Ref. Ares(2022)3508774 - 06/05/2022
Co-funded by
the Health Programme
of the European Union

Deliverable 4.3
Report on In-service vaccinology trainings-module
Test in one pilot country the developed in-service/pre-service trainings-module

Grant Agreement No.: Start Date: End Date:	801495 01/08/2018 31/03/2022
Project title	European Joint Action on Vaccination — EU-JAV
WP number Deliverable number Title	WP4 D4.3 Report on in-service vaccinology trainings-module - Test in one pilot country the developed in-service trainings-module
Responsible partner No. Organization Name E-mail address	VAZG (Vlaams Agentschap voor Zorg en Gezondheid) Universiteit Antwerpen Greet Hendrickx/ Sara Valckx/ Aurélie De Waele/ Pierre Van Damme Greet.hendrickx@uantwerpen.be
Nature R-report O-other (describe)	R
Dissemination Level **PU**-public **CO**-only for consortium members	PU
Delivery Month Planned	M
Actual Delivery Date (01/12/2021)	19/01/2022

Performed by

Name	Organisation
Greet Hendrickx	*University of Antwerp*
Sara Valckx	*University of Antwerp*
Pierre Van Damme	*University of Antwerp*
Aurélie De Waele	*University of Antwerp*
Dur-e-Nayab Waheed	*University of Antwerp*
Dirk Wildemeersch	*VAZG*
Geert TOP	*VAZG*
Solvejg Wallyn	*VAZG*
Angela Domínguez	*University of Barcelona/CIBERESP*
Diana Toledo	*University of Barcelona/CIBERESP*

Contents

Executive Summary

The Council recommendation on strengthened cooperation against vaccine-preventable diseases emphasises that: "Healthcare workers play a key role in working towards the goal of improved vaccination coverage rates. To support their efforts, they should be offered opportunities for continuous education and training on vaccination". In light of this recommendations, in a task 4.3 of the European Joint Action on vaccination (EU-JAV) aiming at piloting selected actions toward an integration into national policies, a curriculum for vaccine and vaccination education was developed and extensively tested as **a pilot**, in the Summer School on Vaccinology organised at the University of Antwerp, Belgium.
Each course was evaluated by the participants and the comments were used to update the curriculum. Overall, this training was considered as very useful and in line with the expectations of the participants.
Due to the pandemic situation it was not possible to test the curriculum in an 'in-service 'setting and instead an extra review round among all members of the Coalition of Vaccination was performed to optimize the curriculum.

The curriculum was developed on the basis of the results of a vaccine Training Barometer among health care professionals (HCP) and a survey among health care students.

The **Vaccine Training Barometer** was developed for in-service HCPs as an online survey To It question the need for training on vaccination, to collect information about their education on vaccination and to assess their attitudes towards vaccination. Furthermore the survey allowed to collected circulating misinformation/myths as well as questions that HCPs received but could not answer. The Vaccine Training Barometer was pilot tested twice in Flanders (Belgium) and once in Spain. From the responses, it was concluded that in both countries there is a need for training since only a third of HCPs felt confident to answer questions on vaccines they get and the vast majority of the surveyed HCPs indicated that they were willing to follow extra courses.

Since health **students** (medical as well as para-medical) are the future vaccinators, it was important to evaluate the attention given to vaccinology in their education, their attitudes towards vaccination and their confidence to answer questions about vaccination. Thanks to the collaboration with the student organisations represented in the Coalition for Vaccination, the response of more than 3500 students could be analysed. These results supported the notion that improved education on vaccination in the different (para) medical courses is needed to better support the role of future HCPs in vaccination programs.

Based on the input of these different surveys, it became clear that an optimal in-service and pre-service training in immunization is needed and would be appreciated by HCPs. Therefore an **all-inclusive curriculum vaccines and vaccination** has been created, that is suitable for all types of HCPs that are involved in the vaccination process, as well as future HCPs (health students following their standard education). In this curriculum all different topics are divided in 8 different modules with their specific learning outcomes: 1. Rationale, context and history of immunization, 2. Immunology/ immunopathology, 3. Key aspects vaccine safety, development, quality, 4. Vaccine preventable diseases, 5. Immunization policies and schedule, 6. Future perspectives, 7. Understanding, active listening and communication about vaccines and 8. Practical skills

Finally, as all this deliverables, the Vaccine Training Barometer, the Students' survey and, above all, the Curriculum on Vaccine and Vaccination can be easily translated in other European languages, they represent valuable tools for monitoring and measuring the need for training of HCPs' involved in vaccines delivery, as such can be sustained and integrated into national vaccine policies.

Pilot study of the curriculum in vaccinology

Context of the pilot study and information on the development of the Curriculum

This report presents the results of the work carried out as part of the European Joint Action on Vaccination (EU-JAV) Work Package 4 (Integration in National Policies and Sustainability). One of the key objectives of Work Package 4 was 'to implement pilot actions to explore the feasibility of joint undertakings on vaccine-related issues'.

One of these pilot actions (Task 4.3.1) aims at a "Sustainable EU vaccination through pre- and in-service educational activities in medical and paramedical curricula on vaccines and vaccination programs in Europe".

First, In order to measure the need for in-service training of HealthCare Professionals (HCPs), **the EU JAV Vaccine Training Barometer** was developed, and is presented in **Part 1.** The barometer is both a survey designed to question the need of HCPs for training on vaccination and a tool to collect questions that HCPs received but could not answer, and misconceptions/myths about vaccines they encountered. The idea is that the survey will be performed at regular points in time on a representative number of HCPs. This work was conducted in the sub-task 4.3.1.1 entitled "assess the need for in-service training of heath care professional in all Member States".

Second, Since HPC indicate that their knowledge on vaccine and vaccinology is often based on the information they received during their health education an EU JAV Student Survey was developed in order to investigate the attention given to vaccinology in the curriculum of (para-) medical students, and their confidence to answer questions on vaccination. Based on results from the survey, sustainable guidelines for learning outcomes and a work plan for an all-inclusive **immunization course or module for students** were developed, presented in **Part 2**. This work was done in the sub-task 4.3.1.3 entitled "Sustainable guidelines for learning outcomes and the work plan of an immunization course or module in the pre-service training of future HCP".

Additionally, based on the results of the two previous tasks, it has become clear that an optimal in-service training in immunization is needed for HCPs. Therefore, a curriculum for a modular and adaptable in-service training was drafted to meet the educational requirements of HCPs, presented in **Part 3**. This work was done in the sub-task 4.3.1.2 entitled "Develop criteria and evaluation tools for optimal in-service training in immunization". **This training module was supposed to be field-tested by professional medical organisations. Due to the COVID 19 pandemic, with all travel and contact restrictions but also because health care providers were very occupied in this period, it was impossible to organise a live training for Health care providers in a specific pilot country.**
However, since the curriculum was developed for both pre-service (students) and in-service (healthcare provider) we took the opportunity to test this curriculum in a pre-service (health care student) setting, namely "the Summer school on vaccinology for future health care providers".

Summer school on vaccinology: organisation, participation and agenda

31 August – 7 September 2021, Antwerp. 12th Edition of the Summer school of vaccinology was organised by the Centre of Evaluation of vaccination of the University of Antwerp.
Based on the curriculum of vaccines and vaccination, an agenda was prepared to answer all questions on vaccines and vaccination, including communication, and practical skills

21 participants from **15 different countries** attended the course. Due to the COVID pandemic, the Summer School was moved from July to September 2021, and only a limited amount of students were allowed to participate to be in line with all travel and contact restrictions. The delegates are in different years of their curriculum: 8 bachelor students, 8 advanced master student, 3 PhD students and 2 attendees graduated already and are currently employed in vaccine related fields. Furthermore, they had different educational backgrounds: 76% attend(ed) a medical education, the other participants are studying (or graduated in) biochemistry, nursing, health sciences.

Student, organizers and some of the teachers – Summer School on vaccinology 2021

During 5 full course days, different aspects of vaccinology including immunology, safety, composition, schedules, role of adjuvants, disease specific vaccines, risk groups, novel vaccines, communication, etc … were handled, following major parts of the curriculum. The courses were in line with the curriculum, focusing on the modules: **Vaccine preventable diseases, Vaccine preventable diseases, Key aspects vaccine safety, development, quality practical skills, communication and Immunization policy and schedules**. Lecturers from all over Europe (Belgium, Italy, Greece, United Kingdom) shared their knowledge, experience and enthusiasm with the students.

