

# Are Nurses at Swedish Departments of Infectious Diseases Prepared to Care for Patients With African Viral Haemorrhagic Fever? - A Survey Study

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## Research Article

**Keywords:** Ebola, Haemorrhagic Fever, Personal Protective Equipment, Nursing, Nurse, survey, infectious diseases

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2 diseases prepared to care for patients with African viral  
3 haemorrhagic fever?

4 - A survey study

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## 19 ABSTRACT

20 **Background:** The African viral haemorrhagic fevers have in recent years been causing large  
21 outbreaks with high mortality rates and elevated risks of global spread. These outbreaks puts the  
22 Departments of Infectious diseases, both national and international, on high demand when caring  
23 for this patient group, in a patient- and staff-safe manner. The aim of the study was to describe  
24 nurses perceived ability and knowledge about caring for patients with suspected or verified African  
25 viral haemorrhagic fever at Departments of Infectious diseases in Sweden.

26

27 **Method:** A web survey was conducted to collect data. The results are presented through a  
28 descriptive design. Participants were registered nurses working in infectious diseases clinics; 216  
29 survey results were registered.

30

31 **Results:** Registered Nurses in Swedish Departments of Infectious diseases clinics witnessed about  
32 having limited knowledge about the African haemorrhagic fevers. They were also experiencing  
33 limited or very limited knowledge about some practical procedures, like drawing blood samples to  
34 confirm the infection. The majority of the participants had not been given theoretical education, nor  
35 had been given the opportunity to sufficiently practice using personal protective equipment at their  
36 place of work. The nurses witnessed about fear for their own safety while caring for this group of  
37 patients.

38

39 **Conclusion:** The participants perceived about fear, both limited theoretical and practical knowledge  
40 and training about caring for patients with African haemorrhagic fever, even though they had  
41 worked with infectious diseases for several years. There is a need for implementation of measures

42 to ensure the healthcare professionals' safety and to prevent them from being infected with  
43 potentially lethal infections. It also poses a risk for the patient in the absence of specific nursing care,  
44 which can lead to an increased critical disease state.

45

46 **Key words:** Ebola, Haemorrhagic Fever, Personal Protective Equipment, Nursing, Nurse, survey,  
47 infectious diseases.

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## 63 Background

64 Globalization leads to natural gains in economics and social benefits, but also demand consciousness  
65 and knowledge about its consequences [1]. In the infectious diseases healthcare, globalization is seen  
66 in various ways. Tropical diseases find their way to previously unknown territory, like Sweden, in  
67 ways through global traveling and immigration [2]. Climate change does also change the common  
68 areas for tropical pathogens spread [2].

69

70 The African viral haemorrhagic fevers are a group of diseases caused by RNA-viruses and are severe  
71 but uncommon in Europe [3]. The group includes Ebola, Marburg, Lassa fever, Crimean-Congo and  
72 Rift-Valley. The pathogens attack various cells of the body causing major damage, for example on the  
73 endothelial cells. The Ebola virus also attacks the hepatocytes and these malfunctions of the cells  
74 causes symptoms like coagulation defects [3].

75

76 World Health Organization (WHO) has stated in their guidelines for regarding personal protective  
77 equipment (PPE) that the health and wellbeing of the healthcare professionals is in the hands of the  
78 employer responsibility [4]. WHO also states that it is in the healthcare professionals' own interest and  
79 responsibility to stay informed about recent science and routines knowledge about the diseases.

80 Recommended PPE should be provided by the employer, including responsibility for educating the  
81 staff in using PPE [4].

82

83 Since the large Ebola outbreak in West Africa throughout the years of 2014 to 2016, which caused the  
84 death of more than 10 000 people [5], countries have been forced to be more prepared and create a  
85 structure on through how to cope with diseases whom are not that common but have high mortality  
86 [6]. A large outbreak of Lassa fever has been ongoing in Nigeria since 2016 and several patients has  
87 been cared for, both suspected and verified infection, in Swedish Departments of infectious diseases

88 through this outbreak [7]. WHO reports that among the group of Lassa fever infected patients are a  
89 number of caregivers included [7].

90

91 Currently, Europe is struck hard by the Covid-19 pandemic [8]. All over the world, healthcare  
92 workers struggle to get hold of PPE and other necessities to care for the patients. In Europe, Sweden  
93 was one of the countries who hospitalized and cared for a lot of patients diagnosed with Covid-19 [8].  
94 WHO stated that employers and managers in health care are responsible of making sure to take all  
95 measures to provide a safe and risk-free working environment [9]. The employers are also responsible  
96 of providing education and training in working with PPE – and provide for this equipment [9]. The  
97 responsibilities for both employers and employees are similar, both regarding the Covid-19 and the  
98 African Haemorrhagic fevers [4].

99

100 The amount of research regarding Swedish nurses working at Swedish Departments of infectious  
101 diseases and their knowledge and experiences regarding caring for patients with either suspected or  
102 confirmed African viral haemorrhagic fever, is non existing known to the authors. International  
103 studies have shown that there are shortcomings concerning the caring for this group of patients [10,  
104 11]. To conclude, the health care professionals globally witness about having an insufficient level of  
105 knowledge about the diseases and there is uncertainty about how to build caring structures around  
106 these patients. As shown by earlier studies, there is a need for clear guidelines and procedures and  
107 higher level of knowledge about the diseases amongst the healthcare professionals [10, 11].

108

## 109 **Methods**

110 The aim of this study was to describe the Swedish nurses perceived ability and knowledge about caring for  
111 patients with suspected or verified African viral haemorrhagic fever at Departments of Infectious diseases  
112 in Sweden.

## 113 Design

114 The study was conducted as a quantitative study with a deductive approach. This was an opportunity to  
115 see if there were trends in data collection and to describe the extent to which the various phenomena  
116 occurred, for example routines and training opportunities. The web survey was chosen as method of  
117 data collection. The method, which has the advantage to reach a larger population, is self-  
118 administered and the participants are also given the possibility to remain completely anonymous [12].

119

## 120 Participants

121 Eligible participants were all nurses employed within Departments of Infectious diseases in Sweden.  
122 The inclusion criteria for the participants was that they were registered nurses (RN) and worked at the  
123 Departments of Infectious diseases clinics, both in- and outpatient departments. In Sweden there are  
124 28 Departments of Infectious diseases, 26 of them met the inclusion criteria, which was that there was  
125 a possibility that a patient with haemorrhagic fever could be admitted to the ward. Two of them were  
126 excluded, one because they were specialized in highly contagious diseases and one because they did  
127 not care for this patient group at all. Of these 26 departments, 18 Departments of Infectious diseases  
128 chose to participate. Eight departments chose to refrain from participating. In total 603 nurses were  
129 asked to participate, this was the number of nurses working in those departments. Of these 603 nurses  
130 there were 216 nurses that participated in the study.

131

## 132 Data collection

133 The study was conducted as a web survey. The data was collected between September 16 through  
134 October 21 2019. The head of the departments of the included Departments of Infectious diseases  
135 were contacted through email and were asked to forward the web survey by email to their employees.  
136 The study project plan and the aim of the study were attached in the email. The heads of the  
137 departments received reminders twice about participating in the study. They also received reminders

138 which they forwarded to the employees about answering the study. These reminders contained  
139 information about that the respondents could ignore the reminders if they had already answered the  
140 web survey.

141

#### 142 **The web survey**

143 The authors chose a web survey with closed-ended questions as the data collection method [12]. A  
144 survey in the participants' native language, Swedish, felt necessary to get as high response rate as  
145 possible. The authors could not find any pre-designed survey within the topic. Therefore, the web  
146 survey was developed by the authors themselves. To assembling a self-report instrument is  
147 challenging and the researchers had to analyse the research requirements and take into account all the  
148 details [12]. The questions were designed based on literature, the authors experiences and in  
149 collaboration with experienced colleagues. The survey was pilot tested on an expert group who have  
150 provided feedback about for example clarity and risk of bias from the authors [12]. To avoid bias is an  
151 important consideration when assembling a self-created instrument [12]. The expert group consisted  
152 of five registered nurses (RN) with varying backgrounds. The nurses included was working in intensive  
153 care, anaesthesia, surgery and infection and had varying ages, work experience and gender. The expert  
154 group's opinion was that the survey fell out well and that it was understandable. The first questions  
155 concerned demographic information and was described in a nominal scale and ratio scale. Thereafter  
156 the questions were closed survey questions in a Likert scale with a 5-point scale; "Strongly disagree,  
157 Disagree, Undecided, Agree, Strongly Agree" [12]. The survey was distributed by esMaker [13].

158

#### 159 **Data analysis**

160 The result was analysed through descriptive statistics, which was appropriate when the authors  
161 wanted to describe the participants' views on a particular situation. To describe the results of the  
162 survey, the same software was used in which the survey was designed. The software used for this  
163 study was esMaker [13]. By using esMaker, every single question has been processed and statistically

164 analysed. Demographic data is reported in nominal scale and descriptive data regarding age and work  
165 experience are described according to quota scale. The issues that described a perceived level of  
166 knowledge and security were analysed and reported according to ordinal scale [14]. Collected data has  
167 been typed in as quantitative data in numerical form [12].

