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Brief report

# Vaccination coverage among students from a German health care college

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Health care students are at risk of acquiring and transmitting vaccine-preventable diseases. The purpose of this study was to assess their vaccination status and the influence of determining factors on their vaccination status. Unsatisfactory vaccination rates (43.8%-94.1%) and significant effects regarding age, sex, and socioeconomic status were found; therefore, there is an increased need for education and motivation for vaccinations in student training.



The consequences of the vaccine fatigue in Germany became relevant in 2013 when >1,700 cases of measles were reported (up from 167 cases in 2012).[1] Compulsory vaccinations and a countrywide vaccination register do not exist in Germany. The German Standing Committee on Vaccination is responsible for publishing vaccination recommendations for individuals with increased occupational risk; these recommendations are not compulsory for health care professionals.[2] In several studies, low vaccination rates have been detected in nursing staff[3] and students.[4-7] The training period of health care students is characterized by working closely with patients[6]; students are therefore at risk of acquiring and transmitting vaccine-preventable diseases. The purpose of this study was to assess vaccination status, attitude toward the importance of vaccinations, and influence of determining factors on the vaccination status of a sample of health care students.

## METHODS

A standardized self-administered questionnaire, which has been applied in several studies among health care students,[4,5] was used to examine students of nursing, pediatric nursing, physiotherapy, medical laboratory, technician, and midwifery in a health care college in Saxony, Germany, between January and March 2013. The questionnaire was completed voluntarily and anonymously during classes, resulting in a response rate of 100% (N = 420). Sociodemographic data, vaccination status, and attitude toward the importance of vaccinations were first analyzed in a descriptive way. According to previous studies, the influence of age, sex, educational level, smoking, alcohol, illegal drugs, and socioeconomic status (SES) on vaccination status were investigated.[3,5-8] For SES categorization, the Family Affluence Scale was used.[9] Multivariable logistic regression modeling was conducted to determine these variables independently associated with vaccination. Therefore, vaccination status was classified into "primary immunization and primary vaccination with booster vaccination" versus "do not know" and "no immunization." The level of significance was set at $P < .05$.

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**Table 1**
Characteristics of investigated health care students

| Sociodemographics | n | % |
|---|---|---|
| Age (years) | | |
| 16-18 | 104 | 24.9 |
| 19-21 | 189 | 45.2 |
| 22-24 | 88 | 21.0 |
| >24 | 37 | 8.9 |
| Sex | | |
| Male | 80 | 19.0 |
| Female | 340 | 81.0 |
| Educational level | | |
| 9th grade | 8 | 1.9 |
| 10th grade | 258 | 61.6 |
| A-levels (12th grade) | 146 | 34.8 |
| University degree | 7 | 1.7 |
| Profession | | |
| Nursing students | 298 | 71.0 |
| Physiotherapist students | 55 | 13.1 |
| Pediatric nursing students | 18 | 4.2 |
| Medical laboratory technician students | 33 | 7.9 |
| Midwifery students | 16 | 3.8 |
| Family affluence | | |
| FAS* low | 29 | 7.3 |
| FAS medium | 232 | 58.3 |
| FAS high | 137 | 34.4 |
| Substance consumption | | |
| Alcohol† | | |
| Abstinent | 106 | 25.4 |
| Harmless | 211 | 50.4 |
| Critical | 101 | 24.2 |
| Smoking | | |
| Nonsmokers | 259 | 61.8 |
| Smokers | 160 | 38.2 |
| Drug experience | | |
| No experience | 308 | 73.3 |
| Once or more than once | 112 | 26.7 |

*FAS*, Family Affluence Scale.
*The FAS is a 4-item measure of family wealth (car, bedrooms, vacations, computers) developed by the World Health Organization, where a 3-point ordinal scale was used to indicate low, middle, and high family affluence.[9]
†Classification of abstinent, harmless, and critical alcohol consumption.[10]

## RESULTS

Most of the investigated health care students (70.1%) were between 16 and 21 years of age, and most of them were women (81.0%). Most of the students (50.4%) consumed alcohol in a harmless dimension or were abstinent (25.4%). Nearly two-thirds (61.8%) were nonsmokers, and 73.3% had no experience with illegal drugs (Table 1). Most students stated that vaccinations are absolutely necessary (50.2%) or at least partly necessary (46.9%).

The highest vaccination rates were reported for hepatitis B (93.1%), tetanus (94.1%), and hepatitis A (90.1%). The results of multiple logistic regressions indicated a significant effect of age for students who were vaccinated against diphtheria, mumps, rubella, pertussis, hepatitis A, and meningococcal diseases. For all these vaccinations, except hepatitis A and meningococcal diseases, the likelihood of being vaccinated was higher among older students (22-24 years). Students aged ≥25 years were less likely to be vaccinated against hepatitis A (odds ratio [OR], 0.3; $P = .024$) and meningococcal diseases (OR, 0.3; $P = .014$) than the age reference group (16-18 years). Men were less vaccinated against diphtheria (OR, 0.6; $P = .043$), measles (OR, 0.4; $P = .002$), mumps (OR, 0.5; $P = .038$), and rubella (OR, 0.4; $P = .001$) than women. The likelihood of being vaccinated against diphtheria decreased for students with a low (OR, 0.4; $P = .027$) family affluence compared with students with high family affluence. Students with medium family affluence were less vaccinated against meningococcal diseases than those with high family affluence (OR, 0.5; $P = .006$) (Table 2).

## DISCUSSION

Strengths of the study were as follows: the outstanding response rate, the supraregional student body, and the well-established questionnaire.[4,5,7] A limitation was the self-reported vaccination status without referring to the vaccination booklet.

It should be assumed that health care students, trained in health promotion and with a sound working knowledge of preventive practices, are aware of the need for complete vaccination coverage. However, vaccination coverage was unsatisfactory, corresponding to other previously published research.[4-7] This development may be because of a reduced perception of disease incidences that have a significant influence on the willingness to get vaccinated. As a consequence, from this perception of decreased disease risks resulting from low incidences, the fear of the risks associated with vaccination becomes more relevant, which could be the main reason leading to the lack of vaccination coverage.[8] In contrast with a former study,[7] students aged 22-24 years showed significantly better vaccination coverage than younger students. However, another study conducted in German nursing students found that among younger students vaccination coverage was higher.[5] It seems likely that with increasing age during the second decade of life, the probability of not having any knowledge about personal vaccination status decreased. An explanation could be that parents of young adults hand over the responsibility for vaccinations. It is possible that the young students' (16-18 years) responsibility for their own health is not yet sufficiently developed; however, when students are in their twenties, they start adapting to their roles as adults.

The overall findings of better vaccination status among women than men were comparable with other research regarding nursing students.[5] Women might be more aware of their own health and preventive actions, such as regular medical check-ups and upcoming family planning.

An association was found between low family affluence and vaccination status. Recommended vaccinations against vaccine-preventable diseases are benefits of the mandatory health insurance service and are therefore free of charge for all insured people. Hence, for people with low SES, there may be other aspects than prevention and healthy sustainment that are more relevant. Low awareness and lack of interest in vaccination could adversely affect the vaccination behavior of this group. Therefore, close contact with families with lower SES and information about importance of vaccination coverage are recommended.

In conclusion, unsatisfactory vaccination rates among health care students were detected and should be improved. Because of the high acceptance of vaccinations, repeating and practicing knowledge could raise awareness of immunization. Health care students act as role models and should protect vulnerable patients and themselves against vaccine-preventable diseases and should increase their ability to educate patients and the general public about the importance of vaccinations.

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