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RESEARCH

Changing Resuscitation Guidelines During the COVID-19 Pandemic Did Not Change Resuscitation Conduct

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ABSTRACT

Background: At the beginning of the COVID-19 pandemic (early 2020), the lifeguard community was informed about adapted resuscitation guidelines to prevent infection during resuscitation. This study investigated the adherence to the adapted guidelines for the resuscitation of drowning victims on beaches in the Netherlands by lifeguards.

Methods: Based on Ajzen's theory of Planned Behavior, we used an online questionnaire and semi-structured focus group interviews of lifeguards to understand how resuscitations were performed and whether the adapted guidelines had been followed. We conducted the interviews within one year after the resuscitation.

Results: We investigated five resuscitations. Nine lifeguards (all males; aged 25–53 years) answered the questionnaire; seven participated in the interviews. All lifeguards had at least some understanding of the adapted resuscitation guidelines. All lifeguards handled the resuscitations by adhering to what they had learned during pre-COVID-19 training. For them, the life-threatening condition of the victim took priority over the risk of infection from COVID-19. Other people at the scene shared this view. Furthermore, no lifeguard could estimate the risk of becoming infected while doing mouth-to-mouth resuscitation. No lifeguard was concerned about becoming infected or infecting others. The lifeguards would act similarly in future situations.

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Conclusion: Although the lifeguards were informed about the new guidelines that were provided to protect them, they acted as they had been trained before the pandemic. Reasons for this behavior need to be explored to better prepare for a new pandemic.

Keywords: Emergency treatment; first responder; beach; training; behavior; public health

RÉSUMÉ

Contexte: Au début de la pandémie de COVID-19 (début 2020), la communauté des sauveteurs a été informée de directives de réanimation adaptées afin de prévenir le risque d'infection lors des réanimations. Cette étude a examiné l'adhésion à ces directives adaptées pour la réanimation de victimes de noyade sur les plages des Pays-Bas par les sauveteurs.

Méthodes: En nous appuyant sur la théorie du Comportement Planifié d'Ajzen, nous avons utilisé un questionnaire en ligne et des entretiens semi-structurés en groupes de discussion avec des sauveteurs pour comprendre comment les réanimations ont été réalisées et si les directives adaptées avaient été suivies. Nous avons mené les entretiens dans l'année suivant la réanimation.

Résultats: Nous avons étudié cinq réanimations. Neuf sauveteurs (tous des hommes âgés de 25 à 53 ans) ont répondu au questionnaire; sept ont participé aux entretiens. Tous les sauveteurs avaient au moins une certaine compréhension des directives adaptées. Tous ont géré les réanimations en adhérant aux directives d'avant la pandémie de COVID-19. Pour eux, l'état critique de la victime avait la priorité sur le risque d'infection par la COVID-19. Les autres personnes présentes sur les lieux partageaient ce point de vue. Par ailleurs, aucun sauveteur ne pouvait estimer le risque d'infection lors d'une réanimation bouche-à-bouche. Aucun sauveteur n'était préoccupé d'être infecté ou d'infecter d'autres personnes. Les sauveteurs agiraient de la même façon dans des situations futures similaires.

Conclusion: Bien que les sauveteurs aient été informés des nouvelles directives mises en place pour les protéger, ils ont agi comme ils avaient été formés avant la pandémie. Les raisons de ce comportement doivent être examinées afin de mieux se préparer à une nouvelle pandémie.

Mots-clés: Traitement d'urgence; premiers intervenants; plage; formation; comportement; santé publique

ABSTRACTO

Antecedentes: Al inicio de la pandemia de COVID-19 (principios de 2020), la comunidad de guardavidas fue informada sobre guías adaptadas de reanimación para prevenir la infección durante las maniobras de reanimación. Este estudio investigó la adherencia a dichas guías adaptadas para la reanimación de víctimas de ahogamiento en playas de los Países Bajos por parte de los guardavidas.

Métodos: Basándonos en la teoría del Comportamiento Planificado de Ajzen, utilizamos un cuestionario en línea y entrevistas semi-estructuradas en grupos focales de guardavidas para comprender cómo se realizaron las reanimaciones y si se siguieron las guías adaptadas. Las entrevistas se realizaron dentro del año posterior a la reanimación.