168

#### 169 Ethical considerations

170 The study was conducted within Specialist Nursing Programme in Infectious Diseases Care as master  
171 degree project and approved by the Swedish red Cross University College. According to the Swedish  
172 Ethics Review Act, no further approval was needed [15]. Ethical considerations have also been taken  
173 with regard to the Helsinki Declaration [16]. The participants in this study answered the questions  
174 anonymously, which was of great value when questions regarding perceived levels of knowledge and  
175 fears were asked. This could be assured by forwarding the web survey from the head of operations or  
176 the unit. For research questionnaires that may expose participants' weaknesses, this should be  
177 addressed in a way that does not put the participants in a position of being exposed through their  
178 participation [12].

179

180 The study participants have been informed about the purpose of the study, their anonymity and that  
181 they can choose to abandon the study or cancel it if they wish. The participants of the study answered  
182 voluntarily, and the answers could not be linked to any specific individual. This is required to assure  
183 the participants anonymity when participating in the study and also ensure that their data is held  
184 confidential [12]. This has been done by using the esMaker survey program which does not register IP  
185 addresses or e-mail addresses. EsMaker encodes the participants' respective survey responses and  
186 indicates only the date and time the survey is completed. In this way, it has been impossible for the  
187 authors to be able to identify the participants. This has also meant that a written consent was not  
188 possible to obtain.

189 The research has followed the ethical considerations given for presenting a clinical research [17]. This  
190 through informing about consent, choosing a relevant subject regarding the group of participants and  
191 leading up to content that is useful for further studies and education.

192

## 193 Results

194 In total 18 Swedish Departments of Infectious diseases located throughout Sweden participated in the  
195 study. Departments from both regional- and university hospitals were included. From these  
196 departments, 216 (36 % of all nurses working at these 18 Departments of Infectious diseases)  
197 participated in the study by answering the web survey. The majority of the participants were female,  
198 90.3% (n=195) (figure 1). The largest group were in the ages between 20-30 (40.3 %, n=87), but all  
199 age groups are represented in the study (figure 2). The participants had several years of working  
200 experience in the field of infectious diseases, 32.9 % (n=71) had worked in the field for more than 10  
201 years (figure 3).

202 The result of this study show that the participants had low levels of knowledge regarding the African  
203 viral haemorrhagic fevers. They had not been given theoretical- or practical education from their  
204 employers on an adequate level and felt unsafe when caring for this group of patients. They were also  
205 concerned of their own safety while caring for patients whom may be infected by an African  
206 Haemorrhagic fever.

207 The result is presented in three categories. These categories were included; *Experienced level of*  
208 *knowledge, Conditions given by employers and Perceived personal security.*

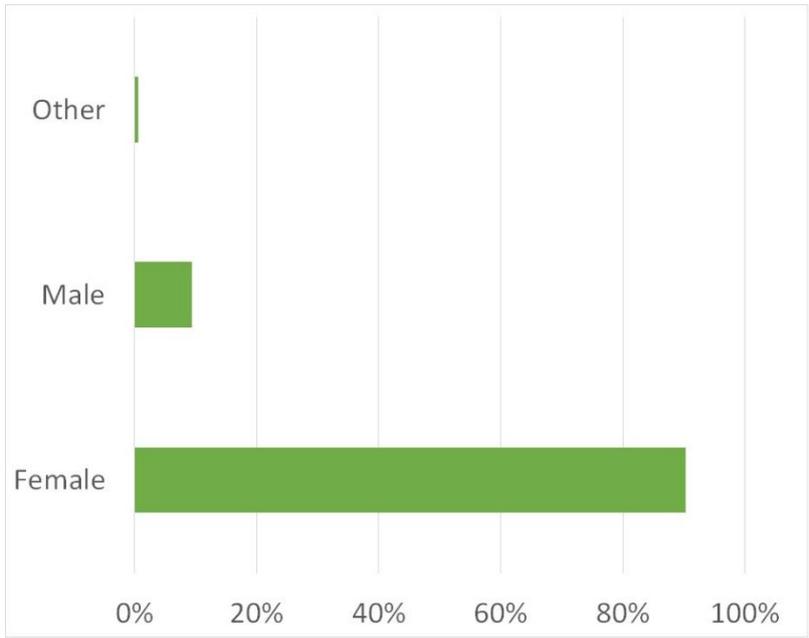
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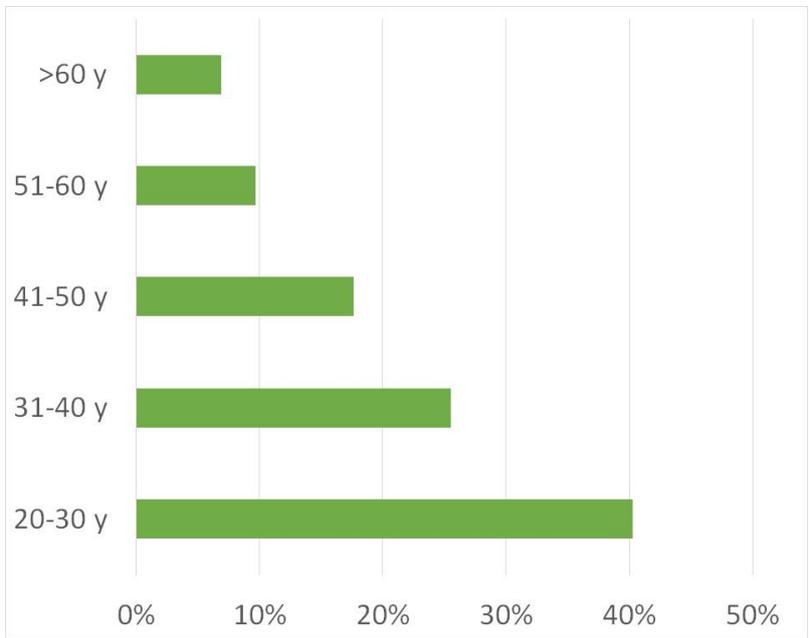
213 **Figure 1:** Demographic data: Gender of participants. (n=216)



214

215

216 **Figure 2:** Demographic data: Ages of participants. (n=216)



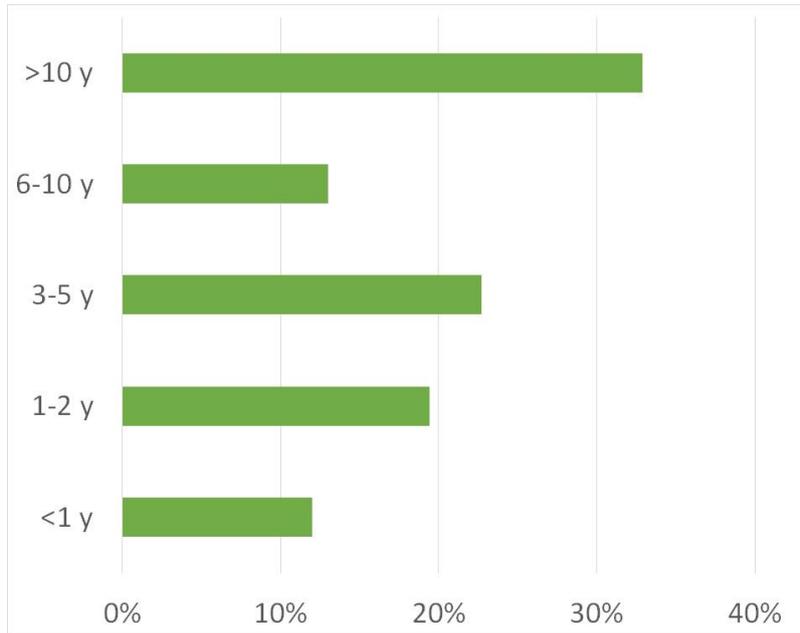
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221 **Figure 3:** Demographic data: Years of working experience in the infectious diseases field. (n=216)



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#### 224 Experienced level of knowledge

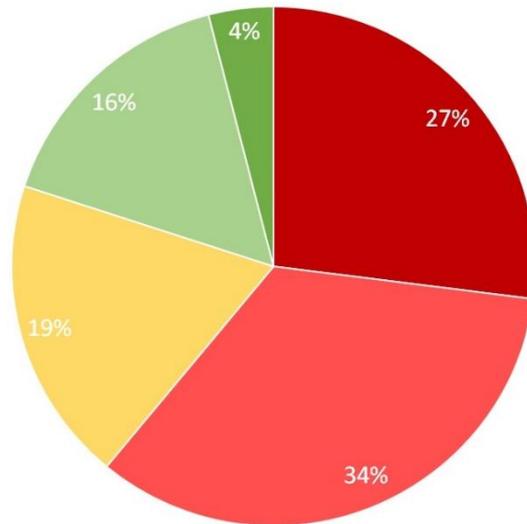
225 The dimension contained questions about the participants experienced level of knowledge regarding  
226 the African viral haemorrhagic fevers, like *“I have good knowledge about the different African viral*  
227 *haemorrhagic fevers, such as Ebola, Lassa fever, Rift-Valley fever, Crimean-Congo and Marburg”*  
228 and also more detailed questions – for example *“I have good knowledge of how the different African*  
229 *viral hemorrhagic fever, e.g. Ebola and Lassa fever, transmits”*. The questionnaire also included  
230 questions about knowledge about PPE and how to screen patients suspected carrying the viruses.

