. Indien elke student een ander nummer zou krijgen, zou
 - a. Elke student zijn eigen nummer moeten onthouden: hier bestaat het risico dat studenten het nummer vergeten. Mogelijke gevolgen: De procedure wordt vertraagd of studententeams worden ge-excludeerd.
 - b. De persoon met de versleuteling telkens aanwezig moeten zijn om de juiste nummers aan de juiste studenten te geven, onder andere tijdens snelle groepswissels. De studenten, noch de onderzoekers kunnen de nummers checken. Mogelijke gevolgen: studentnummers worden verwisseld (data is dan niet meer betrouwbaar), de procedure loopt vertraging op.

Hierdoor moeten we concluderen dat dataverzameling op basis van geanonimiseerde nummers de betrouwbaarheid van het onderzoek in het gedrang kunnen brengen.

Daarnaast beschikken de onderzoekers niet over de tijd, noch de middelen om data volledig geanonimiseerd te kunnen verzamelen.

Om deze reden stellen we het volgende voor:

Met alle data zal vertrouwelijk worden omgegaan. Omdat het videomateriaal en teams gekoppeld zijn aan studentnummers, zal initieel alle data verzameld worden op basis van dit studentnummer. Wanneer data binnenkomt, wordt elk studentnummer zo snel mogelijk omgezet naar een nieuw nummer door middel van een versleuteling. Dit document zal zich gescheiden van de onderzoeksgegevens, op een fysiek andere plek bevinden. Enkel de hoofdonderzoeker krijgt inzage in de sleutel. Onderzoekers kunnen de data pas analyseren wanneer deze versleuteld is, met uitzondering van het videomateriaal. Deze kan namelijk niet losgekoppeld worden van het studentnummer, omdat de onderzoekers slechts inzage krijgen in de video's die gedeeld werden aan de betreffende studententeams op een beschermd platform. Alle informatie blijft binnen het onderzoeksteam, en derden zullen geen informatie over individuele respondenten kunnen ophalen.

Enkel het geel gemarkeerde zal anders geïnterpreteerd/aangepast moeten worden:

Toegang tot de versleuteling zal vergrendeld worden door middel van een paswoord die alleen Joscha kent. Daarnaast zal –indien mogelijk- een verbod voor printen in het document worden gezet. Na afronding van het onderzoek krijgt de coördinator van het onderzoek (Marcella Hoogeboom) toegang tot het document, en wordt de toegang voor Joscha, Bryce, Aniek en Fabienne verboden.

In de praktijk:

Alle analoge data zal de studentnummers bevatten, de respondenten vullen deze zelf in. Op digitale data (met uitzondering van het videomateriaal) zullen geen persoonsgegevens (naam of studentnummer) terug te vinden zijn. Het omzetten van studentnummer naar een geanonimiseerd nummer zal gebeuren tijdens het handmatig invoeren van analoge data in een digitaal bestand. Hiervoor zal een beschermde sleutellijst aangemaakt worden, waar enkel de hoofdonderzoekers toegang tot zullen hebben.

We zijn ons ervan bewust dat deze manier van data verzamelen risico's met zich meebrengt. Wegens tijdgebrek en gebrek aan middelen was het niet mogelijk data volledig geanonimiseerd te verzamelen. Echter zal erg voorzichtig met de data worden omgegaan, en zal alles achter slot en grendel (digitaal en analoog) bewaard worden.

	Categorie:	Locatie:	Inzicht door:
Studentnummers	Persoonsgegevens	Analoog	J. Friedrich, B. Cherry, A. Poort, F.A. Lok
Nieuwe nummers	Geanonimiseerd	Digitaal	Onderzoekers team ALS