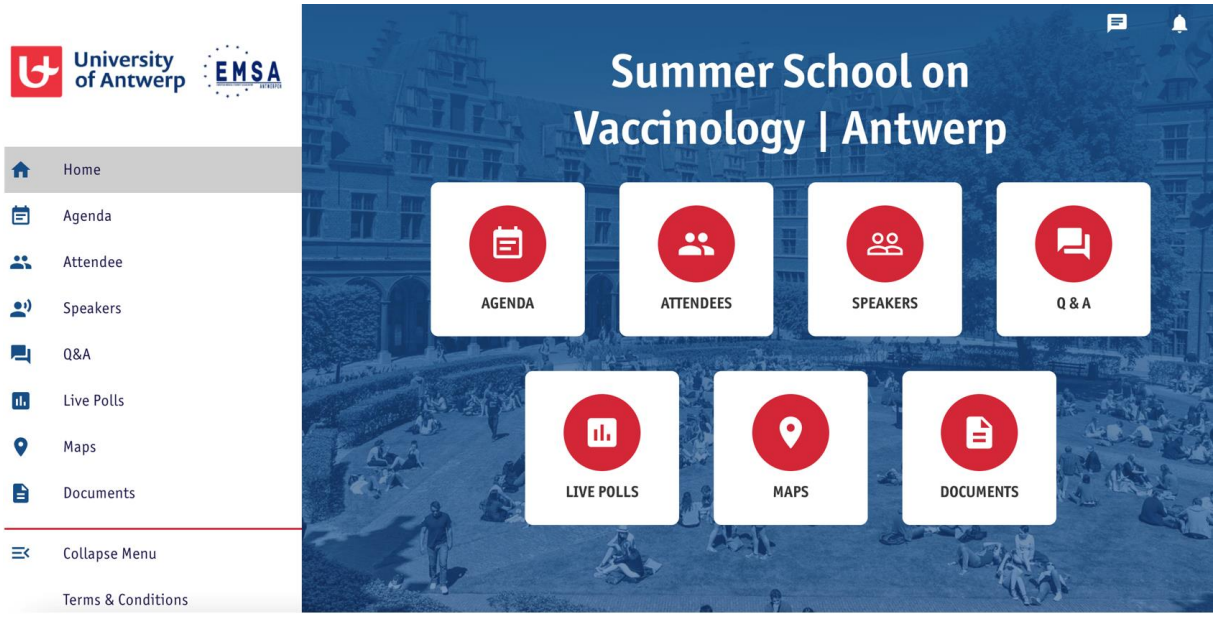
Agenda

Monday 30 August 2021			**Location**
Arrival of participants		ECLIPS	
18.30	Welcome dinner (Pizza)		Arranged by EMSA
Tuesday 31 August 2021			**Location**
9.00	Introduction + group work explanation	Prof Pierre Van Damme, Laura Téblick and Esra Ekinci, Antwerp University	Promotiezaal + Wandelgangen Klooster van de Grauwzusters
10.00		Break	
10.15	The immune system Part 1	Prof Viggo Van Tendeloo or collegue, Antwerp University	Promotiezaal + Wandelgangen Klooster van de Grauwzusters
11.30		Lunch	
13.00	The immune system Part 2	Prof Viggo Van Tendeloo or collegue, Antwerp University	Promotiezaal + Wandelgangen Klooster van de Grauwzusters
14.15		Break	
14.30	Pneumococcal infections and their vaccines	Prof Adam Finn, University of Bristol, UK	Promotiezaal + Wandelgangen Klooster van de Grauwzusters + S.S106.1 & S.S106.2
15.45		Break	
16.00	Meningococcal infections and their vaccines	Prof Adam Finn, University of Bristol, UK	Promotiezaal + Wandelgangen Klooster van de Grauwzusters + S.S106.1 & S.S106.2
17.00		Closing of the day	
17.00	Antwerp city tour + dinner (restaurant)		Arranged by EMSA
Wednesday 1 September 2021			**Location**
8.45	Local initiatives regarding vaccinology		Summer School participants
9.00	Composition of vaccines and the role of adjuvants	Prof Isabel Leroux-Roels, University of Ghent, Belgium	Promotiezaal + Wandelgangen Klooster van de Grauwzusters
10.00		Break	
10.15	Diphtheria, Tetanus, Pertussis and Polio part I	Prof Pierre Van Damme, Antwerp University	Promotiezaal + Wandelgangen Klooster van de Grauwzusters
11.15		Break	
11.30	Diphtheria, Tetanus, Pertussis and Polio part II	Prof Kirsten Maertens, Antwerp University	Promotiezaal + Wandelgangen Klooster van de Grauwzusters
12.30		Lunch	
13.30	MMR(V): epidemiology and vaccination	Prof Vana Papaevangelou, University of Athens, Greece	Promotiezaal + Wandelgangen Klooster van de Grauwzusters
14.45		Break	
15.00	MMR(V): epidemiology and vaccination	Prof Vana Papaevangelou, University of Athens, Greece	Promotiezaal + Wandelgangen Klooster van de Grauwzusters
16.15		Closing and evaluation of the day	
18.00	Cultural village + dinner		Arranged by EMSA
Thursday 2 September 2021			**Location**
8.45	Local initiatives regarding vaccinology		Summer School participants

9.00	Vaccination and pregnancy	Prof Kirsten Maertens, Antwerp University	Promotiezaal + Wandelgangen Klooster van de Grauwzusters
10.00		Break	
10.15	HPV infection & vaccination	Prof Paolo Bonanni, University of Florence, Italy	Promotiezaal + Wandelgangen Klooster van de Grauwzusters
11.45		Break	
12.00	Safety, schedules and coadministation of vaccines	Prof Heidi Theeten, Antwerp University	Promotiezaal + Wandelgangen Klooster van de Grauwzusters
13.00		Group picture + lunch	
14.00	*COVID-19 pandemic: short lectures*	*Prof Erika Vlieghe, Prof Philippe Beutels, prof Niel Hens, prof Pierre Van Damme, Antwerp University*	Promotiezaal + Wandelgangen Klooster van de Grauwzusters
15.30		Closing and evaluation of the day	
19.00	Dinner (??BBQ)	Arranged by EMSA	
Friday 3 September 2021			**Location**
10.00	Hepatitis B	Prof Pierre Van Damme, Antwerp University	Promotiezaal + Wandelgangen Klooster van de Grauwzusters
11.15		Break	
11.30	Influenza vaccination	Prof Marc Van Ranst, Catholic University of Leuven	Promotiezaal + Wandelgangen Klooster van de Grauwzusters + S.S106.1 & S.S106.2
12.30		Lunch	
13.30	Rotavirus vaccination	Prof Marc Van Ranst, Catholic University of Leuven	Promotiezaal + Wandelgangen Klooster van de Grauwzusters + S.S106.1 & S.S106.2
14.30		Break	
14.45	Vaccination techniques and group work	Pierre Van Damme, Heidi Theeten, Katie Steenackers, Antwerp University	Promotiezaal + Wandelgangen Klooster van de Grauwzusters + S.S106.1 & S.S106.2
17.30		Closing and evaluation of the day	
19.00	Dinner (restaurant)	Arranged by EMSA	
Saturday 4 September 2021			**Location**
Social & cultural programme			
Sunday 5 September 2021			**Location**

The organisation of the summer school was also supported by ESPID (European Society For Paediatric Infectious Diseases), Antwerp Rotary Club, and WHO regional office for Europe.

In addition, with the support of ESPID, an app was developed and used along this Summer School to disseminate among the students the background information, share the programme/other necessary documents including the training material (slides) and tasks, and to make changes to the programme when needed.
The app made it feasible for each session to be evaluated by each student directly after.
Moreover, self-evaluation questions were included to check if the content was adapted on the level of all participants.



Screenshot of the app used during the Summer School to disseminate all meeting information, including background material and slides of the different lectures.

More details on this module/ app can be obtained at the University of Antwerp. Contact: sumvax@uantwerpen.be Tel. +32 3 265 25 23 https://www.uantwerpen.be/en/summer-winter-schools/vaccinology/

Evaluation of the course based on feedback by the delegates

Evaluations were carried out daily during the Summer School. The forms were specifying the lecture and teacher, asking participants to rate the lecture from 1-5. Additional blank fields were available to add suggestions for improvement and to add what was missing in their opinion.

Most of the students evaluated the lectures as very interesting and useful. However, some of them thought that some lectures went too fast, making it hard to understand them while others perceived the course as basic or too much clinically or epidemiologically oriented. Content related feedback is shown below, in the day-by-day overview.

Each session was evaluated separately and students could include suggestions in blank boxes. Example: Session on Immune system by Viggo Van Tendeloo:
Students rated the immune session as very interesting and a good opportunity to refresh the immunological basic principles.

Score		
Poor	**1/5**	0
Fair	**2/5**	0
Good	**3/5**	0
Very good	**4/5**	4
Excellent	**5/5**	11

All individual remarks on the content were taken into consideration for all session and if appropriate the curriculum was adapted as such.

Due to the time restrictions of 5 days of the course, a selection of topics had been made (not all topics of all modules could be included in the course). Most students commented that they were missing a course more focusing on the impact of vaccines on global health and more courses for other specific vaccines not included in the agenda, including future vaccines.

Finally the curriculum was also reviewed by **all the teachers of the course**.

Limitation and justification: Although the evaluation of the curriculum and the special modules was not possible in the requested pilot setting for healthcare providers (in-service), due to the pandemic, we may conclude that this curriculum fits the needs of future healthcare providers (students).
However, to make sure that this curriculum is applicable for training of (in-service) health care providers (since we didn't have the chance to test it), an extra review round among the members of the **Coalition for vaccination**, European associations of healthcare professionals and student associations in the field of health and vaccination was performed (November '21). All their comments were taken into consideration and the curriculum was adapted if appropriate.

The final (reviewed) version of the curriculum is included in this document- (see Part 3- pages 69-82)

Sustainability of the actions performed

Vaccine Training barometer

The EU-JAV Vaccine Training Barometer served as the basis for a survey that has been performed within the scope of the new EU project IMMUNION (WP4) and the coalition for vaccination, with the purpose of questioning HCPs about their needs for training and the format in which they would like to receive information, in order to develop a tailored online training platform.
Within the same project, the Vaccine Training Barometer will be used to tailor "Training of Trainers" modules for specific educational needs in targeted countries.
With the Vaccine Training Barometer we also collected questions about vaccines the HCP could not answer and also myths that are circulating both are saved in a separate database that is being or can be used in vaccine communication-education-awareness projects, e.g. Vaccinchat initiative (Flanders, VaccinChat), a high level chatbot to answer questions about COVID-19 vaccines and the current vaccination strategy.

EU-JAV Student Survey

Besides serving as a basis to advocate for changing the curriculum of future HCPs so that it includes a more extensive vaccinology module, the data of the EU-JAV student survey will also be shared with EPSA and EMSA for a more targeted approach. EPSA and EMSA will work within their organisations to improve training on vaccination amongst their members.

Curriculum

Based on the curriculum a toolbox will be created in which each module will be worked out in more detail and then refer mainly to existing training courses. Moreover, the understanding listening and communication module of the curriculum will also be used as a starting point for tailored train-the-trainer modules within the scope of the EU IMMUNION project, where general and country specific sessions on communication about vaccination will be organised in 3 pilot countries.

Via the Coalition for Vaccination, the Students organisations and the network of European medical curriculum managers this curriculum will be promoted as a tool to improve vaccination training for HCP as well as for improving curriculum of health students.

Part 1: Assessment of the need for in-service training of healthcare professionals

Introduction

In order to measure the need for in-service training of HealthCare Professionals (HCPs), the EU JAV **Vaccine Training Barometer** was developed. The Vaccine Training Barometer includes questions about the HCP's attitudes towards vaccination, their education about vaccinations and the questions they receive from their patient base. It also inquires about where HCPs look for information about vaccines and what they need as extra support. The barometer is both a survey designed to question the need of HCPs for training on vaccination and a tool to collect questions that HCPs received but could not answer, and misconceptions/myths about vaccines they encountered. The idea is that the survey will be performed at regular points in time on a representative number of HCPs.

In the development and validation phase, the sustainable training barometer has been evaluated by selected individuals in different (para-)medical professions (nurse, researcher, and midwife) involved in vaccine administration in Belgium and Spain. A test run of the Vaccine Training Barometer was performed in Flanders, Belgium (Pilot, Feb 2020) and adapted based on the input of the respondents. Finally, the Barometer was launched a second time in Flanders and Spain simultaneously in November 2020 - January 2021. The launch was well-prepared and received a very good response rate (Flanders: 821 responses among pharmacists, medical doctors, nurses and a few midwives – Spain: 298 responses) for both Spain and Flanders. All data are collected in one database, making analysis and comparison among European countries easily feasible.

Methods

A standard survey system in Qualtrics has been developed (in Flemish/English/Spanish). Other languages can be added to the survey for implementation in other countries. Link to the survey: https://uantwerpen.eu.qualtrics.com/jfe/form/SV_50vcwojdB9TpLg1.

a) <u>Standard operating procedure</u>

1. Select the 4 most important groups of vaccinators in your country: General practitioners, nurses, midwives, pediatricians, pharmacists, school doctors etc.
2. Find and appoint min. 50* participants for each group, that are willing to complete a short survey (13 questions) <u>twice per year, for 3 consecutive years</u>.
3. Translate the survey questions in your native language
4. Contact the surveyors at each pre-defined time point and
    a. send them the survey questions

   b. send them the link to the online survey
   c. question the participants in person (if needed)
5. Collect responses and/or add them to the online survey (in case manually taken)
6. Report back to UAntwerpen when data collection is completed at each time point.