Resultados: Investigamos cinco reanimaciones. Nueve guardavidas (todos hombres; entre 25 y 53 años) respondieron el cuestionario; siete participaron en las entrevistas. Todos los guardavidas tenían al menos cierto conocimiento

de las guías adaptadas de reanimación. Todos los guardavidas actuaron en las reanimaciones adhiriéndose a lo aprendido en su capacitación previa a la pandemia de COVID-19. Para ellos, la condición potencialmente mortal de la víctima tuvo prioridad sobre el riesgo de infección por COVID-19. Otras personas en la escena compartieron esta visión. Además, ningún guardavidas pudo estimar el riesgo de contagiarse al realizar ventilaciones boca a boca. Ninguno manifestó preocupación por infectarse o contagiar a otros. Los guardavidas afirmaron que actuarían de manera similar en situaciones futuras.

Conclusión: Aunque los guardavidas fueron informados sobre las nuevas guías diseñadas para protegerlos, actuaron de acuerdo a como habían sido entrenados antes de la pandemia. Es necesario explorar las razones de este comportamiento para estar mejor preparados ante una nueva pandemia.

Palabras clave: Tratamiento de emergencia; primer respondiente; playa; capacitación; comportamiento; salud pública

When the first wave of the COVID-19 pandemic hit the world in 2020, (inter)national resuscitation guidelines needed sudden adaptation (IFRC Global First Aid Reference Centre, 2021). The reason behind this was to reduce the risk of airborne infection related to the ventilation and chest compression of an infected person in cardiac arrest. This goes especially for resuscitation of drowning victims, where ventilation is of increased importance (Bierens et al., 2021; Lott et al., 2021; Queiroga et al., 2022). Lifeguards dealing with drowned people have been taught for several decades that early mouth-to-mask ventilation is essential. Therefore, it was assumed that performing resuscitation according to adapted guidelines would be particularly challenging for lifeguards.

Although over the past years, researchers have been evaluating the impact of the pandemic during out-of-hospital resuscitations (Rosell Ortiz et al., 2020; Singh et al., 2020), we found only one article, Jansen et al., 2023, that addressed adherence to adapted COVID-19 resuscitation guidelines for out-of-hospital resuscitation by members of the German Association of Emergency Medical Services (Deutscher Berufsverband Rettungsdienst e. V., DBRD). The study found that only 32% followed a COVID-19 resuscitation protocol, highlighting poor guideline implementation after one year.

We conducted a qualitative study with nine lifeguards and explored their adherence to adapted resuscitation guidelines in the resuscitation of drowning victims on Dutch beaches during the early COVID-19 pandemic.

SETTING

This study took place during the first wave of the pandemic in the Netherlands. No vaccines were available worldwide during the study period, while the introduction of self-tests had just started. In this period, de Nederlandse Reanimatieraad (NRR – the Dutch Resuscitation Council) revised the national resuscitation guidelines (Supplementary file 1). As a result of this, de Koninklijke Nederlandse Reddingsmaatschappij (KNRM – Royal Netherlands Sea Rescue Institution) and Reddingsbrigade Nederland (KNBRD – Royal Dutch Lifesaving Association), which always base their resuscitation training on the guidelines of the NRR, integrally adopted these changes and informed their members to use the adapted protocols. The guidelines were then disseminated online to all lifeguards of both organizations, and the advice was given to use the adapted protocols. Face-to-face education and teaching were not possible then because of the social distancing measures taken to prevent the virus from spreading further. There was no new guidance regarding learning, training, or assessment. There was also no mechanism to gain insight

into whether the lifeguards had read or familiarized themselves with the adapted protocols. As the NRR is the national standard, the lifeguards in this study were expected to act in the same way as other rescuers or citizens in the country.