231

232 Generally, the participants graded themselves low in the Likert scale, witnessing about low degree of  
233 knowledge. The largest number of answers to the question about *“... having good knowledge about*  
234 *the different haemorrhagic fevers”*, was mostly negative (61.6 %, n=133) (figure 4).

235

236 **Figure 4:** Percentage distribution regarding the statement “I have good knowledge of the different  
237 African viral hemorrhagic fever Ebola, Lassa fever, Rift-Valley fever, Crimean-Congo and Marburg” .  
238 (n=216)



239 ■ Strongly disagree ■ Disagree ■ Undecided ■ Agree ■ Strongly Agree

240

241 About the question regarding “I have good knowledge of how the different African viral  
242 haemorrhagic fever, e.g. Ebola and Lassa fever, transmit”, the participants answers were scattered.  
243 The largest group of answers was the ones of "agree" (35.6 %, n=77) followed by participants who  
244 answered "disagree" (25.5 %, n=55) (figure 5).

245

246

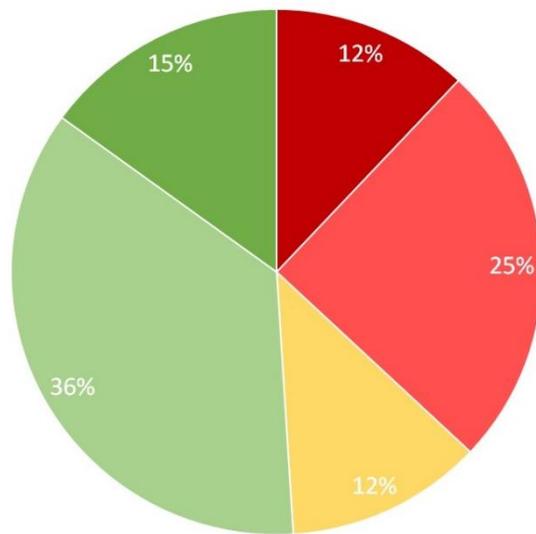
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250

251 **Figure 5:** Percentage distribution regarding the statement “I have good knowledge of how the  
252 different African viral haemorrhagic fever, e.g. Ebola and Lassa fever, transmit. ”. (n = 216)



253 ■ Strongly disagree ■ Disagree ■ Undecided ■ Agree ■ Strongly Agree

254

255 Regarding diagnosing the patients in a correct and safe way, questions with the statement for example  
256 “I have good knowledge about how to test patients regarding African viral haemorrhagic fevers”  
257 were asked. The majority stated that they “strongly disagree” (40.7 %, n=88) or “disagree” (21.3 %,  
258 n=46) to the statement (figure 6).

259

260

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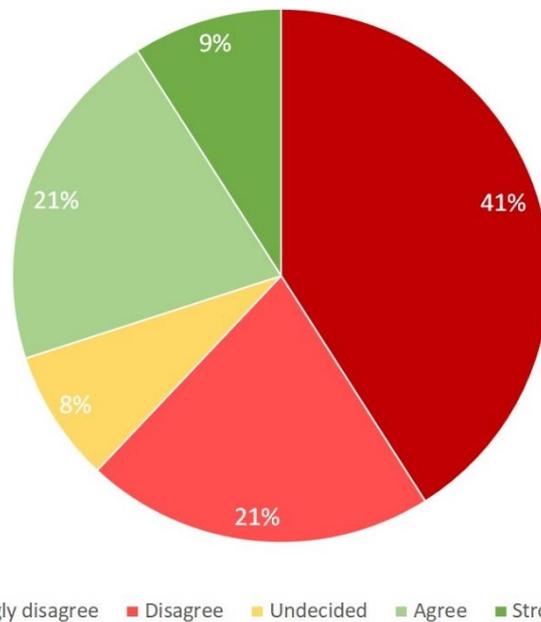
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266 **Figure 6:** Percentage distribution regarding the statement “I have good knowledge of how to test  
267 patients regarding African viral haemorrhagic fever”. (n = 216)



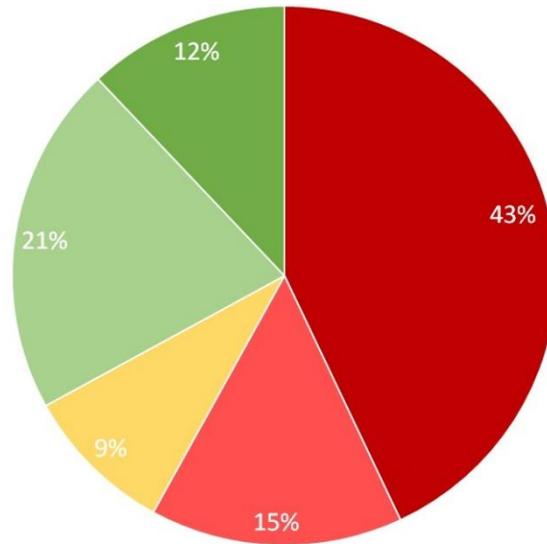
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269

270 **Conditions given by employers**

271 The web survey contained questions about how cooperative the employers were to enhance the level  
272 of knowledge about the haemorrhagic fevers among the healthcare professionals. One of the questions  
273 were regarding if the participant had been given chances to practice PPE enough to feel safe caring for  
274 patients with haemorrhagic fevers. 43.1 % (n=93), which is also the largest group of participants,  
275 answered "disagree" (figure 7). The majority of the participants has also answered negative about  
276 been given theoretical education from their employers. 7.4 % answered "strongly agree" (figure 8).

277

278 **Figure 7:** Percentage distribution regarding the statement “I have practiced PPE (personal protective  
279 equipment = protective equipment / protective clothing) enough to feel safe in caring for patients with  
280 suspected African viral hemorrhagic fever”. (n = 216)

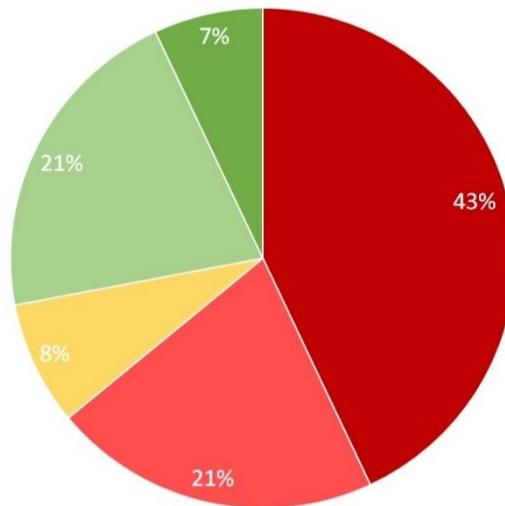


281

■ Strongly disagree ■ Disagree ■ Undecided ■ Agree ■ Strongly Agree

282

283 **Figure 8:** Percentage distribution regarding the statement *“Through my employer or other instance*  
 284 *funded by the employer, I have received theoretical training in African viral hemorrhagic fever and the*  
 285 *care of patients affected by this.”* (n = 215)



286

■ Strongly disagree ■ Disagree ■ Undecided ■ Agree ■ Strongly Agree

287

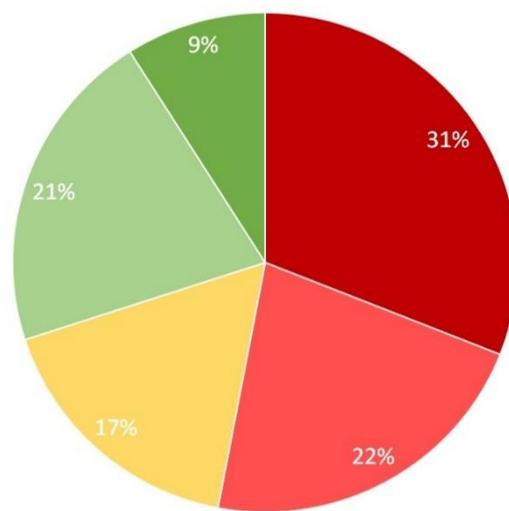
288

289 Perceived personal security

290 The web survey contained questions for the participants concerning perceived security due to caring  
291 for this group of patients. The majority of the participants' answered “strongly disagree” (31.2 %,  
292 n=67) or “disagree” (21.9 %, n=47) about the question “*I am/would feel safe about my own security if*  
293 *I care for patients with African viral haemorrhagic fever*”. Only 9.3 % (n=20) responded "strongly  
294 agree” (figure 9).