**the amount should be representative for the region you are would like to cover – min 50*

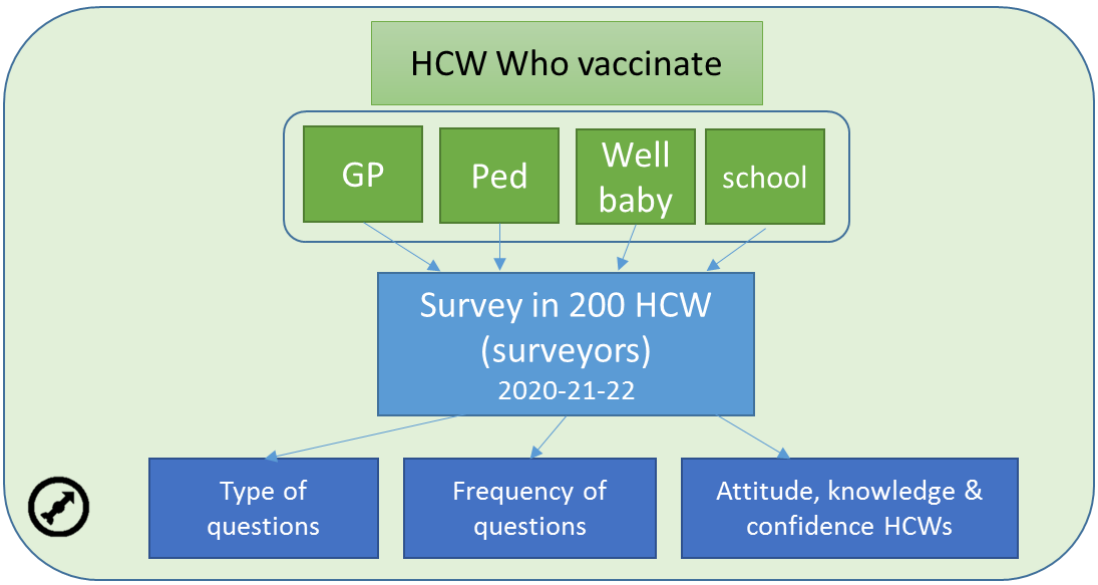


Fig. Example methodology Flanders, Belgium. (Abbreviation: GP General practitioner, Ped Pediatric, HCP Health care worker)

b) <u>Survey questions</u>

Please select your preferred language in the drop-down menu on the right.
Healthcare workers (HCPs) play a crucial role in the transfer of information about vaccines to the general public. A recent survey among medical students has suggested that the education of HCPs might not always be adequate to respond to questions about vaccines. For this reason and within the scope of the EU-Joint Action on Vaccination, we have developed a barometer, that evaluates the need for training in HCPs in European regions, twice a year.

1. In which country are you professionally active? …
2. What is your postal code? …
3. What is your gender?
   a. Male
   b. Female
   c. Other
4. What is your main profession?
   a. Nurse
      - Well Baby Clinic nurse
      - School nurse
      - Occupational nurse
      - Hospital nurse

- Other

b. Physician
   - General practitioner
   - Pediatrician
   - Geriatric physician
   - School physician
   - Well Baby Clinic physician
   - Occupational physician
   - Other

c. Midwife
   - Independent
   - Maternity ward

d. Pharmacist
e. Other: …

5. How frequent do you receive question about vaccines from your clientele?
   a. Every day
   b. Every week
   c. Every month
   d. Other: …

6. Has the frequency of these questions changed over the last 3 months?
   a. Increased
   b. Decreased
   c. Similar

7. In general, do you feel confident to reply to questions about vaccines?
   a. Yes
   b. Most of the time
   c. Sometimes
   d. No

8. Do you feel you have gained sufficient knowledge to support you in answering questions about vaccines?
   a. Yes
      - Through my standard education
      - Through an additional education
      - Through personal experience
   b. No

9. Did you follow a specific course/information lecture about vaccines after your education? (multiple answers are possible)
   a. Course
      - Which course?
   b. Info session(s)
      - Which session?
   c. Self-studies
   d. No

10. Would you be willing to follow an extra course in case that was provided?
    a. Yes
       - Lecture (1h)

- Evening (3h)
- Course (1day)
- Course (5days)
- Online course

b. No

11. Where do you look for information about vaccines? (multiple answers are possible)
    a. Online, ex. Google search
    b. Online medical library / standard medical platform
    c. Online other: …
    d. Text books or other reference works
    e. I send an email to experts
    f. National health institute
    g. Other: …

12. What type of extra support would be useful to feel more confident in answering the questions of your clientele? (multiple answers are possible)
    a. Leaflet
    b. Website
    c. FAQ system (e-system to find the answers to frequently asked questions)
    d. Training course / Education
    e. App with information on disease, vaccines, recommendations & vaccination schemes.
    f. Government recommendations / support
    g. 24/7 helpline (via telephone or email)
    h. Other: …

13. Were there in the last 3 months questions about vaccines that you could not answer?
    a. Yes
        - What information was hard to find? Which questions remained unanswered?
        - What is the proportion of questions you could not answer, related to all the questions you received? (% BAR)
    b. No

14. What was the most frequent topic of the questions you received in the past 3 months? (multiple answers are possible)
    a. Basic vaccination scheme
        - Which vaccine: …
    b. Other vaccines
        - Which vaccine: …
    c. Side effects and vaccine safety
    d. Clinical manifestation of disease
        - Which disease: …
    e. Catch up vaccination
    f. Other: …

15. What was the biggest misconception about vaccinations you recently heard and where did this information originate from? …

16. Are you willing to remain a study barometer respondent?
    Respondents are asked to anonymously fill out this same survey twice a year, for 3 consecutive years, to map a potential change in the need for training amongst healthcare workers
    a. Yes
        - Email address:

In case you have already participated in the barometer before, please use the same email address.

b. No

c) Promotional materials

d)

Invitation letter

EU Joint Action on Vaccination September 2020
Work Package 4 – Sustainability
VAZG – University of Antwerp
www.eu-jav.com
Contact: Greet.Hendrickx@uantwerpen.be

To: Healthcare providers
Topic: Invitation for participation in the EU JAV Vaccine Training Barometer

Dear healthcare provider,

Healthcare providers (HCPs) play a key role in delivering information about vaccines to the public, which in turn greatly influences the decision-making process for vaccinating. In a recent large-scale survey amongst student HCPs, it was shown that vaccinology is not always well implemented in the curriculum. Therefore, we believe that not all HCPs are equally well equipped with information, knowledge and support, to perform the important task of informing patients.
Within the EU Joint Action on Vaccination, we want to investigate the HCP's need for training on vaccination, confidence to answer questions about vaccines and the type of support HCPs would like to receive. For this purpose, we have developed the **Vaccine Training Barometer**, a short online survey that targets different types of HCPs across Europe (medical doctors, pharmacists, nurses and midwives). The survey is available in English, Dutch and Spanish.

We want to ask you to contribute to this EU JAV initiative by filling out the survey. Your individual answers are highly valuable for us to be able to map your specific need for support over time. The results will be used to implement changes that support you as a HCP.

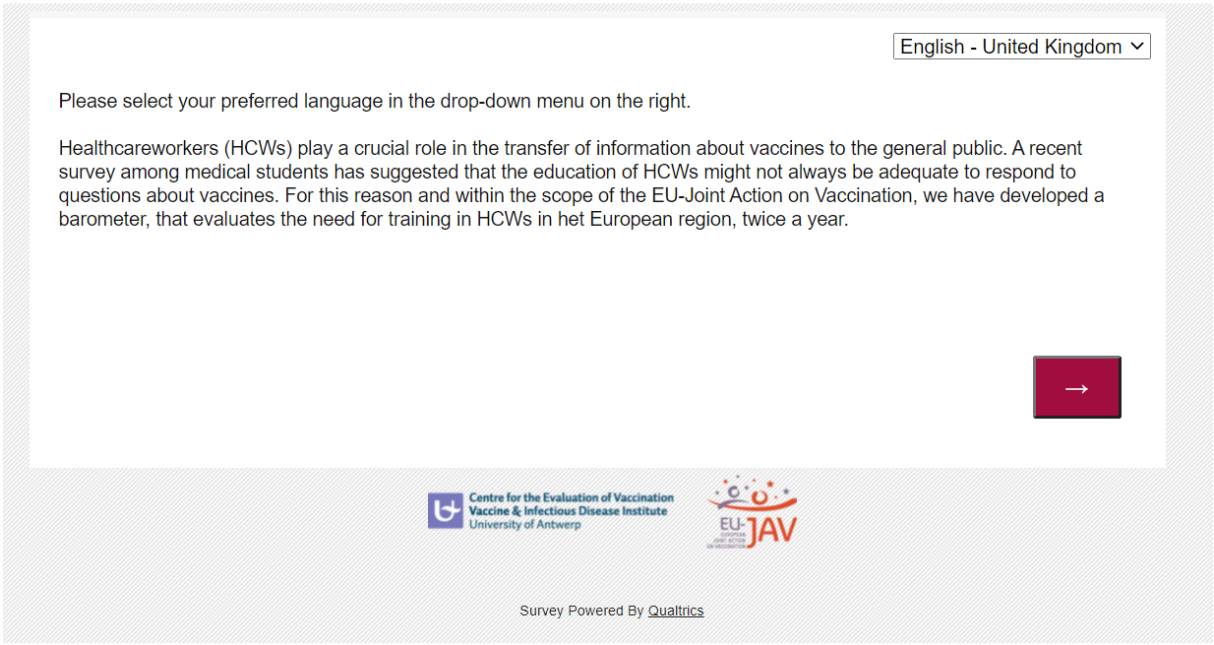
You can reach the survey by scanning the QR code or by following this link!

Thank you in advance for considering this invitation.

NAME
On behalf of the EU JAV consortium.

Flyer distributed in Flanders, Belgium

Flyer distributed in Alicante, Catalonia and Navarre, Spain



Link: Online Survey Software | Qualtrics Survey Solutions

e) Data collection

Pilot test

- FLANDERS 1: data were collected between the launch on the 7th of February 2020 (Valentijn Vaccinatiesymposium Flanders) and the 7th of July 2020.

Second Round

Data were collected between the 16th of November 2020 and 22nd of February 2021

- FLANDERS 2
- SPAIN 1

All survey data with a completion rate ≥ 65% were included in the descriptive analysis.

Results

Enclosed in this report are summaries of the *descriptive* statistics performed on the data from the Pilot and second round. (Full data are available upon request)

Number of participants:

	Frequency
Pilot Flanders 1	118
Flanders 2	831
Spain 1	295
Total	**1244**

Summary Pilot Flanders, Belgium **(Feb 2020 – FLANDERS**   **1)** –

(updated analysis 22/06/2021 to ensure conformity with the posted results from the second round Flanders & Spain)

This pilot was launched in Flanders, Belgium in February 2020 at the Valentijn Symposium 2020. For this report, all responses with a completion rate of ⩾65% were included.
A total of 118 answers was included.

Characteristics of the respondents

- 64% were physicians and 45% nurses (pharmacists and midwifes are minimally represented). The majority of the physicians/nurses were school doctors/nurses.
- *Respondents frequently receive questions about vaccines:* **39.8%** of the respondents stated that they answer questions about vaccines on a **weekly basis**, while this was **daily** for **22.9%** and monthly 28.8% of the respondents.
- Although the majority (78.8%) of the respondents indicated that the number of questions they received remained stable, 16.9% indicated that they received an increasing number of questions over the last three months.