The original resuscitation guidelines included, in summary: open the airway; check breathing by looking, feeling, and listening; perform 30 compressions followed by 2 mouth-to-mouth ventilations; operate a defibrillator; a facemask is recommended. The COVID-19 adapted guidelines started with making as little contact as possible; wear gloves; do not open the airway; check breathing by looking. Then, when proven or assumed COVID-19: only defibrillation; no compressions; no mouth-to-mouth or mouth-to-facemask ventilation. Or, when no proven or no assumed COVID-19: only compressions and operate a defibrillator; no mouth-to-mouth or mouth-to-facemask ventilation.

METHODS

Data was collected from a purposive sample of lifeguards who had performed a resuscitation on a drowned person at a Dutch beach during the early stage of the COVID-19 pandemic between June and September 2020. The study period and the study population were defined *a priori* to minimize the risk of confounding bias.

The lifeguards were recruited in April and May 2021 via the KNRM and the KNBRD. The persons responsible for resuscitation in each organization were contacted. The study was explained, and collaboration was requested and approved. The KNRM has a central and compulsory recording of all resuscitations and was able to provide all relevant reports. The communication department of the KNBRD emailed all lifeguard stations and individual lifeguards. Additionally, the study was promoted through social media channels of the KNBRD. All responders who performed a resuscitation between June and September 2020 joined the study. We included lifeguards actively involved in each resuscitation attempt by providing compressions and/or mouth-to-mouth ventilation. Lifeguards in the Netherlands are professionally trained and serve as volunteers.

Based on a structured literature search on the effects of the COVID-19 pandemic on out-of-hospital resuscitation, a questionnaire and an interview guide were developed and tested by face validation for clarity, suitability, and technical proficiency. The questionnaire, including 20 multiple-choice items and nine open items, examined which aspects of the resuscitation were performed, what personal factors contributed to the decision to initiate resuscitation, and which factors determined their adherence to the adapted guidelines, or not. The questionnaire was made with LimeSurvey (GmbH, Hamburg, Germany). The interviews, each lasting 45-60 minutes, used seven scripted open-ended questions that were identical in the different interviews to examine the actions and interactions of the lifeguards at each resuscitation site. The questionnaires were sent via email, and the interviews were conducted via Zoom teleconferences. Supplementary file 2 shows the English translation of the questionnaire and interview questions.

The questionnaire data were collected in May 2021 and analyzed by two researchers (NM, MM). The two interviews were held on two days in May 2021 by two researchers (MM, AJ). The questionnaire and interviews were held within the accepted recall period of one year after serious events (Bhandari & Wagner, 2006). Two researchers (JZ, AJ) made audio recordings of the interviews and transcribed them. Three researchers (JZ, RC, AJ) independently coded and thematically analyzed the transcriptions. In case of disagreement, a discussion followed until full consensus was reached. The study contains method triangulation, data source triangulation, and investigator triangulation.

Deductive codes were defined and based on factors that constitute Ajzen's Theory of Planned Behavior (Ajzen, 1991, 2020). Ajzen's theory has been used to analyze behavior in many areas, including resuscitation (Magid et al., 2021). Ajzen's theory suggests that behavioral performance depends on belief-based attitudes (in what manner does someone favor the behavior and its expected outcomes), subjective norms (in what manner does someone feel approved by others to perform the behavior), and perceived behavioral control (in what

manner does someone feel able to perform the behavior). These factors not only affect each other, but they are also affected by feedback (the influence of actual experiences on the behavior).

RESULTS

Participants

Between 1 June and 30 September 2020, the KNRM recorded five resuscitations. After excluding three non-drowning resuscitations, two remained, involving six lifeguards, who all participated. The KNBRD identified four resuscitations. After excluding one non-drowning resuscitation, three remained, involving three lifeguards, who all participated.

All nine lifeguards completed the questionnaire, and seven lifeguards participated in the interviews. Among them were two lifeguards who had jointly resuscitated the same person. Both independently completed the questionnaire and joined together during the same interview. Another four lifeguards had jointly resuscitated another person; all independently completed the questionnaire, and two joined together during the same interview.