295

296 **Figure 9:** Percentage distribution regarding the statement “*I am/would feel safe about my own*  
297 *security if I care for patients with African viral haemorrhagic fever*”. (n=215)



298 ■ Strongly disagree ■ Disagree ■ Undecided ■ Agree ■ Strongly Agree

299

300 Discussion

301 The demographic data that were collected from the participants did in some ways reflect the  
302 demographics of Swedish nurses. The dividing of genders was accurate to the general nursing staff in  
303 Sweden [18]. Concerning age, 40 % of the participants were younger than 30 years, which in the  
304 general group of nurses in Sweden is 11 % [19]. This could mean that the participants had limited

305 years of working experience, but 32 % of the participants' reply practicing in the specialised field of  
306 infectious diseases for at least 10 years. 67 % of the participants had been working in the field for  
307 more than 3 years. The authors are concerned because of the fact that the nurses experienced limited  
308 knowledge concerning several topics in the web survey, even though the nurses had worked with  
309 infectious diseases for several years.

310

311 The results of this study states that nurses that perceived having inadequate theoretical- and practical  
312 practice felt insecure and had less knowledge about the haemorrhagic fevers. Almost half (45 %) of  
313 the participants responded that they did not agree, nor disagree, on the claim that they had good  
314 knowledge of the haemorrhagic fever. Similar results have previously been described, among others  
315 [10, 11]. The result is in direct contrast to the requirements that the Swedish Public Health Authority  
316 requires in preparation to maintain high infection protection, including the requirements that the  
317 Swedish Infectious Diseases Association puts on the national departments [20, 21]. The same applies  
318 to the negative responses' participants have provided regarding knowledge of sampling and packaging  
319 and transport of samples. WHO describes that the responsibility lies with each employee to seek their  
320 own knowledge of the subject and make sure that they are updated in the event of any situations in  
321 their working field [4]. The individual responsibility for knowledge in professional practice is also  
322 described in International Council of Nurses Code of Ethics [22]. This also applies to the  
323 responsibility for proper professional practice. The nurses should work grounded in evidence-based  
324 knowledge [23]. This is likely to fail according to this study.

325

326 The result showed that in some ways, the participants were not able to, even though they had  
327 extensive working experience, live up to the standards put up by WHO and International Council of  
328 Nurses (ICN) [4, 22]. The majority of the nurses who participated in the survey did not receive  
329 theoretical training on the haemorrhagic fever, nor did they practice PPE sufficiently to feel confident  
330 in their work caring for patients. Several studies has shown that it is precisely the practical training

331 combined with increased theoretical knowledge that is the foundation for being able to safely care for  
332 patients with high risk infection [10, 24, 25]. This has also been shown in other studies regarding  
333 several other nursing fields [26-29]. As a practitioner having a specific knowledge regarding a  
334 specific patient group leads to a higher clinical expectation and understanding of changes in the  
335 patient's health [30]. It also means that the observation capacity is enhanced [30]. Since almost half of  
336 the participants responded negatively to the claim that they have "... good knowledge about the  
337 haemorrhagic fevers ..." it could mean that they have difficulty reaching a higher level of nursing  
338 practice. That some experienced nurses could feel like being on a novice level can be related to  
339 Benner who described different levels from novice to expert [28]. This could occur in a clinical  
340 environment where the nursing of the patient is unfamiliar. For example, more than half of the  
341 participants of this study answered negative to the statement that they were sure of how to screen  
342 patients for African viral haemorrhagic fevers. These nurses could then be perceived as novice, even  
343 though they had several years of experience working in the nursing field [31].

344

345 This study showed that more preparation is needed to take care of patients with infectious diseases in  
346 order to feel safe in the situation as caregivers. The fact that participants experienced such insecurity  
347 about caring for this patient group was not unexpected, it has been shown numerous times in other  
348 studies [10, 11, 24]. It was shown that the nurses felt more secure through learning how to handle the  
349 risks they were exposed to through practical experiences [24]. The WHO guidelines for PPE  
350 regarding African viral haemorrhagic fever clearly describe that the employer must provide both  
351 information and education as well as materials [4]. WHO also describes that healthcare workers have the  
352 right to receive repetitive training on infection prevention and control (IPC) and PPE related to  
353 Coronavirus disease (COVID-19) outbreak [9]. Regarding clinical implementation of this matter, one  
354 possible way could be through simulation training. The use of simulation training for qualified nurses  
355 has shown that it makes it possible to give them experiences that is close to real life [29]. Simulation  
356 training for nurses gives benefits such as increased knowledge and skills and contributes to perceived  
357 readiness [29]. When comparing simulation training and standard training with cardiopulmonary

358 resuscitation (CPR) with medical students, it has been shown that simulation training is superior [32].  
359 Nursing students in a Norwegian study experienced simulation as both realistic and effective in  
360 handling anaphylaxis during vaccination [33]. Simulation develops the competence to act in a  
361 concrete situation [33] .

362

363 Even though the participants had worked with infectious diseases for several years, they felt unsafe  
364 when responding to the questionnaire regarding caring for this special group of patients. This  
365 phenomena has also been described in other studies [34]. Hunter and Cook showed in their study that  
366 the senior colleagues were important for the more unexperienced colleagues. The fact that nurses,  
367 despite long experience in a specific area, can experience themselves as novices means that they need  
368 established routines that guide them in their clinical nursing practice. The responsibility of making  
369 these routines and guidelines rest in the hands of the managemental field. These could be performed  
370 and established by specialized nurses and other experienced healthcare professionals in the Infectious  
371 diseases field.

372

373 Continuing professional education as a nurse involves learning about concrete and practical  
374 conditions in clinical situations [30]. Practical exercise with PPE to treat patients with haemorrhagic  
375 fever is a prerequisite for being able to act correctly and feel safe if such a situation occurs [30]. This  
376 can also be linked to the covid-19 pandemic which has affected the whole world [9]. This pandemic  
377 showed that many governments and healthcare institutions were not prepared for the consequences of  
378 a global spread of an infectious disease like this, neither guarantee the patients safety whilst caring for  
379 these large numbers of patients infected [9]. The large demand on PPE, necessary treatments for  
380 intensive care and biological tests created a shortage of these supplies and also illuminated challenges  
381 in a pandemic situation [8].

382

383

## 384 Limitation and strengths

385 The authors would have preferred to use a pre-designed validated survey, but since the study's  
386 research area is to a level unexplored, there are no accepted measuring instruments [12]. For this  
387 reason, the authors constructed questions that answered the purpose. The comprehensibility of the  
388 web survey was evaluated by having an expert group read and answer the actual questionnaire. The  
389 response options were designed, in addition to the demographic questions, with the response options  
390 "Strongly disagree", "Disagree", "Undecided", "Agree" and "Strongly agree". This is according to the  
391 Likert scale, which is a validated response scale where the participant indicates the degree to which  
392 they agree with a statement. However, there is a risk when the same answer alternative repeats  
393 throughout the survey that the participant's response becomes routine [12].

394 Strengths throughout the study has been the use of an expert group, who could confirm that the survey  
395 contained questions relevant and fit for the purpose [35]. The expert groups variation of experience  
396 and specific knowledge contributed to broad expertise when interpreting the questions. Also, this  
397 study is presumed to contribute to a highly current issue.

398

## 399 Conclusion

400 The participants perceived about fear, limited theoretical and practical knowledge and training about  
401 caring for patients with African haemorrhagic fever, even though they had worked with infectious  
402 diseases for several years. There is a need for implementation of measures, managerial and  
403 educational interventions to ensure the healthcare professionals' safety and to prevent them from  
404 being infected with possible lethal infections. It also poses a risk for the patient in the absence of  
405 specific nursing care, which can lead to an increased critical disease state. Future studies are needed to  
406 increase knowledge about the nursing care regarding these patients. There is also a need to study the  
407 future level of implementation of practical and theoretical education in this nursing field.

408

409 **Declaration**

410 **Ethics approval and consent to participate**

411 The study was conducted within Specialist Nursing Programme in Infectious Disease Care at the  
412 Swedish Red Cross University College and according to the Swedish Ethics Review Act, no further  
413 approval was needed [15].

414

415 **Consent for publication**

416 Not applicable.

417

418 **Availability of data and material**

419 The datasets used and/or analysed during the current study are available from the corresponding  
420 author on reasonable request.

421

422 **Competing interests**

423 The authors declare that they have no competing interests.

424

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428

429

430 Authors' contributions

431 SJB and SG developed the study concept and its design, planned the study and analyzed the data. All  
432 authors (SJB, SG and KM) contributed to drafting and revision of the article. All authors have  
433 approved the final draft of the paper.