Confidence to reply to questions about vaccines

- 35.6% of the respondents always feel confident to reply to questions about vaccines, **54.2% indicate to feel confident most of the time**. Approximately 10% do not or rarely feel confident to reply to questions about vaccines.

Knowledge and education

1) 78.8% of the respondents state that they have gained sufficient knowledge to answer these questions. Importantly, **only 4.2% of them indicate that this knowledge was obtained through their standard education**. Most of the knowledge came from either experience (36.4%) or an additional education (38.1%).

- Most of the respondents have followed an extra course (14%) and/or info-session (49%) about vaccines and/or have engaged in self-studies (52%). Only a minority of 10% indicated that they had not followed an extra training. Training initiatives are variable, e. g., advanced vaccinology course, full master-after-master program, symposia.

- **94.1%** of the respondents would **be willing to follow an extra course on vaccinology**, with a preference for a 1-day course (48.3%). Other options were evening (3h, 8.5%), course (5 days, 9.3%), lecture (1h, 5.9%), online course (21.2%).

Source for information

- When asked about where the respondents look for information about vaccines, the following order was identified: (more answers were possible)
    1. 53% - Online medical library / standard medical platform
    2. 45% - Online, e. g., Google search
    3. 42% - I send an email to experts
    4. 31% - Online other
    5. 20% - textbooks and other reference works
    6. 14% - Other

    Some other identified sources specific to Flanders were: VWVJ website, extranet K&G, ITG, Zorg en Gezondheid, laatjevaccineren.be and other colleagues.

Extra knowledge support

- The respondents' preferences for extra support can be summarized as follows:
    1. 64% - App with information on disease, vaccines, recommendations & vaccination schemes
    2. 53% - Website
    3. 50% - FAQ system (e-system to find answers to FAQ)
    4. 42% - Course / Training
    5. 41% - Government recommendations / support
    6. Only 12% would prefer a 24/7 helpline
    7. 7% would find a leaflet helpful
    8. 2% chose other, like Wanda app ITG or include vaccinology more in curriculum.

Unanswered questions - Misconceptions

- **32.2% of the respondents indicated that there were questions that they could not answer in the last 3 months**. The topics of these questions were various, like vaccination in non-European subjects, differences in vaccination schemes across European countries, how to proceed in case different vaccines are available, legal issues, catch-up vaccinations… (on average 15% of the questions were hard to answer)
- The vast majority of questions (70%) were about catch-up vaccinations, while other important topics were basic vaccination scheme (51%, mainly meningitis C, MMR, Tetravac, HPV), other vaccines (40%, mainly ACWY, Bexero, Nimenrix), side effects and safety of vaccines (47%). Few questions were asked about the clinical manifestation of the disease (9%) or other topics (8%, like refusals, beliefs vs. vaccination, travel vaccinations).
- The **biggest misconceptions** about vaccines and their sources were also questioned. Some examples:
    - Getting cancer from an HPV vaccination / infertility through HPV vaccine
    - Mercury/aluminium in vaccines
    - Autism because of vaccination
    - A healthy child should not be vaccinated

- Vaccines are better given in summer than winter
- Vaccines are not needed because child does not go to daycare
- Vaccines causing illness
- New vaccines are less safe
- Vaccinations as the reason for various developmental disorders
- The main sources were **internet, Facebook/social media and family/friends.**

Summary Flanders 2, Belgium **(Nov 2020 – Jan 2021, FLANDERS 2) - with reference to the pilot study – updated 22/06/2021 (to ensure conformity with the pilot study)**

We included all responses from Flanders (Belgium), with a completion degree of ⩾ 65%, between 17/11/2020 and 22/02/2021. This resulted in a total of 828 data records.

For comparison purposes, results from the pilot study in Flanders (133 respondents) are indicated in lower case italics.

N44% - Ph 22% - MD 16% - Oth 16%

Characteristics of the respondents

- 83.5% of the respondents were female
- 22.0% of the respondents were a pharmacist, 16.4% physician and 43.8% nurse. Midwives were underrepresented (0.4%).

  Pilot: 64% were physician and 45% nurses (pharmacists and midwifes are minimally represented).
- **40.5%** of the respondents indicated to receive questions about vaccines on a **daily basis**. Another **39.1%** indicated questions on a **weekly** basis, while only 11.1% indicated to receive questions on a monthly basis.

  *Pilot: 39.8% of the respondents stated that they answer questions about vaccines on a **weekly basis**, while this was daily for 22.9% and monthly 28.8% of the respondents.*
- 62.2% indicated that the frequency of these questions has increased in the last 3 months, while 36.6% stated the frequency has stayed the same and only 0.6% sayed the frequency has decreased.

  Pilot: Although the majority (78.8%) of the respondents indicated that the number of questions they received remained stable, 16.9% indicated that they received an increasing number of questions over the last three months.

Confidence to reply to questions about vaccines

- **31.2% of the respondents** indicated **to feel confident to answer questions** about vaccines (response option: yes), while 53.4% declared feeling confident only most of the time, 11% sometimes and 4% did not.

  *Pilot: 35.6% of the respondents always feel confident to reply to questions about vaccines, **54.2%** indicate to feel confident most of the time. Approximately. 10% do not or rarely feel confident to reply to questions about vaccines.*

Knowledge and education

- 30.8% of the respondents felt that they have **not gained sufficient knowledge** to answer questions about vaccines (68.6% say they do).
- Of the **68.6%** answering they have **gained sufficient knowledge**, 31.5% indicated sufficient knowledge through extra education, 25.8% through experience and only 11% through their standard education.

  *Pilot: 78.8% of the respondents stated that they have gained sufficient knowledge to answer these questions. Importantly, **only 4.2% indicated that this knowledge was obtained through their standard education**. Most of their knowledge came from either experience (36.4%) or an additional education (38.1%).*
- **48.6%** of the respondents indicated that they did **follow an info session after their standard education,** 38.3% reported self-studies, 15.1% a course and 23.5% no additional training.

  Pilot: Most of the respondents have followed an extra course (14%) and/or info-session (49%) about vaccines and/or have engaged in self-studies (52%). Only a minority of 10% indicated that they had not followed an extra training. Training initiatives are variable, e. g., advanced vaccinology course, full master-after-master program, symposia.
- **94.6%** of the respondents were **willing to follow an extra course**, with a strong preference for an online course (45.5%). A total of 14.1% of the respondents would like to follow an evening course (3h), 23.7% a course of 1 day, 8.9% a lecture of 1h and only 2.2% a 5-day course.

  Pilot: 9.1% of the respondents would be willing to follow an extra course on vaccinology, with a preference for a 1-day course (48.3%). Other options were evening (3h, 8.5%), course (5 days, 9.3%), lecture (1h, 5.9%), online course (2.,2%).

Source for information

- Following sources are used by the respondents:
  - 27.29% of the respondents send emails to experts,
  - 25.24% information of the national health institute,
  - 23.31% online other,
  - 11.23% textbooks and other reference works,
  - 45.29% online medical library,
  - 44.20% online (e. g., Google search)
  - 18.48% other sources.

  Pilot: When asked about where the respondents look for information about vaccines, the following order was identified:
    1. *53% - Online medical library / standard medical platform*
    2. *45% - Online, e. g., Google search*
    3. *42% - I send an email to experts*
    4. *31% - Online other*
    5. *20% - Textbooks and other reference works*
    6. *14% - Other*

Extra knowledge support

- Furthermore, the preferred methods of support are ranked as follows:
  - 56.16% - app
  - 53.86% - website
  - 47.10% - course/training
  - 46.26% - FAQ
  - 36.47% - recommendations and support of the government
  - 16.43% - 24/7 helpline
  - 10.63% - leaflet
  - 1.33% - other

Pilot: The respondents' preferences for extra support can be summarized as follows:

1. *64% - App with information on disease, vaccines, recommendations & vaccination schemes*
2. *53% - Website*
3. *50% - FAQ system (e-system to find answers to FAQ)*
4. *42% - Course / Training*
5. *41% - Government recommendations / support*
6. *Only 12% would prefer a 24/7 helpline*
7. *And 7% would find a leaflet helpful*
8. *2% chose other, like Wanda app ITG or include vaccinology more in curriculum.*

Unanswered questions - Misconceptions

- **52.2%** of the respondents indicated that there have been questions **in the last 3 months, that they could not answer.** More than half of the respondents (64%) indicated that the proportion of questions that they could not answer was below 20% of all questions received. The questions that could not be answered are saved in the **Database FAQ vaccines_Flanders.xlsx** (supplementary materials on request).

  Pilot: 32,2% of the respondents indicated that there were questions that they could not answer in the last 3 months. The topics of these questions were various, like vaccination in non-European subjects, differences in vaccination schemes across European countries, how to proceed in case different vaccines are available, legal issues, catch up vaccinations, … (a mean of 15% of the questions was hard to answer).

- The most frequent topic of received questions
  - 71.86% about side effects and safety of vaccines
  - 43.36% basic vaccination scheme
  - 31.88% catch-up vaccinations
  - 39.25% other vaccines
  - 10.39% disease presentation
  - 9.3% other

  Pilot: The vast majority of questions (70%) were about catch up vaccinations, while other important topics were basic vaccination scheme (51%, mainly meningitis C, MMR, Tetravac, HPV), other vaccines (40%, mainly ACWY, Bexero, Nimenrix), side effects and safety of vaccines (47%). Few questions were asked about the clinical manifestation of the disease (9%) or other topics (8%, like refusals, beliefs vs. vaccination, travel vaccinations).

- The respondents also answered elaborately to the question: "what is the biggest misconception about vaccinations you recently heard and where did this information originate from?" (see "**Database common misconceptions**" in the supplementary materials on request)

  Pilot: The biggest misconceptions about vaccines and their sources were also questioned. Some examples:
  - *Getting cancer because of a HPV vaccination / infertility through HPV vaccine*
  - *Mercury/aluminium in vaccines*
  - *Autism because of vaccination*
  - *A healthy child should not be vaccinated*
  - *Vaccines are better given in summer than winter*
  - *Vaccines are not necessary because child does not go to daycare*
  - *Vaccines causing illness*
  - *New vaccines are less safe*
  - *Vaccinations as the reason for various developmental disorders*

  The main sources were internet, Facebook/social media and family/friends.

- A total of 57 (6.9%) of the respondents participated in the barometer survey before and 73.3% were willing to continue to be a respondent for the study.

Summary Spain, **SPAIN 1 (Nov 2020 – Jan 2021)**

This report was drafted by the Spanish team (Angela Dominguez, José Tuells, Jesús Castilla and Diana Toledo).

All responses from Catalonia, Alicante and Navarre (Spain) were included, with a completion degree of at least 58.6%%, between 16/11/2020 and 30/11/2020. This resulted in a total of 295 data records.

N 10% - Ph 23%-MD 16% - Midw 52%

Characteristics of the respondents

- **81.7%** of the respondents were female.
- 51.5% of the respondents were midwifes, 23.1% pharmacists, 15.6% physicians and 9.8% nurses.
- **36.9%** of the respondents indicated to receive questions about vaccines on a **weekly basis**. Another 25.1% indicated to receive questions on a daily basis.
- **66.4%** indicated that the frequency of these questions had increased in the last 3 months.