Questionnaire

Nine lifeguards (all males, aged 25-53, three with previous resuscitation experience) filled out the questionnaire. In total, they resuscitated five people, of whom three had restoration of spontaneous circulation (ROSC) while being transported to the hospital. All lifeguards were aware of the COVID-19-adapted national resuscitation guidelines, although two lifeguards only partly understood these. No lifeguard was concerned about getting COVID-19 whilst resuscitating. One lifeguard was slightly worried about possibly infecting others after the resuscitation. COVID-19 did not cross the minds of four of the nine lifeguards during resuscitation. In comparison, three lifeguards prioritized resuscitation over the risk of becoming infected, and two lifeguards tried to lower the possibility of becoming infected by using a resuscitation mask. Another four out of the nine lifeguards performed mouth-to-mouth ventilation, of which two used a resuscitation mask. The other five did not perform mouth-to-mouth ventilation.

No lifeguard considered withholding resuscitation, nor did any lifeguard feel that bystanders had influenced the decision to resuscitate. All lifeguards would perform resuscitation in the same way as they do now during a future pandemic. The lifeguards estimated the percentage of successful resuscitation, or ROSC, to be between 5% and 65%, whereas no lifeguard could estimate the chance of becoming infected during mouth-to-mouth resuscitation. None of them knew that the adapted guidelines (NRR, 2020) mentioned that the possibility of infection during mouth-to-mouth is almost 100%. Before the resuscitation, no lifeguard participating in this study had been infected by COVID-19. No lifeguard reported to be infected by COVID-19 after the resuscitation.

Interviews

Seven lifeguards participated in the first (n = 4) and second (n = 3) interviews. Two lifeguards stated at the beginning that they were able to complete the questionnaire but would not participate in the interview due to other assignments at the time. The seven lifeguards resuscitated five people, of whom three had ROSC during transport to the hospital. The interviews provided information about the four factors of Ajzen's (1991, 2020) Theory of Planned Behavior (attitudes, subjective norms, perceived control, and feedback), examples of this information are presented in Table 1.

Regarding attitudes, lifeguards prioritized the victim's survival over the risk of COVID-19 infection. They focused entirely on the drowning victim and had no hesitation performing close-contact actions like ventilation. Regarding subjective norms, lifeguards felt supported at the scene. Police and bystanders made way, ensuring space for resuscitation. The lifeguards also believed that colleagues and emergency responders prioritized survival over infection risks.

Regarding perceived behavioral control, lifeguards relied on pre-pandemic training, believing it was correct. Three did not wear protective equipment and were later reminded by colleagues, but felt no regret. Regarding feedback, lifeguards did not feel that their experiences

Attitudes	**Quotes**
The chances of survival for the drowning victims needed to be as high as possible.	"My feeling has also been that we have simply done everything we can to give that lady the best chance of survival. And we are not at all hindered by a possible infection." (lifeguard 4) "You are doing your thing and corona or not, it does not matter that much. You have a goal, and you go for it 100%" (lifeguard 5)
The life-endangered situation of a drowning victim had a higher priority than a possible COVID-19 infection.	"And I have to say that just focusing on helping the victim at that moment had a much higher priority for me than a possible infection of COVID" (lifeguard 2) "Look, if you are sitting around a victim with 4 people, then you are certainly not 1.5 meters apart. But in this setting you are not very concerned with that. You actually have other priorities at that moment." (lifeguard 2)
Subjective norms	**Quotes**
Other people allowed lifeguards to perform resuscitation.	"When we went to the beach, the bystander actually ran away. A sort of startle response, like 'Oh, oh, it is happening here'. Yes, that is how I interpreted it. And then more bystanders actually went further away. Yes, that is how it looked to me, but I was not hindered by it at all." (lifeguard 1) "That workspace was so big that I was not bothered by it. We had our own little world where we were occupied with that man and everything around it was regulated by others who were not resuscitating, who kept people at bay." (lifeguard 7)
Other people prioritized the situation of the drowning victim above the COVID-19 pandemic.	"I think indeed, in line with what [lifeguard 2] also indicates, that the whole atmosphere that hung there a bit at that moment, was actually that everybody really went all out for the care of the victim." (lifeguard 3) "I can still remember that the police and ambulance wore masks, but that they did not let themselves be hindered at all by the 1.5 meters. That they also went all out for the survival of the person." (lifeguard 4)
Perceived behavioral control	**Quotes**
Resuscitations were made possible by adhering to the training that the lifeguards had received.	"Yes, then it goes on autopilot, and you do the actions as you learned them in the training." (lifeguard 4) "Somehow you are so trained and programmed that you just follow a standard procedure." (lifeguard 6)
Feedback	**Quotes**
Future resuscitations during the COVID-19 pandemic would be handled similarly.	"I would act in the same way as how we have acted now. I think that how the care has been delivered, I think it has been in a desirable way and in the best possible way. I think I would approach it [the resuscitation] in the same way." (lifeguard 3) "But I think that the moment I get beeped again or receive another notification and I am in the same situation, I will probably do the same thing again. And I can already tell you that I am going to think about putting on a mouth mask and putting on gloves and God knows what, but then I would be lying to you." (lifeguard 5)