434

435 Acknowledgements

436 Not applicable.

437

438 Authors' information

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441 Katri Manninen, RN, MSc, PhD, Karolinska University Hospital, Stockholm and Swedish Red Cross

442 University College, Huddinge, Sweden

443

444 **Abbreviations**

445 WHO = World Health Organization

446 PPE = Personal Protective Equipment

447 RN = Registered Nurse

448 ICN = International Council of Nurses

449 IPC = Infection Prevention and Control

450 CPR = Cardiopulmonary resuscitation

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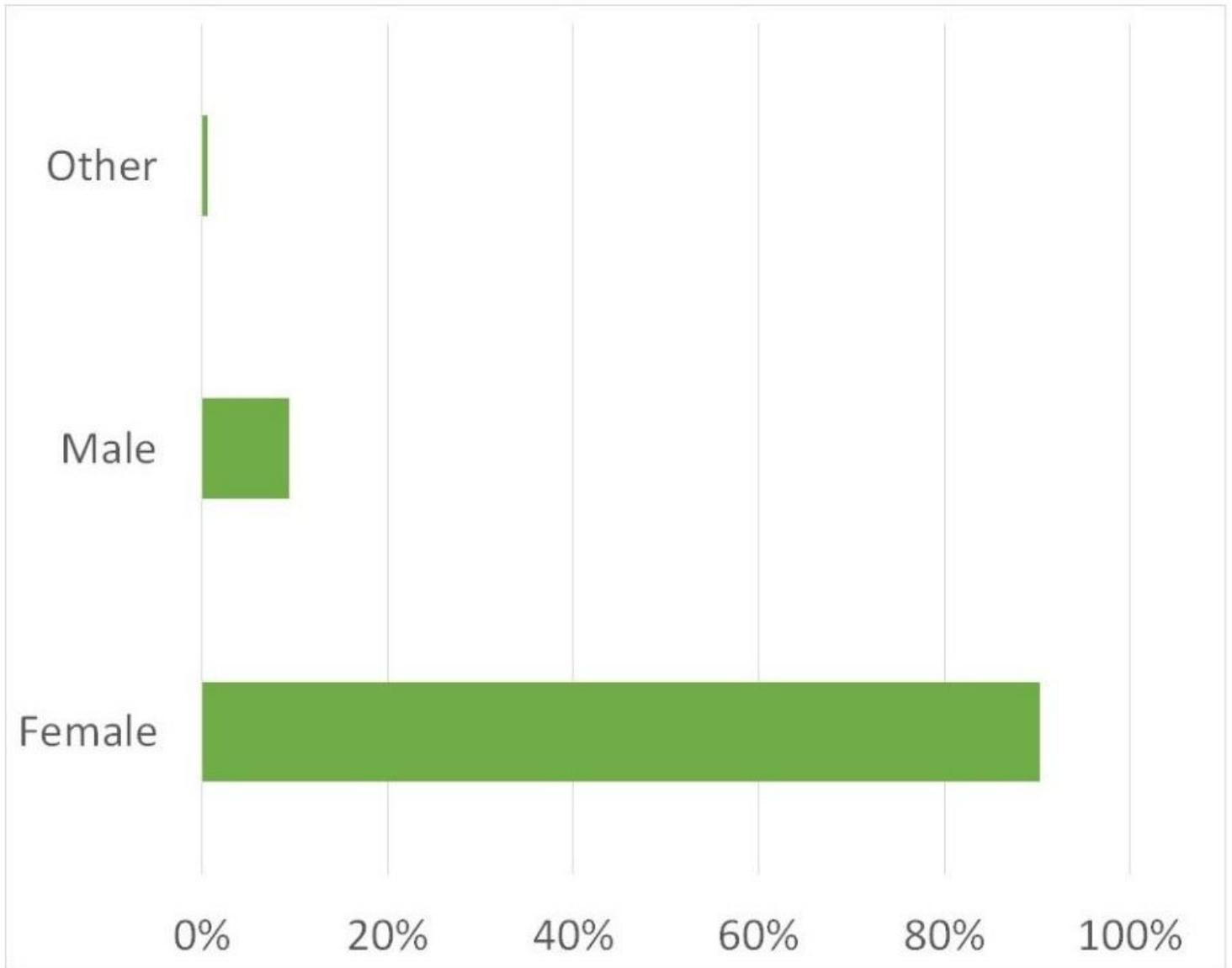
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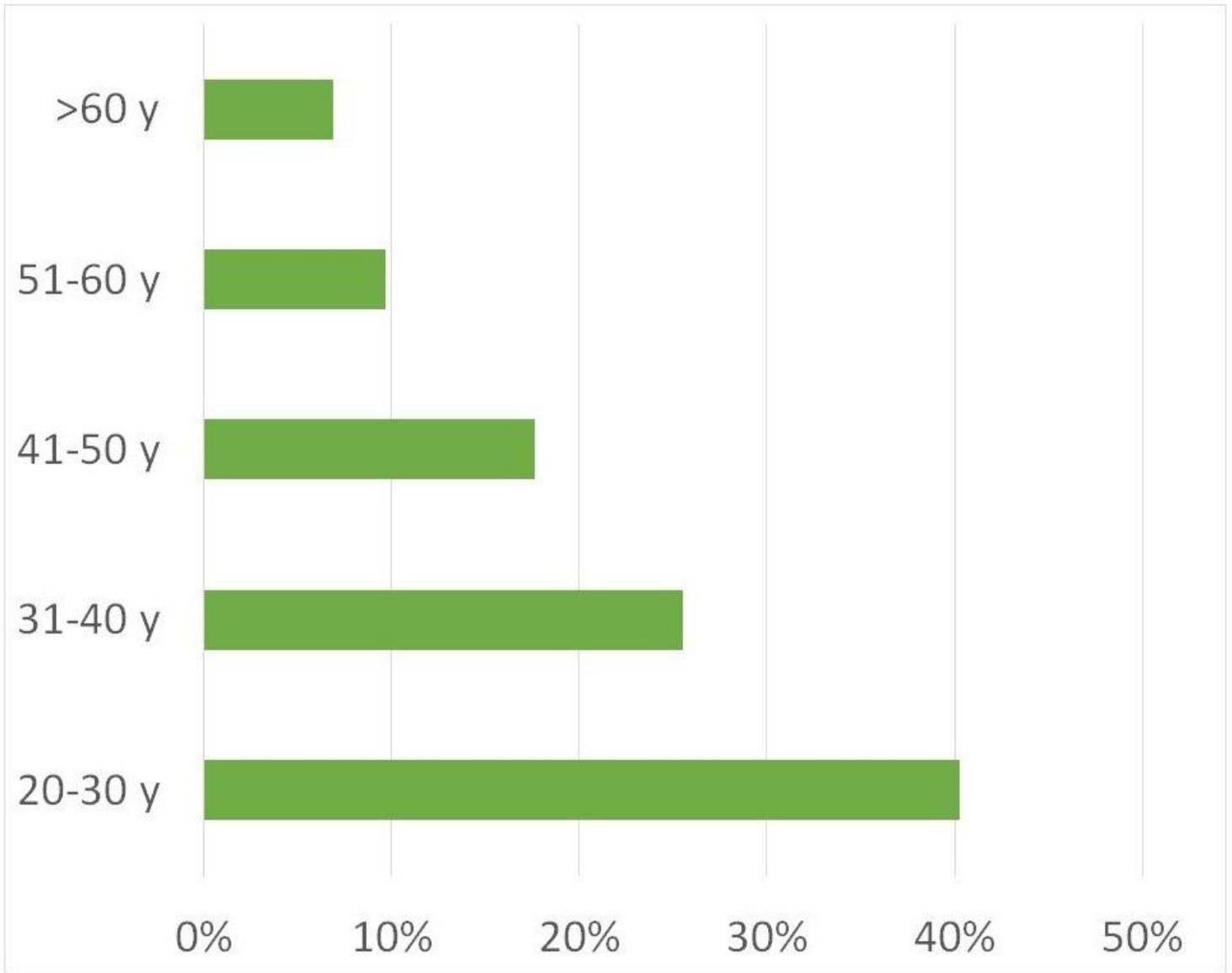
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## Figures