Confidence to reply to questions about vaccines

- **21.7%** of the respondents indicated to feel confident to answer questions about vaccines (response option: yes), while 53.9% said most of the time, 19.0% sometimes and 4.1% never.

Knowledge and education

- **47.5%** of the respondents felt that they **have not gained sufficient knowledge** to answer questions about vaccines.
    - Of the **49.5%** answering they have gained sufficient knowledge:
        - **68.5% indicated sufficient knowledge through extra education**, 21.9% through their standard education and only 8.2% through experience.
- **85.4%** of the respondents indicated that they did **follow a specific course** or information lectures about vaccines after their education and 10.8% did not follow an additional training.
    - Of those who followed a specific course or information lectures about vaccines after their education:
        - 57.9% of the respondents indicated that they did follow an info session after their standard education, 45.6% reported self-studies and 24.6% referred a course.
- **91.5%** of the respondents were **willing to follow an extra course**, with a strong preference for an online course (64.4%)

Extra knowledge support

- Following sources are used by the respondents:
    - 49.8% online (e. g., Google search)
    - 40.3% online medical library
    - 18.0% online other
    - 23.4% textbooks and other reference works
    - 12.2% send emails to experts
    - 34.6% information of the national health institute
    - 9.2% other sources

- Furthermore, the preferred methods of support are ranked as follows:
    - 50.2 % App
    - 47.8% Website
    - 43.4% Training course/education
    - 38.0% Government recommendations / support
    - 33.6% FAQ (33.6%)
    - 29.8% Leaflet
    - 21.4% 24/7 helpline
    - 1.7% Other

Unanswered questions - Misconceptions

- **36.9%** of the respondents indicated that there have been questions **in the last 3 months, that they could not answer**. More than half of the respondents (68.2%) indicated that the proportion of questions that they could not answer was below 30% of all questions received.
- The most frequent topics of received questions were about
    - 72.5% about side effects and safety of vaccines
    - 23.7% other vaccines
    - 22,0% basic vaccination scheme
    - 21.7% disease presentation
    - 15.9% catch-up vaccinations
    - 8.8% other
- The respondents also answered elaborately to the question: “what is the biggest misconception about vaccinations you recently heard and where did this information originate from?” 36.6% of the respondents gave some answer.

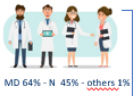
This was the first time in the barometer survey for all participants and 70.5% were willing to continue to be a respondent for future studies.

Overview outcome different Vaccine training Barometer runs

Results (Feb 2020)

Flanders 1

Input of 118 HCP

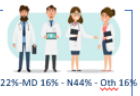


- **35.6%** feels confident to answer questions about vaccines
- **4.2%** gained sufficient knowledge through their standard education
- **94.1%** is willing to follow extra courses
- **32,2%** got questions in the last 3 months that they could not answer

Results (Jan 2021)

Flanders 2

Input of 820 HCP



- **31.2%** feels confident to answer questions about vaccines
- **11.1%** gained sufficient knowledge through their standard education
- **94.8%** is willing to follow extra courses
- **52.1%** got questions in the last 3 months that they could not answer

Results (Jan 2021)

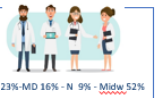
Flanders 2

Input of 820 HCP

- **31.2%** feels confident to answer questions about vaccines
- **11.1%** gained sufficient knowledge through their standard education
- **94.8%** is willing to follow extra courses
- **52.1%** got questions in the last 3 months that they could not answer

Spain 1

Input of 295 HCP



- **21.7%** feels confident to answer questions about vaccines
- **52.5%** gained sufficient knowledge through their standard education
- **91.5%** is willing to follow extra courses
- **36.9%** got questions in the last 3 months that they could not answer

Outcome Vaccine Training Barometer part 2

In addition to measuring the confidence to talk about vaccination and the need for training, there are other features of the Vaccine Training Barometer that can be used:

Database frequently asked questions about vaccines

A Frequently Asked Questions (FAQ) database has been drafted. All questions collected via media, mailings and the vaccine training barometer about vaccines (COVID-19 and general) have been collected in a database. However, due to the nature of the Vaccine Training Barometer and the ongoing COVID-19 pandemic-related developments (e.g., questions about COVID-19 vaccines, side effects, contra-indications, age limits…), this is considered an ongoing process. For the purpose of this report, all questions received (Flanders) until 22nd of February 2021 (date of closing down the Barometer survey) are included. Following items are included in the database: language, profile (what type of healthcare provider asked the questions), the question (in Dutch), the source of the question (either the Vaccine Training Barometer or other channels), the date and a selection of 4 key words. The database is available upon request as supplementary material – **Database FAQ vaccines_Flanders.xlsx.** The questions received from Spain can be consulted in the main **Database vaccine training barometer**.xlsx (supplementary material that can be requested at University of Antwerp).

Common misconceptions about vaccines

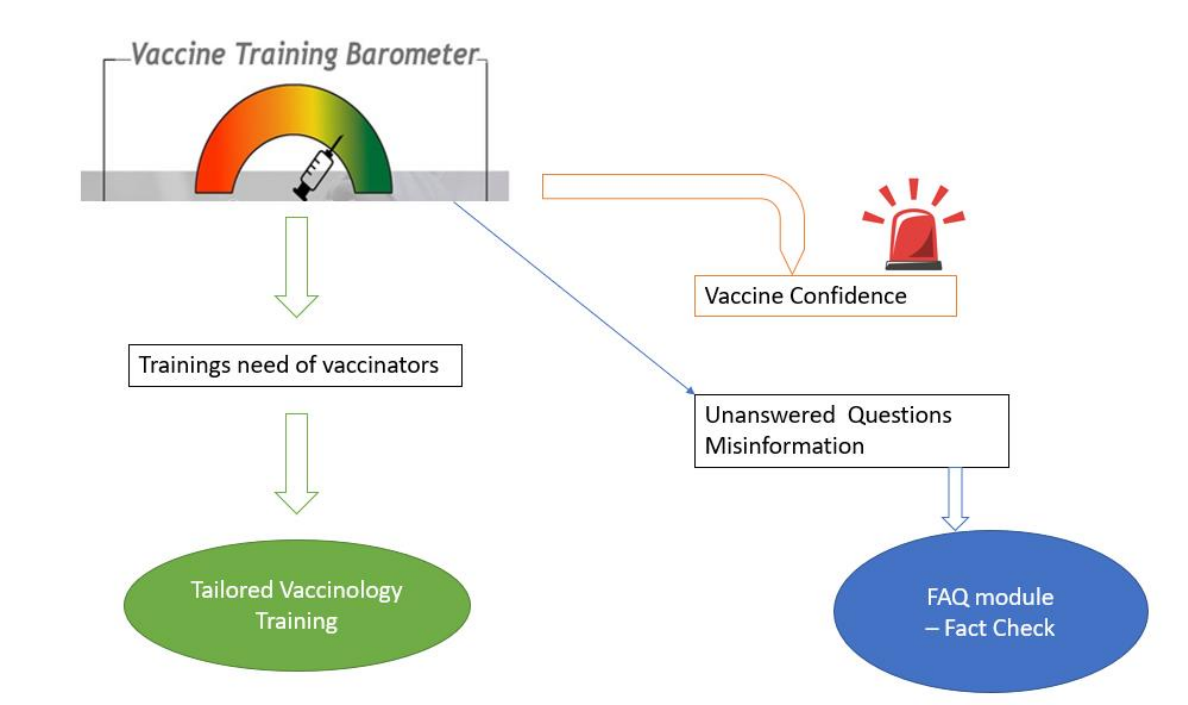
A database was drafted, based on the input from the question: "What was the biggest misconception about vaccinations you recently heard and where did this information originate from?". The information available in this database is: source (Pilot, Flanders, Spain), date, user language, profile of the respondent, answer to the question (in the original language).
The database of the list of misconceptions is available on request - please contact University of Antwerp (**Database common misconceptions.xlsx**).

Partner contributions

Spain has provided a Spanish translation for the Barometer, has launched the Barometer in November 2020 in Spain and has provided UAntwerpen with an interim report on the results (incl. translation of the questions asked by the HCPs). The other collaborating countries (Greece, Romania, Finland) had the possibility to provide a translation of the Barometer questions and launch the Barometer in their country.

Conclusion Vaccine Training Barometer

The results described above, have been created in light of the Sub-task 4.3.1.1: Assess the need for in-service training of healthcare professionals. From the results, we can conclude that **the Vaccine Training Barometer is a valuable and sustainable tool for monitoring the need for training amongst healthcare providers involved in vaccines delivery.**
The possibility to easily add translations for the on-line survey, renders the Vaccine Training Barometer suitable for use at all national, sub-national and European levels.
Furthermore, the results (in the different tests) indicate that **there is indeed a need for training** and that HCPs are very willing to learn more and **are open to extra training opportunities**. Another important finding is that many HCPs feel that vaccinology training in **their standard curriculum is not sufficient** to support them in their daily activities.
The results of the Vaccine Training Barometer are also **suitable to tailor vaccination training modules** for specific populations. Therefore, it is recommended to use the Vaccine Training Barometer among the specific audience of the specific vaccine training. The results can be used to tailor the content of the training as well as the education methodology.
Moreover, if the barometer is used periodically (every 6 months) among a fixed panel of representative surveyors, **it can possibly predict the outbreak of a vaccine hesitancy crisis** and will allow **to collect a database of frequently asked questions** about vaccines and major misinformation.



FOR MORE INFORMATION AND FOR THE USE OF THE VACCINE TRAINING BAROMETER Online Survey Software | Qualtrics Survey Solutions PLEASE CONTACT CENTRE FOR THE EVALUATION OF VACCINATION, UNIVERSITY OF ANTWERP

Part 2: Sustainable guidelines for learning outcomes and the workplan of an Immunization course or module in the pre-service training

Introduction

The first goal of this sub-task was to investigate the attention given to vaccinology in the curriculum and the confidence of HCP (para)-medical students. For this purpose, an online survey was developed: the **EU JAV Student Survey**. Pilot data were available from a previous survey (2018, with a focus on HPV, distributed among medical students), but a large-scale survey with a focus on all vaccines was performed to validate the findings.
The second goal of this sub-task was to provide sustainable guidelines for learning outcomes and a workplan for an **immunization course or module for students**. As described above, the curriculum, drafted in the previous sub-task, is an all-inclusive curriculum that outlines all learning objectives that should be met and can be used as a guiding document for curriculum managers.

Methods

An online questionnaire was developed using Qualtrics (London, UK) to determine and understand the level of attention given to vaccinology in the curriculum of (para)-medical students/ future healthcare workers in Europe, as well as their confidence about vaccines. The questionnaire contained 23 items, with both single and multiple-choice options, with some questions leaving room for additional free text comments. The questionnaire was tested for comprehensibility and clarity by a member practicing each healthcare profession, as well as by representatives from the student organizations (EMSA and EPSA).

The survey was circulated among European Medical Student Association (EMSA), European Nursing Student Association (ENSA), European pharmacy Student Association (EPSA), European Midwives Student Association. The student organizations circulated the survey among their members via email and on social media platforms. The questionnaire targeted para-medical students currently enrolled in a training/degree to become a healthcare provider. The questionnaire was available online between 2nd of June 2020 to 1st of December 2020.