Table 1 Examples of the most informative responses during the interviews.

with resuscitation would influence their behavior regarding resuscitation in the future.

DISCUSSION

This is, as far as we know, the first and only study that explores adherence to adapted resuscitation guidelines in the resuscitation of drowning victims during the COVID-19 pandemic. All lifeguards knew about the new guidelines, although two partly understood them. However, the results demonstrate that the lifeguards did not adjust their resuscitation techniques. Instead, they acted as they were trained before the COVID-19 adapted

guidelines. This outcome aligns with previous research on adherence to adapted COVID-19 protocols among pre-hospital healthcare providers in Germany (Jansen et al., 2023). All lifeguards in our study prioritized the outcomes of the people requiring resuscitation, and they were prepared to act in the same ways in similar future resuscitations. At the same time, the lifeguards were unable to balance the potential risks of obtaining an infection during a resuscitation against the possibility of a good outcome from resuscitation.

None of the lifeguards were concerned about getting COVID-19 whilst resuscitating. This observation warrants further investigation. Although the fear of COVID-19 transmission during CPR is addressed in guidelines, such as *Advies NRR: OHCA & COVID-19* (NRR, 2020), lifeguard attitudes and actions regarding disease transmission have hardly been explored in a research setting. Chong et al. (2021) found that 33.4% of Taiwanese healthcare providers had negative attitudes toward CPR during the COVID-19 pandemic. No lifeguard in our study reported to be infected by COVID-19. However, formal testing for coronavirus was limited at the time of the resuscitations.

During the first wave of the pandemic, national and international resuscitation and first aid organizations quickly responded by informing their members about adapted guidelines that recommended the usage of personal protective equipment like gloves and face masks. Other recommendations included the avoidance of mouth-to-mouth ventilation, the usage of bag-mask devices with High Efficiency Particulate Air (HEPA) filters, and the coverage of the victim's mouth and nose with a facemask or cloth/towel before performing chest compressions and defibrillation to reduce the risk of spreading the virus during chest compressions (Nolan et al., 2020; NRR, 2020). The adapted resuscitation guidelines aimed to reduce the risks of infection by droplets and airborne transmission (Craig et al., 2020; Nolan et al., 2020; Perkins et al., 2020). Several studies showed that fewer bystander resuscitations were performed during the pandemic (Baert et al., 2020; Baldi, et al., 2020a; Baldi, et al., 2020b; Grunau et al., 2020; Lim et al., 2021; Marijon et al., 2020; Rosell Ortiz et al., 2020). There was also a lower frequency and a worse outcome of resuscitations performed by emergency medical teams (Baert et al., 2020; Baldi, et al., 2020a; Baldi, et al., 2020b; Chan et al., 2021; Lim et al., 2021; Marijon et al., 2020; Rosell Ortiz et al., 2020).

Our study focused on the behavior of lifeguards and found that the lifeguards did not take the suddenly COVID-19 adapted resuscitation guidelines into account during the resuscitations they performed: the lifeguards did not consider the risks of infection during the resuscitations, also were unaware of how high the risk was, and they focused on performing high-quality resuscitations as they were used to do. The selected quotes from the lifeguard interviews reflect their strong sense of duty and deep respect for helping others. This is at the expense of possibly becoming infected and infecting others. These findings correspond with other studies that found that when people know less about the risks of infection, they behave more riskily (Alsubaie et al., 2019; Temsah et al., 2020). Furthermore, in these cases, non-compliance had no consequences, so the lifeguards had no reason for concern.