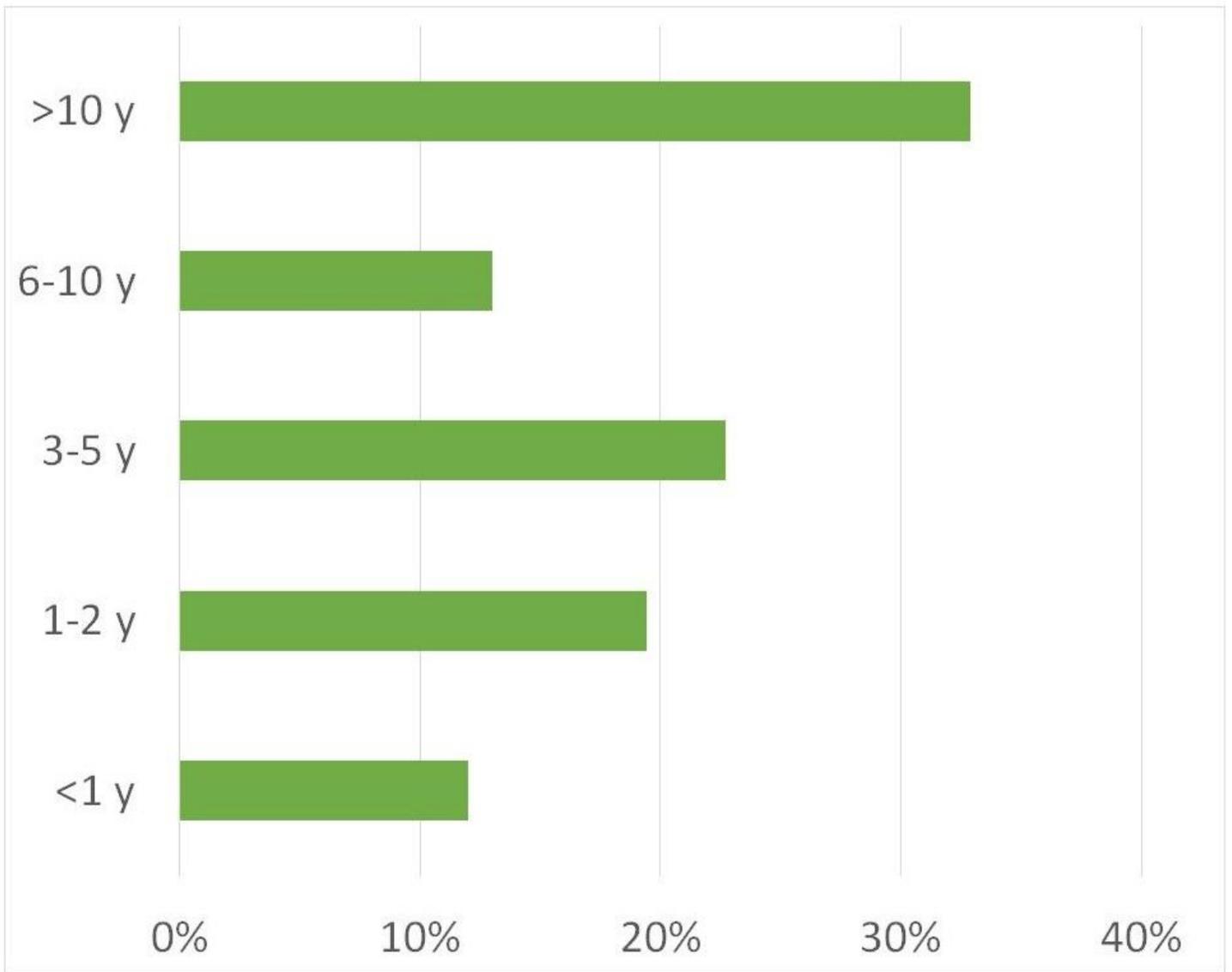
**Figure 1**

Demographic data: Gender of participants. (n=216)



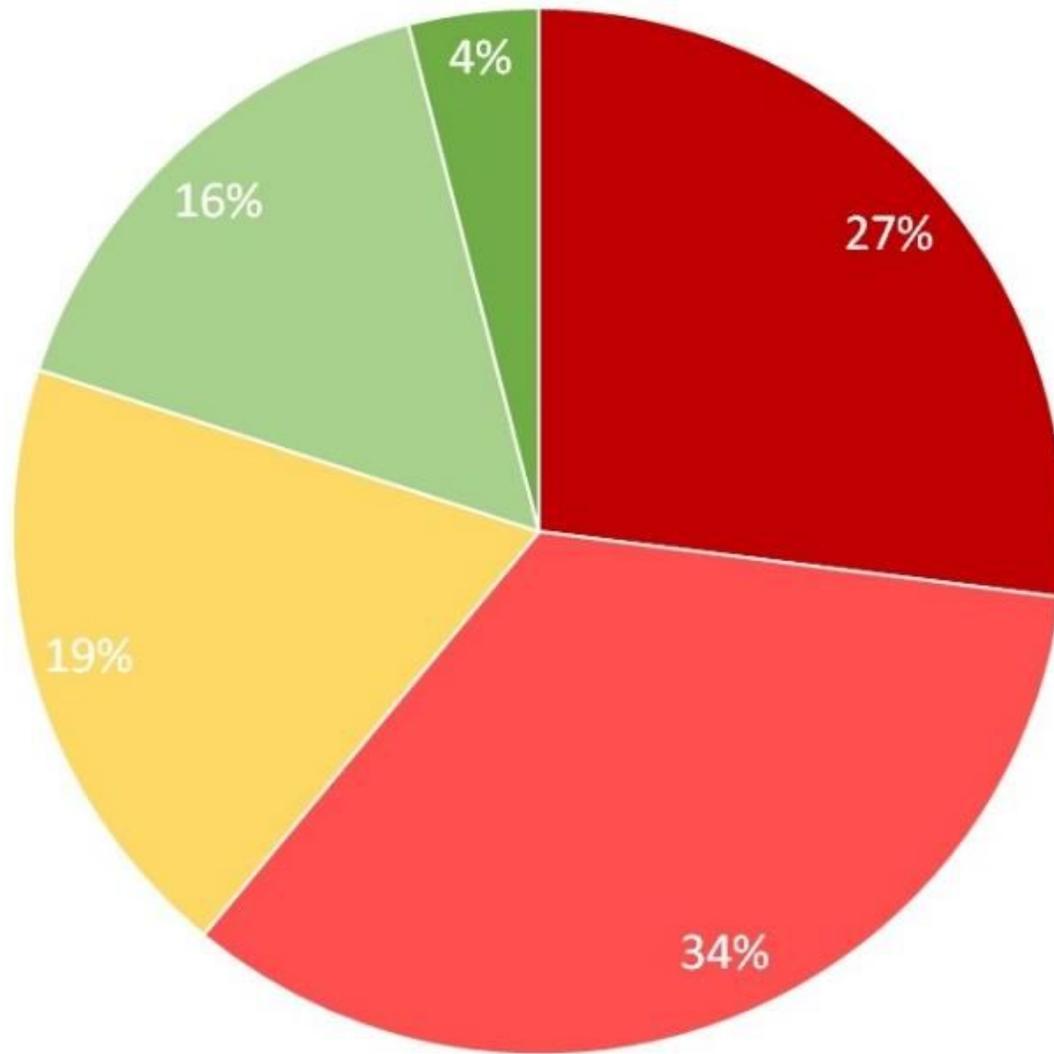
**Figure 2**

Demographic data: Ages of participants. (n=216)



**Figure 3**

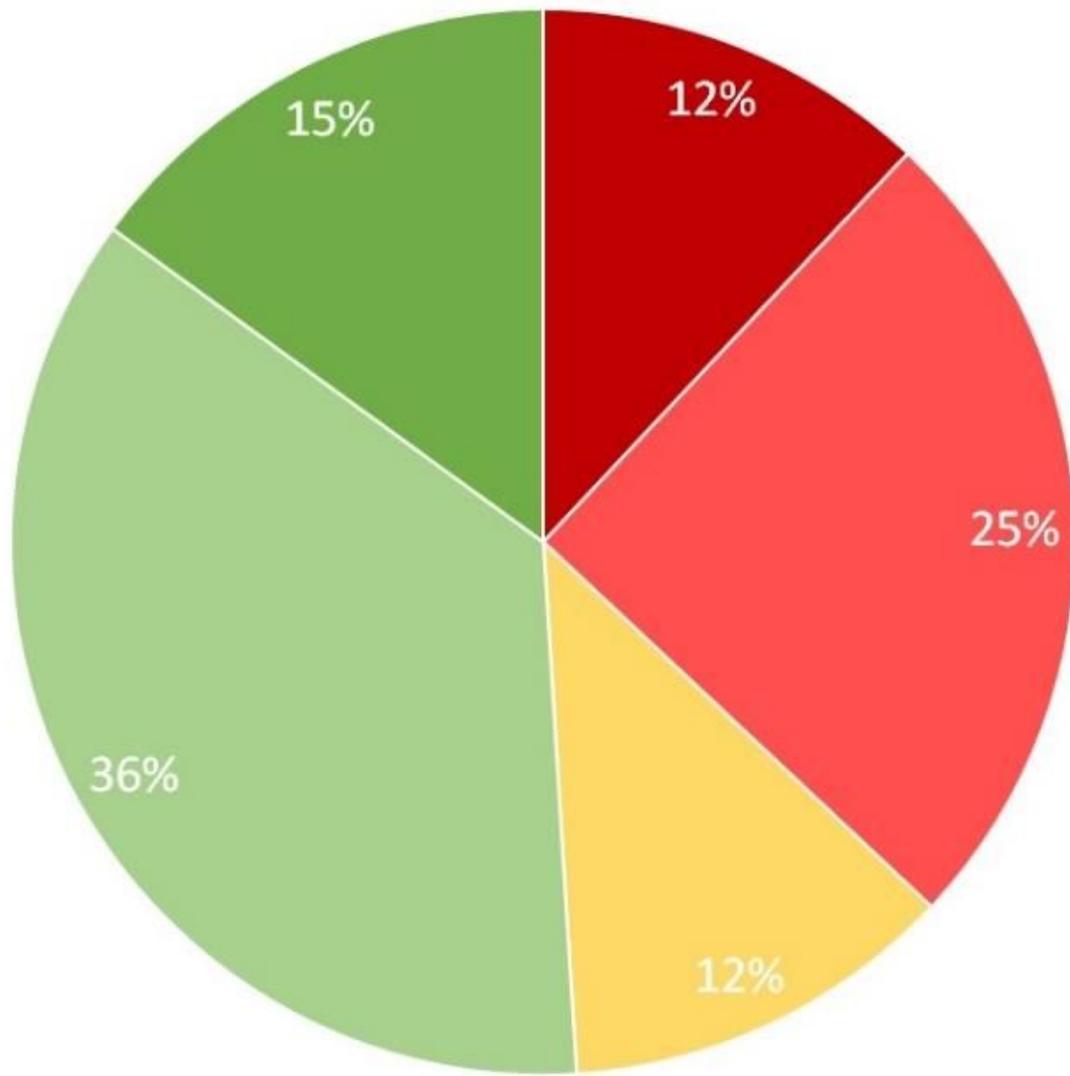
Demographic data: Years of working experience in the infectious diseases field. (n=216)