Excel (Microsoft, Redmond, WA, USA) was used for data sorting and IBM SPSS Statistics 27 was used to perform the descriptive data analysis presented in this report.

a) Survey questions

PARTICIPANT INFORMATION

1. What is your country of residence? …
2. What is the postal code of the city where you follow your studies? …
3. What is your gender?
    - Male
    - Female
    - Other
4. What is your age? …

5. Which type of education do you follow?
    - Medicine
    - Pharmacy
    - Nurse
    - Midwife
    - Other: …
6. What is your current year of training? Indicate the year in which you have most study credits.
    - Year 1
    - Year 2
    - Year 3
    - Year 4
    - Year 5
    - Year 6
    - Other: …

AWARENESS ON VACCINATION RECOMMENDATIONS

7. Are you fully vaccinated according to your country's general calendar and professional recommendations?
    - Yes
    - No
    - I don't know

[In case "No" is selected in 7]

8. What is the reason behind you not being fully vaccinated? …
    - There are no recommendations to get vaccinated in my country
    - I am unaware of recommendations
    - I chose not to be vaccinated
    - The availability of vaccines is limited
    - The cost for vaccinations is too high
    - Other: …]

9. Are you aware of the recommended vaccines in your country for the following groups?

Rotate Statements	Yes, I am aware of recommendations	No, I am not aware of recommendations	There are no recommendations
a. Babies and young children	1	2	3
b. Pregnant women	1	2	3
c. Travelers	1	2	3
d. Older adults	1	2	3
e. People with chronic or underlying medical conditions	1	2	3

VACCINATION IN THE CURRICULUM OF (PARA-)MEDICAL STUDENTS

10. How are courses in vaccination or in vaccinology organized in your curriculum?
    - We have a strong module dedicated to vaccination only
    - Parts of vaccination are covered in other classes
    - We have a strong module dedicated to vaccination and parts of vaccinology are extra highlighted in other classes
    - I do not have a strong vaccination module in my curriculum. No or only little information is provided about vaccinology in other classes

11. How much time is spent on vaccines in your curriculum in total (throughout all the years of your curriculum)?
    - 1-2h
    - 2-5h
    - 1 day
    - 1 week
    - Classe(s) throughout one semester
    - Classe(s) throughout multiple semesters
    - Other: …

12. Which topics are covered (select all that apply)?

Topic	Included	Not included
Rationale, context and history of immunization		
Key aspects of immunology		
Key aspects of vaccines		
Vaccine safety		
Vaccine preventable diseases		
Immunization policies and schedules		
Recent and future developments in the field of vaccinology (recent vaccines, new methods, new target diseases)		
Understanding, active listening and communication about vaccines		
Practical skills		
Other		

13. Do you feel enough attention has been paid to vaccinology in your curriculum?
    - Yes
    - No, too little time is spent on vaccinology
    - No, major parts of vaccinology are missing in my curriculum
    - Other: …

STUDENTS' ATTITUDE TOWARDS VACCINES (~VACCINE CONFIDENCE PROJECT)

14. How strongly do you agree or disagree with each of the following statements about vaccines?

Rotate Statements	Strongly agree	Tend to agree	Tend to disagree	Strongly disagree	Do not know/ No response
a. Vaccines are important for children to have	1	2	3	4	5
b. Overall I think vaccines are safe	1	2	3	4	5
c. Overall I think vaccines are effective	1	2	3	4	5
d. Vaccines are compatible with my religious beliefs	1	2	3	4	5

15. How strongly do you agree or disagree with each of the following statements about the MMR, HPV and seasonal influenza vaccines?

Rotate Statements	Strongly agree	Tend to agree	Tend to disagree	Strongly disagree	Do not know/ No response
a. Overall I think the MMR vaccine is safe	1	2	3	4	5
b. Overall I think the seasonal influenza vaccine is safe	1	2	3	4	5
c. Overall I think the HPV vaccine is safe	1	2	3	4	5
d. Overall I think the MMR vaccine is important for children to have	1	2	3	4	5
e. Overall I think the seasonal influenza vaccine is important	1	2	3	4	5
f. Overall I think the HPV vaccine is important	1	2	3	4	5

16. How strongly do you agree or disagree with each of the following statements?

Rotate Statements	Strongly agree	Tend to agree	Tend to disagree	Strongly disagree	Do not know/ No response
a. Overall I am confident that vaccines offer more benefit than risks	1	2	3	4	5
b. As a healthcare provider I will dedicate sufficient attention to vaccines	1	2	3	4	5

c. I will keep my vaccination status up to date at all times	1	2	3	4	5
d. As a healthcare provider, I will recommend the MMR vaccine to patients	1	2	3	4	5
e. I will take the seasonal flu vaccine every year	1	2	3	4	5
f. As a healthcare provider, I will recommend the seasonal flu vaccine to patients	1	2	3	4	5
g. As a healthcare provider, I will recommend the seasonal flu vaccine to pregnant women	1	2	3	4	5
h. As a healthcare provider, I will recommend appropriate vaccines to pregnant women	1	2	3	4	5
i. As a healthcare provider, I will recommend the HPV vaccine for girls & boys	1	2	3	4	5
j. Overall I feel confident replying to people questioning vaccines	1	2	3	4	5

17. What role do you believe you will have when working as a healthcare provider, related to vaccination in the country in which you are based?
    - No role
    - Only dispensing vaccines
    - Passive advice & support of patients or public health services, but not vaccinating
    - Active partnering with other healthcare professionals to actively promote vaccination, but not vaccinating
    - Integral part of delivering the vaccination program, including vaccinating patients

18. What would you need to gain more confidence to reply to vaccine questions or anti-vaccine statements and opinions (select all that apply)?

    - Extended module on vaccination in my education curriculum
    - Trustworthy website or app with information on diseases, vaccines, recommendations & vaccination schemes
    - Other information sources, like leaflets, reference works, YouTube videos
    - FAQ system (e-system to find the answers to frequently asked questions)
    - Government recommendation campaigns
    - 24/7 helpline (via telephone or email)
    - Other: …

Results

The full database of student survey is available upon request.
The survey was divided into participant information covering demographics, awareness on vaccination recommendations, vaccination in the curriculum of (para-) medical students and students' attitudes towards vaccines. We received **5800 responses** from para-medical students from 50 countries in total, from which **32 European Countries**. Out of the 5800 responses, 2102 were excluded at a cut off rate of 61% (completion rate) for finishing the survey. Additional 77 responses were excluded because the respondents didn't provide any valid response other than country of residence, age, and some respondents submitted the survey without answering a single question (Fig. 1).

Out of the remaining **3621**, 71 responses for country of residence outside of Europe were also excluded for this specific analysis as this report focuses on students in Europe. The target group were students enrolled in the study programs and not having prior experience in the field of vaccination that could influence their answers to the questions of the survey. Therefore, 35 respondents age 35 and over were excluded from the survey.

Out of the remaining **3515 students**, 44.2% reported to study medicine, 40.3% reported to study pharmacy, 7.0% reported studying Nursing, 0.7% reported to follow Midwife study and 7.9% reported Others as the type of study they follow (Table 1). Some of the type of education reported as others were: Biotechnology, biomedical science, dentistry, biology, Psychology, laboratory technician/science/assistant, health assistant/visitor, and physiotherapist.

In addition, the first part of the survey covered demographics of the respondents i.e., gender, age, country of residence and the year of education/training in which they have to study the most credits.

Participants

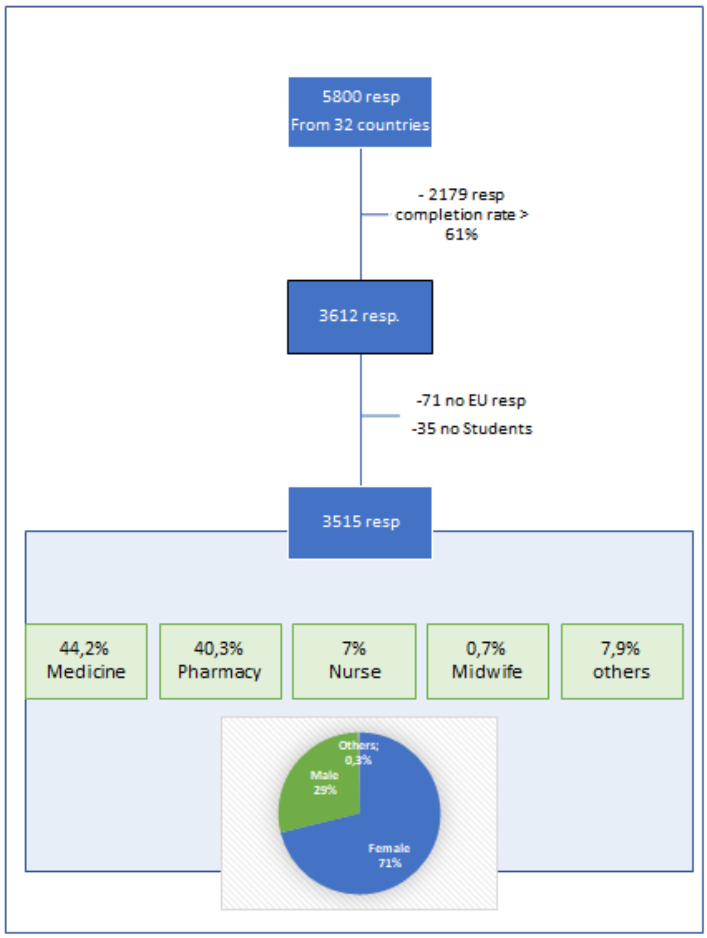


Figure 1: Participants' flowchart

Of the respondents, 71.2% were female, 28.5% were male, and 0.3% respondents reported Other as their gender (Table 2). A total of 32 European countries participated in the survey (Table 3 & Fig. 2). The distribution for the year of training for the survey participants is reported in Table 4, 18.6% participants reported to study most credit in Year 1, 19.3% reported Year 2, and 21.8% reported year 3. From year 4 – year 6, the participants reported 15.6%, 14.0% and 7.4% respectively. 3.1% of the survey participants reported Other as the training year (Fig.3). The participants who chose other as the training year were enrolled in different study programs such as a master's degree.

Education	Frequency (n)	Percent (%)
Medicine	1554	44.2
Pharmacy	1416	40.3
Nurse	245	7.0
Midwife	24	0.7
Other	276	7.9
Total	3515	100.0

Table 1: Type of education the para-medical students/survey responders follow

Gender	n	%
Female	2502	71.2
Male	1001	28.5
Other	10	0.3
Total	3515	100.0

Table 2: Gender of the survey participants

Country of Residence	n	%
Austria	1	0.0
Albania	2	0.1
Austria	51	1.5
Belgium	45	1.3
Bulgaria	1	0.0
Croatia	1	0.0
Cyprus	7	0.2
Czech Republic	2	0.1
Estonia	5	0.1
Finland	65	1.8
France	82	2.3
Germany	180	5.1
Greece	48	1.4
Hungary	37	1.1
Iceland	1	0.0
Ireland	129	3.7
Italy	1686	47.9
Kosovo	5	0.1
Latvia	10	0.3
Lithuania	24	0.7
Luxembourg	1	0.0
Malta	21	0.6
Netherlands	34	1.0
North Macedonia	48	1.4
Norway	16	0.5
Poland	204	5.8
Portugal	166	4.7
Romania	145	4.1
Serbia	107	3.0
Slovakia	51	1.5
Slovenia	104	3.0
Spain	144	4.1
Sweden	1	0.0

Switzerland	51	1.5
United Kingdom	29	.8
Not responded	11	.3
Total	3515	100.0

Table 3: Number of participants from different countries/ Number of countries participated in the survey.