We used Ajzen's theory of planned behavior to order and analyze the interview results. Ajzen's theory assumes that attitudes, subjective norms, perceived behavioral control, and feedback influence behavior (Ajzen, 1991, 2020). We found that all these factors influenced resuscitation. This aligns with previous research, which showed that attitude and subjective norms play a major role in bystander resuscitation (Magid et al., 2021).

Several studies (Franklin & Pearn 2011; Lawes et al., 2020) demonstrate that people are willing to risk their own lives to save someone from drowning. The finding that lifeguards did not follow the suddenly adapted national resuscitation guidelines, developed to minimize the risk of becoming infected by a virus, is not completely surprising compared to this. Changing behavior during a crisis is difficult; simply instructing people does not ensure compliance.

Implications for Theory, Policy, and Practice

The permanent shifting nature of public health requirements during the COVID-19 pandemic made

it challenging to encourage people to help one another. Lifeguards performing resuscitation during the pandemic faced multiple challenges, including duties to the victim, themselves, bystanders, colleagues, and society (Queiroga et al., 2022). The lifeguards in this study show deep-rooted value systems that guide their actions, including when assessing risk to themselves when helping others. During our study period, national safety rules prohibited the common resuscitation training from taking place, and this hindered learning CPR according to the COVID-19-adapted guidelines. Training and instructions were only available online. It was unclear if lifeguards knew or practiced them. One major finding of this study is that when guidelines are changed suddenly during an emergency, a parallel strategy to communicate, distribute, and implement them is required. When guidelines with new content are distributed, guidelines on how to train them should also be provided, and a feedback system should be provided to understand the acceptance and adherence. Considering this, we suggest extensive education and training according to the adapted guidelines in real-life scenarios, in order to learn and unlearn skills (Barcala-Furelos et al., 2020; Queiroga et al., 2022).

This study gives program developers and managers reason to consider how they could improve during future crisis response events. However, because the underlying mechanisms are not clear yet, we prefer to refrain from providing more detailed suggestions for practical implications.

Strengths and Limitations

The study describes a niche situation of drowning resuscitations during the COVID-19 pandemic through the eyes of a small, convenient sample of male lifeguards on Dutch beaches in 2020. A cautious interpretation regarding the generalizability and transferability of the study's findings should be considered. Nevertheless, the experiences and views of the lifeguards found in this study are relevant when lifeguards need to be informed again about sudden changes of resuscitation guidelines, for example, because of the next pandemic. The sample size could be improved in future studies on the same topic. Nevertheless, we believe that this study is a valuable first step in identifying the problem of lifeguards not taking the adapted guidelines into account in times of crisis.

The recruitment method used by the department of communication of the KNBRD may not have reached all potential participants, possibly causing selection bias. While we acknowledge this potential limitation, the Department of Communication uses a standardized and official recruitment approach, reducing the risk of inconsistent messaging or fragmented outreach. Additionally, social media promotion has helped mitigate any potential selection bias. Overall, the extensive communication during the recruitment of the participants did not provide any indication that some lifeguards were not motivated to participate in the study.

Due to time constraints, study tools were not formally validated, which may impact reliability. However, they were developed through an extensive literature review and tested for face validity by the researchers. No respondent reported difficulties with the questionnaire, and no issues emerged during interviews, suggesting minimal impact on findings.

A limitation of the interviews could be that lifeguards provided socially acceptable answers. The interviews contain many congruent beliefs and opinions. However, there were ample opportunities for every lifeguard to voice their own opinion on matters. For instance, three lifeguards were open about the fact that they did not blame themselves for not wearing gloves during the resuscitations. At the same time, the influence of peers on the recollection of the resuscitation is always possible (Lacy & Stark, 2013).