■ Strongly disagree   ■ Disagree   ■ Undecided   ■ Agree   ■ Strongly Agree

**Figure 4**

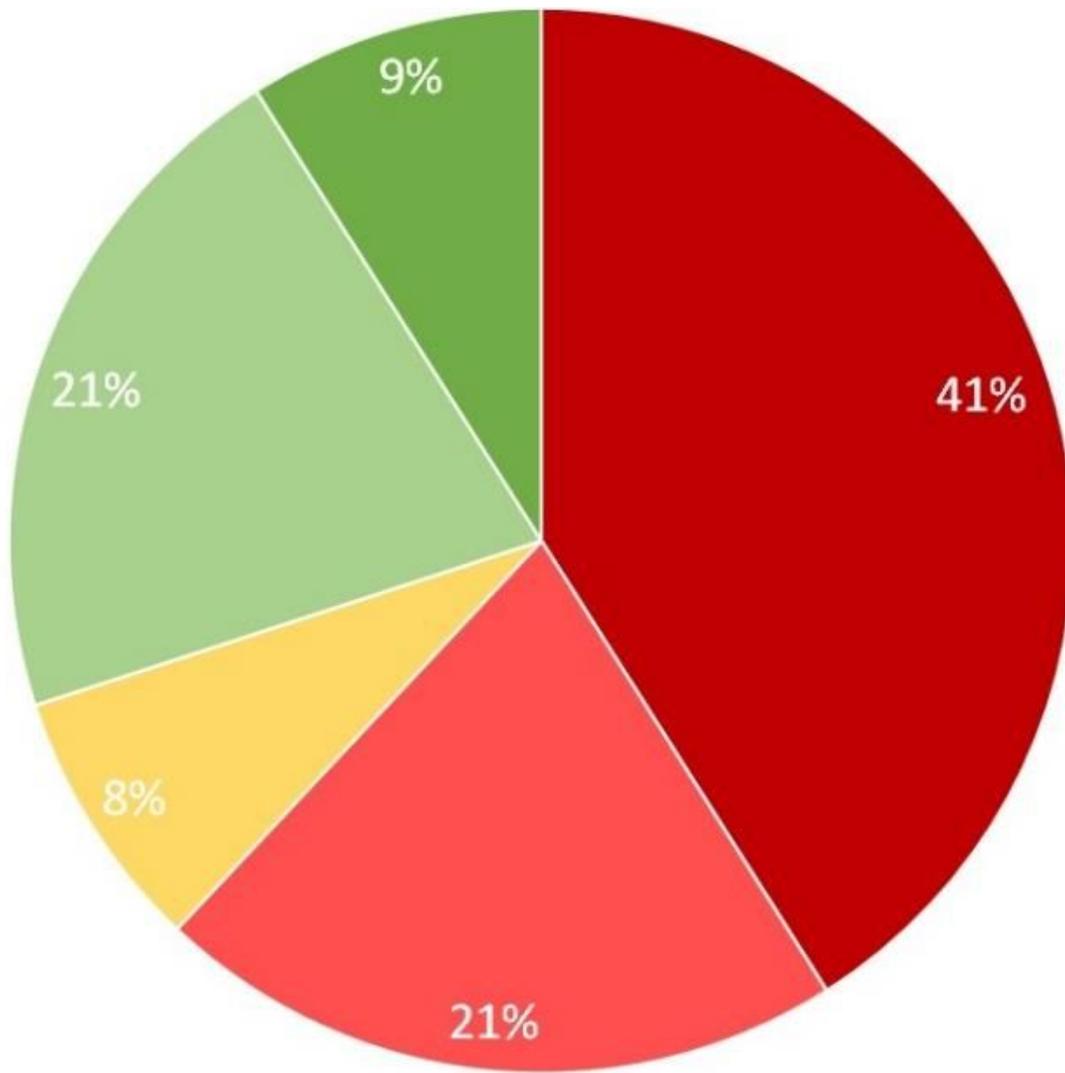
Percentage distribution regarding the statement “I have good knowledge of the different African viral hemorrhagic fever Ebola, Lassa fever, Rift-Valley fever, Crimean-Congo and Marburg” . (n=216)



■ Strongly disagree   ■ Disagree   ■ Undecided   ■ Agree   ■ Strongly Agree

**Figure 5**

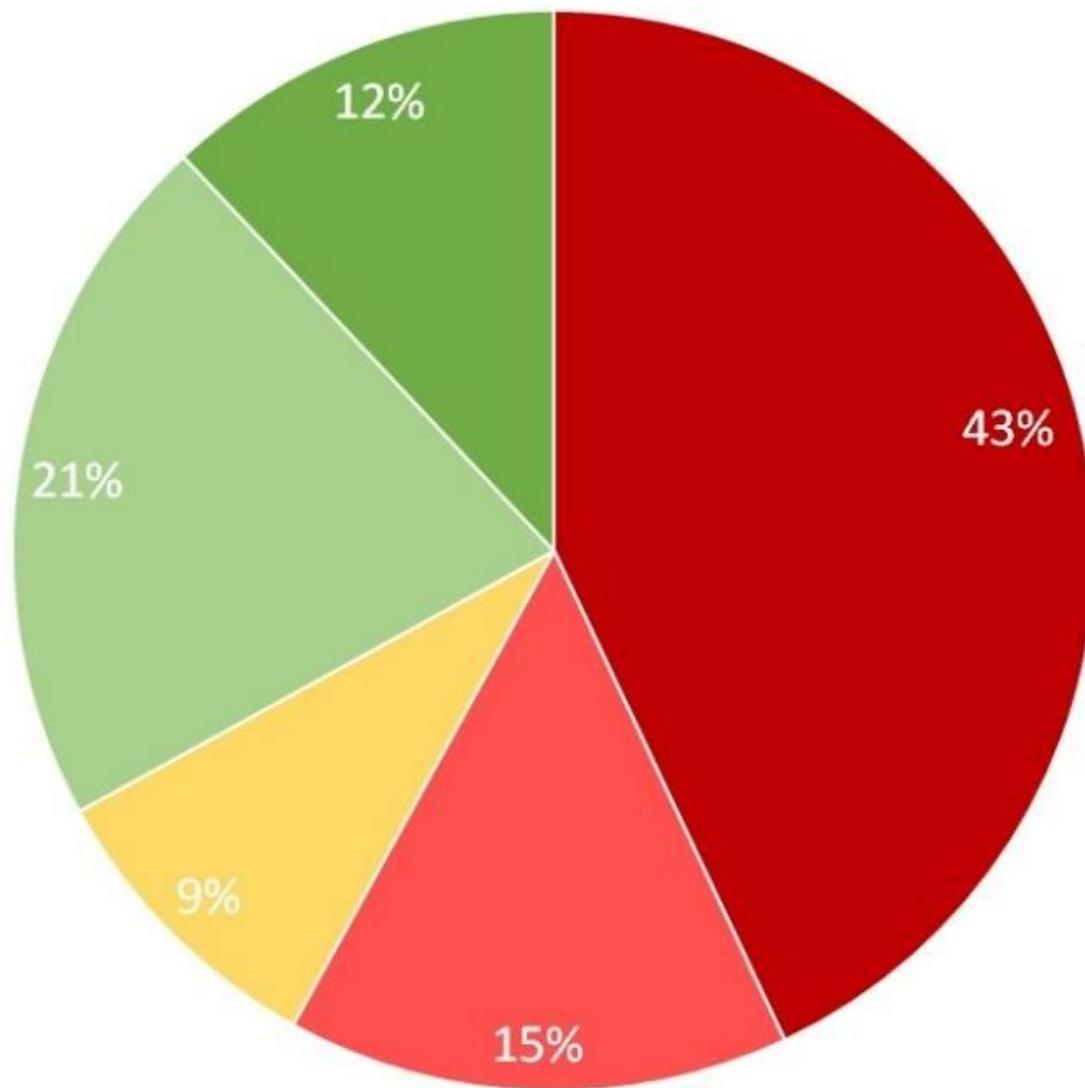
Percentage distribution regarding the statement "I have good knowledge of how the different African viral haemorrhagic fever, e.g. Ebola and Lassa fever, transmit. ". (n = 216)