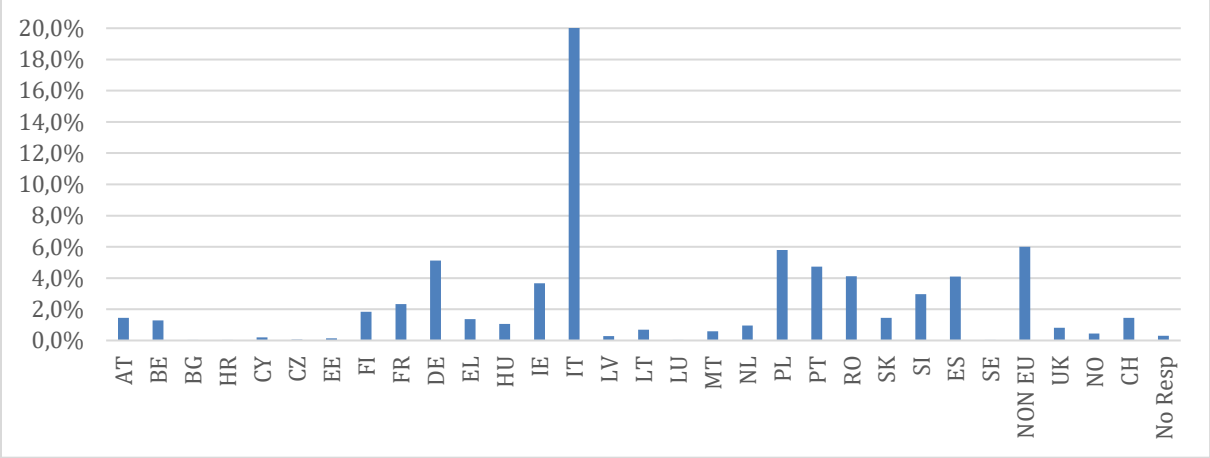


Fig 2: Country distribution of the respondents

Year of training	Frequency (n)	Percent (%)
Year 1	653	18.6
Year 2	679	19.3
Year 3	768	21.8
Year 4	550	15.6
Year 5	493	14.0
Year 6	261	7.4
Other	110	3.1
Total	3515	100.0

Table 4: Frequency of year of training each survey participant reported to have study the most credits

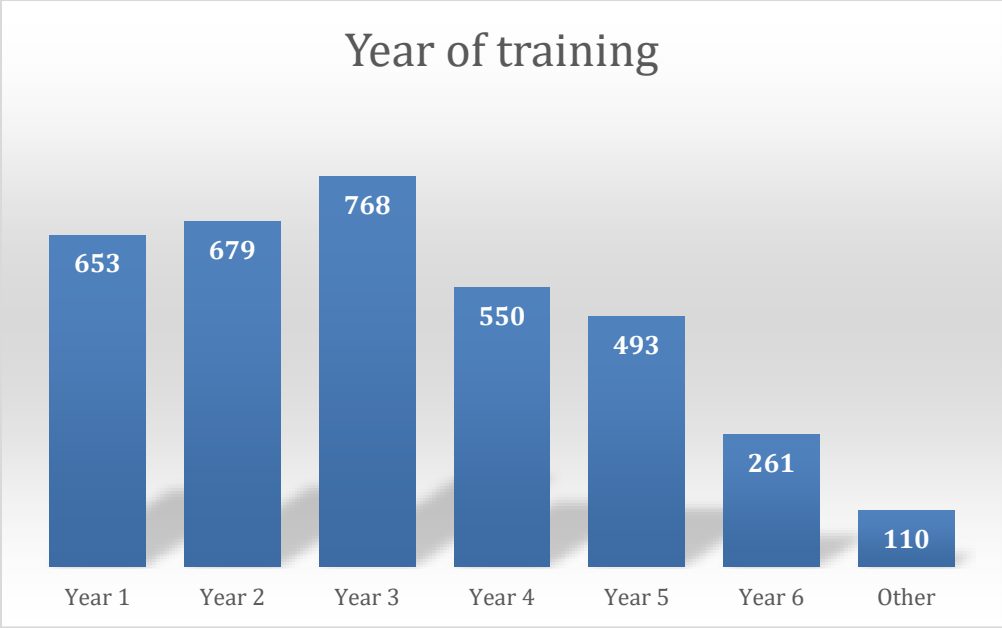


Figure 3. the Year of training the responding students are currently in.

Para-medical students' awareness and knowledge of vaccine recommendations

The second part of the survey focused on para-medical students' awareness of vaccine recommendations. Participants were asked if their own vaccination status was up to date according to their country's recommendation and to what extent they were aware of vaccine recommendations for different population groups in their country.

92.1% of the survey participants reported to be **fully vaccinated** according to their country's general and professional recommendation (Table 5).
The participants who reported not to have been vaccinated according to their country's general and professional recommendations were further asked to elaborate on the reason behind not being fully vaccinated. Out of the 3.6% who reported not to be vaccinated gave the following reasons:

- unaware of the recommendation (0.4%),
- high cost of vaccines (0.4%),
- chose not to be vaccinated (0.6%) and
- 1.7% reported other reasons: missing a dose out of carelessness, parents chose not to vaccinate them, high cost of vaccines, missing HPV vaccination because mother was not sure about the vaccine, high number of side effects reported in school about HPV vaccine, Covid interrupted the completion, chose not to receive the flu vaccine, some vaccines not being part of the National Immunization Plan.

The survey responses were split into each type of education, medicine, pharmacy, nursing and midwives' studies (Table 1). Due to a limited amount of responses, midwifery students (24) were not included in this analysis since it is not representative for all midwife students. 93.9% of 1554 survey participants studying medicine, 89.5% of the 1416 participants studying pharmacy and 93.5% of the 245 participants studying nursing reported to be vaccinated according to their country's general calendar and professional recommendation.

Are you fully vaccinated according to your country's general calendar and professional recommendations?			
	Frequency	Percent	Valid Percent
Yes	3239	92.1	92.1
No	126	3.6	3.6
Not responded	150	4.3	4.3
Total	3515	100.0	100.0

Table 5: Measure of number of participants vaccinated according to their country's General calendar and professional recommendations

The respondents/participants were questioned to report on their knowledge on recommendations for different groups such as babies and young children, pregnant women, travelers, older adults and people with chronic conditions or underlying medical conditions:

1. **88.1% of** the respondents reported to be aware of the recommendation for **childhood vaccination** (baby and young children); 92.1% medical students, 93.5% nursing students, and 82.3% pharmacy students).
2. **51.1%** of the students reported to be aware about **pregnant women** (this was the case for 57.1% medical students, 69.8% nursing students whereas 55.6% of pharmacy students were not aware of the recommendations for pregnant women).
3. Overall, **66.5%** of the students reported to be aware of the recommendations about **travelers**; 67.1% were medical students, 70.6% nursing students, and 64.1% pharmacy students.
4. **72.6%** of the students with a distribution of 77.5% medical students,84.5% nursing students, and 64.5% pharmacy students reported to be aware about recommendation in their respective countries **for older adults**.
5. **50%** reported to be aware of recommendations for **people with chronic conditions or underlying medical conditions** (53.7% medical students, 71% nursing students and 40,3% pharmacy students). (Table 6) (Supplementary Table 6.1 – 6.24. See annex).

Are you aware of the recommended vaccines in your country for the following groups?			
	Yes, I am aware of the recommendations % n	No, I am not aware of the recommendations % n	There are no recommendations % n
Babies and young children	88.1% (3099)	10.8% (381)	0.3% (10)
Pregnant women	51.2% (1801)	44.9% (1579)	2.4% (84)
Travelers	66.5% (2336)	30.5% (1072)	1.7% (61)
Older adults	72.6% (2552)	25% (880)	0.9% (32)
People with chronic conditions or underlying medical conditions	50% (1757)	47.6% (1673)	0.8% (28)

Table 6: The number in brackets shows number of respondents for each option. Some of the respondents didn't respond to this question.

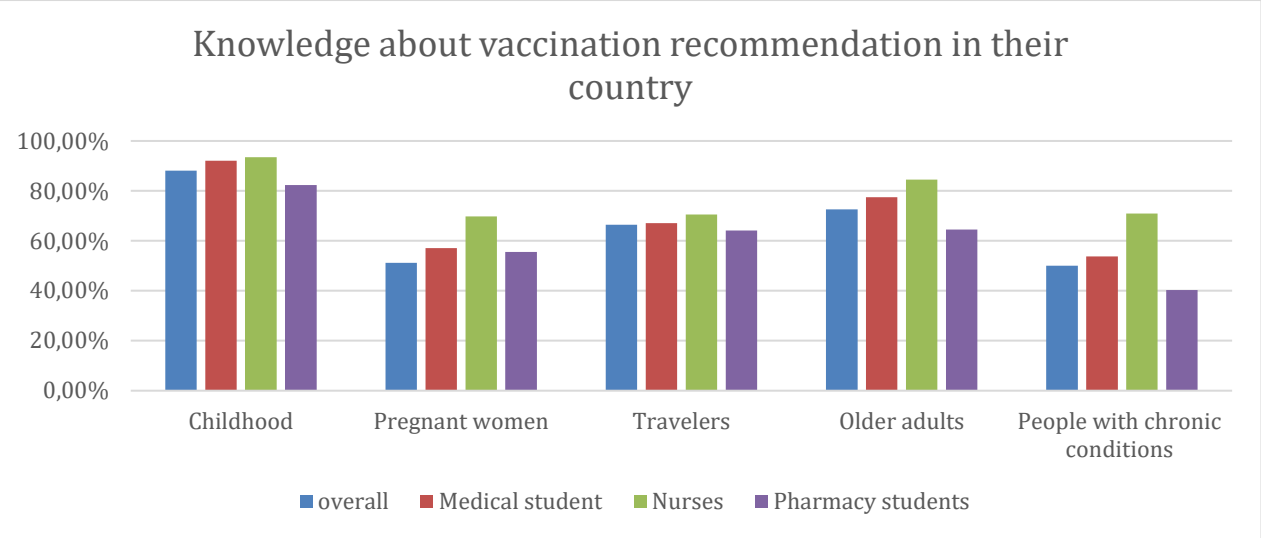


Fig 4: percentage of respondents for each study type who are aware of the different vaccination recommendations

Vaccination in the curriculum of (para-)medical students

The third part of the survey was structured to determine the level of attention given to vaccination in curriculum of para-medical students. The participants were asked about the organization of the vaccinology courses in their curriculum (The study results were analyzed for the curriculum of each type of education. Responses from midwifery students (24) were not included in this analysis as it is not representative for all midwife students):

6. **56% of the students** reported that the information on vaccination is **spread over different courses**,

   - 69% of the medicine students,
   - 36.3% nursing students, and
   - 48.2% of pharmacy students reported that information on vaccination is spread over different courses
     (Supplementary table 7.1 – 7.5. See annex).