Another limitation of this study may be recall bias. Some lifeguards may not have accurately remembered what happened during the resuscitations. The optimal recall period depends on the impact of the event. Because resuscitations are regarded as major events, it is reasonable to accept a reliable recall period of a year (Bhandari & Wagner, 2006). In our study, we did not surpass this recall period. Moreover, several lifeguards were involved in the same resuscitation and could complement each other during the focus group interviews.

The restriction to using only Ajzen's Theory of Planned Behavior for the thematic analysis of the interviews may also be considered a limitation. Ajzen's theory, which is almost all relevant to intentional behavior, has, however, offered a useful analytic framework that helped answer the initial research question: lifeguards did not adhere to the adapted protocols during the COVID-19 pandemic. Now that this rather disquieting observation has been made, the next step is to try to gain a more comprehensive understanding of the underlying educational and decision-making mechanisms driving this behavior.

Exploring the behavior further, we suggest also considering Bandura's cognitive social learning theory (Bandura et al., 2001). This education-based theory suggests that learning occurs through observation, imitation, and modeling other people's behavior. All these elements had not been in place at the start of the COVID pandemic. Another education specialist, Kirschner, argues that instructional methods with minimal guidance are ineffective because they do not align with how people acquire and process new knowledge (Kirschner et al., 2006).

The behavior may also be explained by decision-making theories, notably when decisions must be made under high pressure. Such theoretical models may include the recognition-primed decision (RPD) theory (Klein, 1993, 2008). This model offers insight into how experienced professionals make rapid decisions based on pattern recognition from earlier experiences and do not apply a new decision specifically advised for an unusual emergency. Similarly, the dual-process theory distinguishes between intuitive and analytical decision-making, which may help explain deviations from established protocols under stress (Evans, 2008).

Finally, it can be questioned if the lifeguards showed intentional behavior and started automatically ("on autopilot": lifeguard 4 in Table 1) what they had been trained so often to do. Once started, there was no way back, and they had sufficient reasons not to regret their action. These, and maybe other theories, could help explain why lifeguards did not act according to the adapted COVID-19 resuscitation protocols. Additional qualitative studies are needed to determine whether their behavior fits in with some of these theories.

The study contains methodological strengths. It contains method triangulation, data source triangulation, and investigator triangulation, which enhance the validity and credibility of the study findings (Patton, 1999). The data of the questionnaire and interviews, which were collected at different times by multiple researchers and analyzed by multiple researchers, are largely consistent.

CONCLUSION

The study found that lifeguards in the Netherlands did not follow newly adapted resuscitation guidelines during COVID-19 pandemic's first wave. More investigation on the causes of this behavior is needed to help training organizations understand how to implement changing guidelines effectively during crises. The study recognizes the importance of education in such situations.

DATA ACCESSIBILITY

- **Supplementary file 1: Appendix.** Adapted protocol April 2020. https://doi.org/10.25894/ijfae.2753.s1
- **Supplementary file 2: Appendix.** English translation of the questionnaire and interview questions. https://doi.org/10.25894/ijfae.2753.s2

If there is interest in the original raw data from the questionnaire and interviews, these data, in Dutch, are available upon request from the authors.

ETHICS AND CONSENT

The study was approved by the Medical Research Ethics Committee of the Erasmus MC (MEC-2021-0308). All participants were informed about the aim and methods of the study, and they could withdraw from participating in the study at any moment. Written consent was obtained from each participant. The study was conducted in accordance with the Standards for Reporting Qualitative Research (SRQR) guidelines (O'Brien et al., 2014).

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COMPETING INTERESTS

JB is a consulting governor of the Royal Society to rescue people from drowning, founded in 1767, medical advisor of the Royal Netherlands Sea Rescue Institution (KNRM), and international representative of Royal Dutch Lifesaving Association (KNBRD). The other authors have no conflict of interest to declare.

AUTHOR CONTRIBUTIONS

JB, NM, and AJ conceptualized the study designs and methodologies. NM performed and analyzed the questionnaire, AJ performed and analyzed the interviews, JB supervised the study. JB, NM, and AJ contributed to the article's writing and editing.

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