■ Strongly disagree   ■ Disagree   ■ Undecided   ■ Agree   ■ Strongly Agree

**Figure 6**

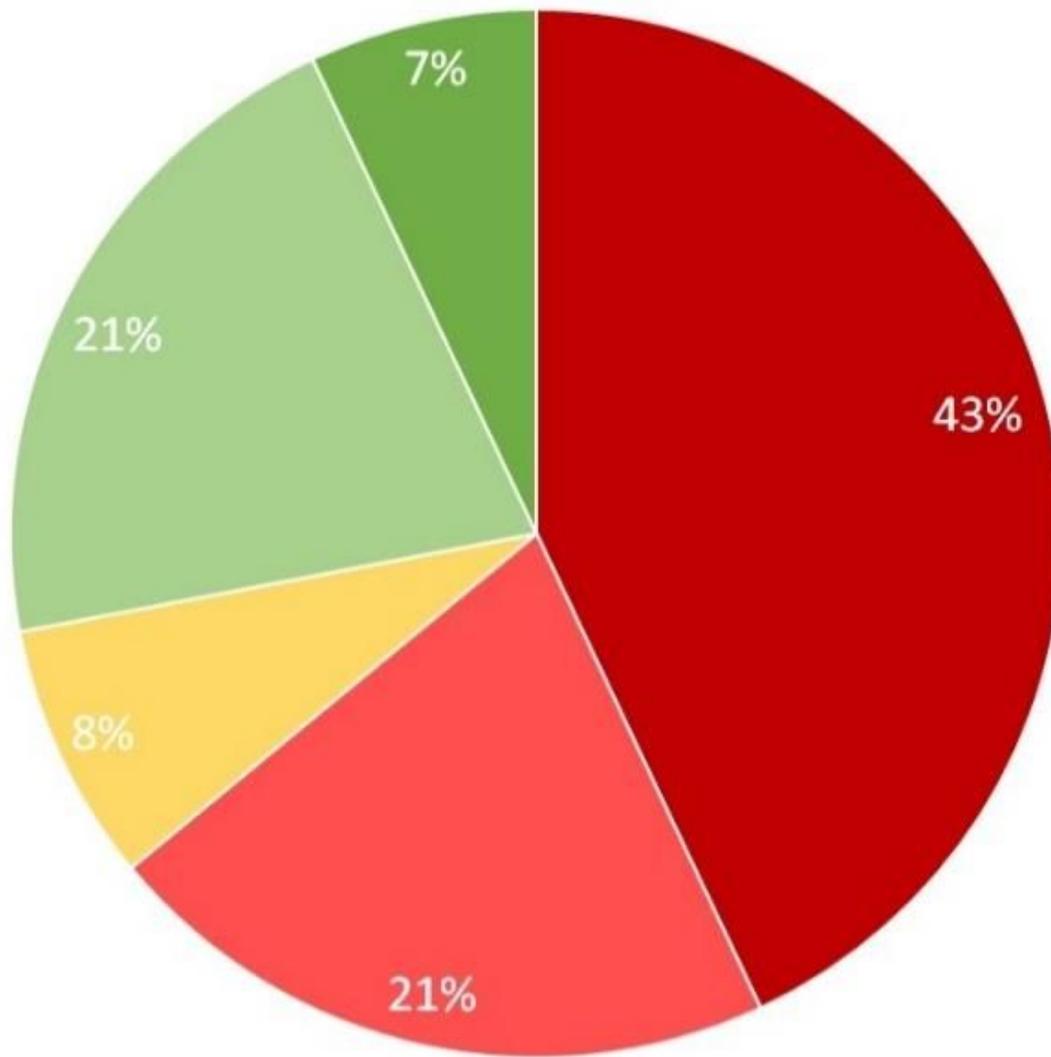
Percentage distribution regarding the statement "I have good knowledge of how to test patients regarding African viral haemorrhagic fever". (n = 216)



■ Strongly disagree ■ Disagree ■ Undecided ■ Agree ■ Strongly Agree

**Figure 7**

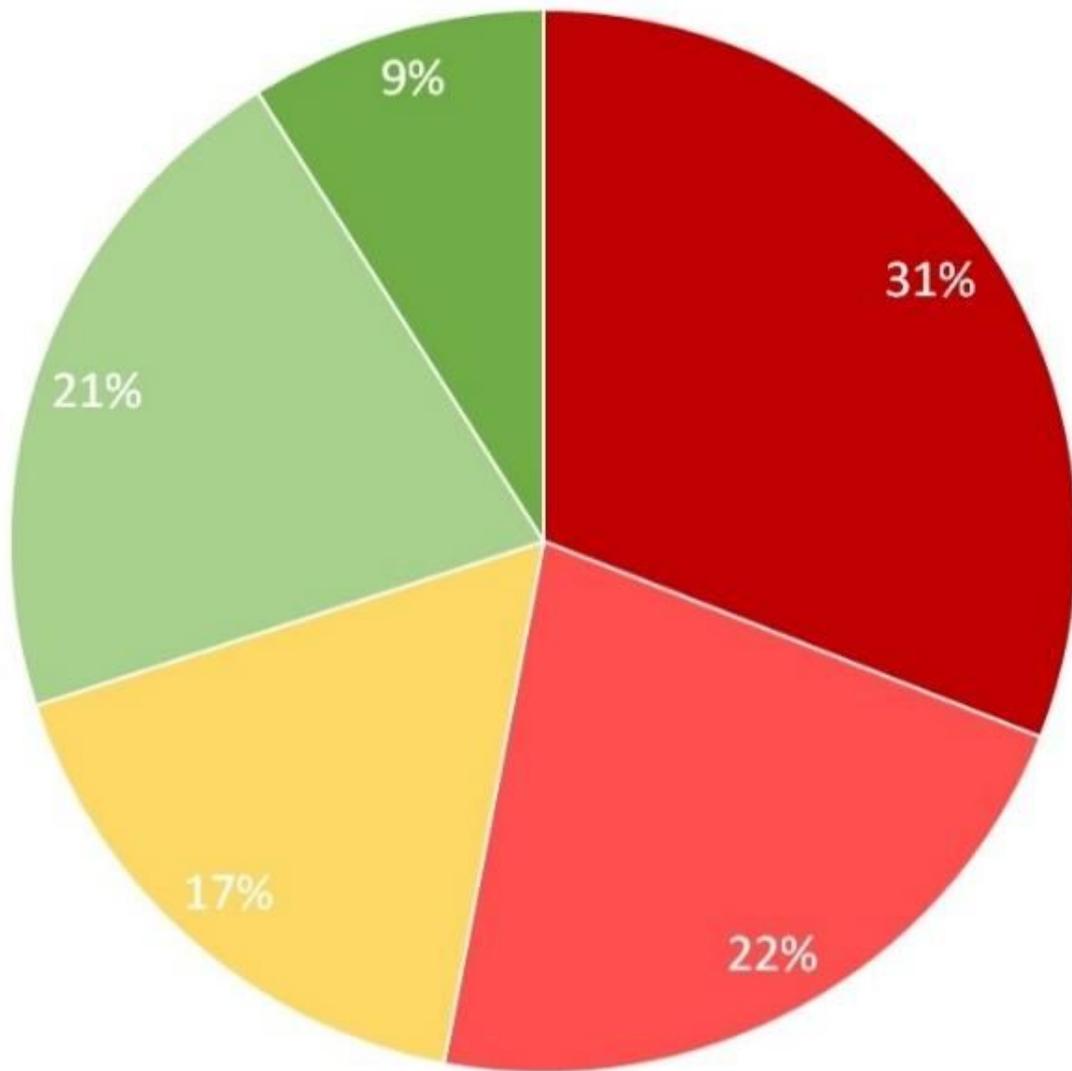
Percentage distribution regarding the statement "I have practiced PPE (personal protective equipment = protective equipment / protective clothing) enough to feel safe in caring for patients with suspected African viral hemorrhagic fever". (n = 216)



■ Strongly disagree ■ Disagree ■ Undecided ■ Agree ■ Strongly Agree

**Figure 8**

Percentage distribution regarding the statement "Through my employer or other instance funded by the employer, I have received theoretical training in African viral hemorrhagic fever and the care of patients affected by this." (n = 215)



■ Strongly disagree ■ Disagree ■ Undecided ■ Agree ■ Strongly Agree

**Figure 9**

Percentage distribution regarding the statement "I am/would feel safe about my own security if I care for patients with African viral haemorrhagic fever". (n=215)