7. **23.7%** responded that **no or only little information about vaccination** is covered in the curriculum (Table 7). (These study results were analyzed for the curriculum of each type of education. Responses from midwifery students (24) were not included in this analysis as it is not representative for all midwife students).

   - 31.5% of pharmacy students,
   - 32.7% nursing students, and
   - 13.1% medicine students reported that no or only little information about vaccination is included in the curriculum

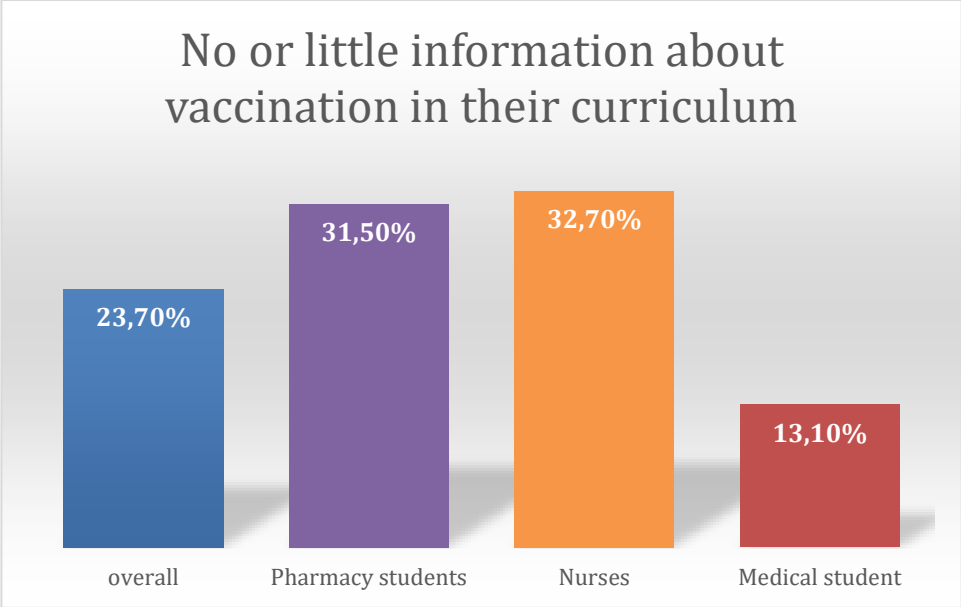


Fig 5: Percentage of responding students by each study type that had no or little information about vaccination in their curriculum

Time spent on vaccination in the curriculum

The respondents were additionally asked how much time was spent on vaccines in their curriculum until the time of taking the questionnaire. The time spent on vaccinology in the curriculum was reported in the following way:

- 1 day (8.5% of participants),
- 1 week (7.0% of participants),
- 1-2h (22.5% of participants),
- 2-5h (18.1% of participants),
- courses through one semester (11.7% of participants),
- courses throughout multiple semester (13.7%),
- 11.9% reported Other and
- 5.6% of the participants didn't respond to the question (Table 8).

This question was further split into type of education of the respondents to determine the amount of time spent on vaccines in each curriculum. 58.5% of the medicine students, 56.4% nursing students, and 41,9% pharmacy students reported that either 1 day, 1 week, 1-2h or 2-5h were spent on vaccinology in their curriculum. (Supplementary table 8.1-8.5. See annex)

How are courses in vaccination or in vaccinology organized in your curriculum?					
		Frequency	Percent	Valid Percent	Cumulative Percent
	Information on vaccination is spread over different courses	1968	56.0	56.0	59.4
	No or only little information about vaccination	834	23.7	23.7	83.2
	One vaccinology course	178	5.1	5.1	88.2
	One vaccinology course + information on vaccination is spread over different courses	414	11.8	11.8	100.0
	Not responded	121	3.4	3.4	3.4
	Total	3515	100.0	100.0	

Table 7: Measure of organization of vaccinology courses in para-medical students' curriculum

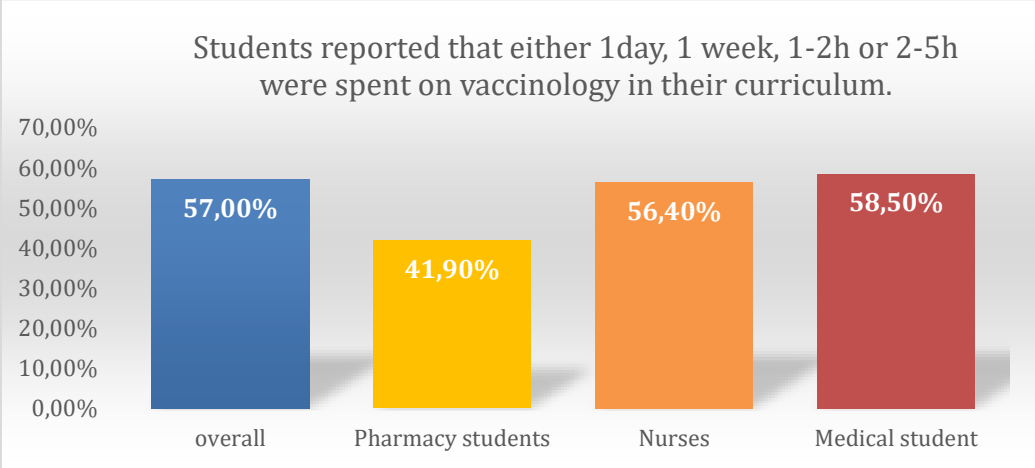


Fig 6: Percentage of responding students by each study type who reported that only a limited time was spent on vaccinology in their curriculum

How much time is spent on vaccines in your curriculum in total – Selected Choices			
		n	%
	1 day	298	8.5
	1 week	277	7.9
	1-2h	791	22.5
	2-5h	636	18.1
	Course(s) throughout multiple semesters	483	13.7
	Course(s) throughout one semester	412	11.7
	Other	420	11.9
	Not responded	198	5.6
	Total	3515	100.0

Table 8: Measure of time reported to be spent on vaccination courses in curriculum

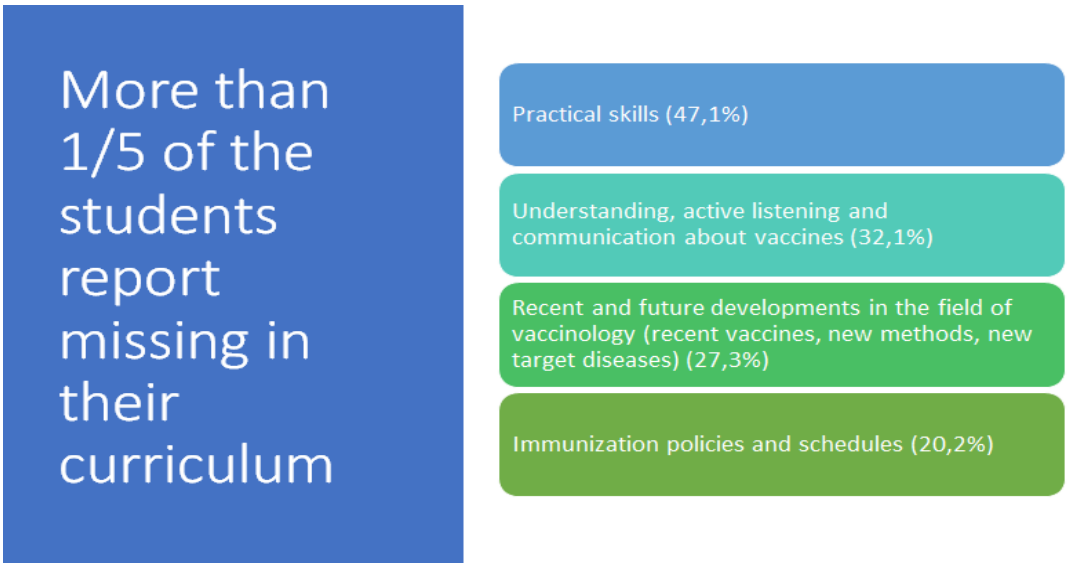
In addition to the time spent on vaccinology in curriculum, participants were asked which topics has been covered, will be covered or was **not** included in the curriculum. The participants were given options to choose from and a free text box next to the option ''Other'':

The participants could choose multiple options. The responses are summarized in table 9 showing that **56.6%** of the participants reported that **rationale, context and history of immunization** has been covered in the curriculum and **12%** indicated that it's not included in the curriculum. Out of these 56.6% of respondents, only 62% of medicine students, 42.4% nursing students, 54.4% pharmacy students reported that rationale, context and history of immunization has been covered in their curriculum**. 63.7%** of participants (only 66% of medicine student, 58.4% of nursing students, 63.5% of pharmacy students) reported that **key aspects of immunology** have been covered and **60.4%** (out of which 62.7% medicine students, 55.5% nursing students, 59.8% pharmacy students) reported that **key aspects of vaccine** have been covered in their curriculum. **Vaccine safety** was reported to be already covered by **only 47.5%** of the respondents and 13.5% reported that it is not included in curriculum. Among the 47.5% of the total survey respondents, only 47.9% of medicine students, 54.7% nursing students and 45.4% pharmacy students reported that topics on vaccine safety has been covered in their curriculum.

Immunization policies and schedules were only reported by **35.8%** of the participants (only 37.3% medicine students, 39.2% nursing students, and 34% pharmacy students). Similarly, topic about recent and **future development** in the field of vaccinology was covered in the curriculum

of **27.9%** of the respondents; 29.9% of medicine students, 27.8% of nursing students and 26.2% of pharmacy students).

Understanding, active listening and communication about vaccines was covered in curriculum of **28.4%** of the respondents (only 27.7% medicine students, 37.1% nursing students, 27.3% pharmacy students) and practical skills for only 11.8% of total respondents.



Which topics are/will be covered in your curriculum? (Select all that apply)

	Has been covered	Will be covered	Not included in curriculum
Rationale, context and history of immunization	56.6% (1988)	12.6% (444)	12% (422)
Key aspects of immunology	63.7% (2239)	15.5% (546)	2.6% (91)
Key aspects of vaccines	60.4% (2124)	16.4% (576)	4.7% (166)
Vaccine safety	47.5% (1668)	20% (702)	13.5% (476)
Vaccine preventable diseases	56.6% (1988)	18.5% (647)	6.2% (219)
Immunization policies and schedules	35.8% (1260)	24.7% (868)	20.2% (711)
Recent and future developments in the field of vaccinology (recent vaccines, new methods, new target diseases)	27.9% (981)	25.9% (910)	27.3% (960)
Understanding, active listening and communication about vaccines	28.4% (999)	20.5% (720)	32.1% (1129)
Practical skills	11.8% (414)	22% (773)	47.1% (1655)

Table 9: The table above shows the frequencies of the topic that are or will be covered. Participants were also given a text entry option as ''other'' to report which topic was not stated in the table. 11.9% (420) respondents chose others. The respondents could choose multiple options. The numbers in brackets show the number of respondents.

The respondents/participants were asked if they feel that enough attention has been paid to vaccinology in their curriculum, and **37.1% reported that too little time** is spent on vaccinology and **11.2%** reported that major parts of vaccinology are missing in the curriculum (Table 11).

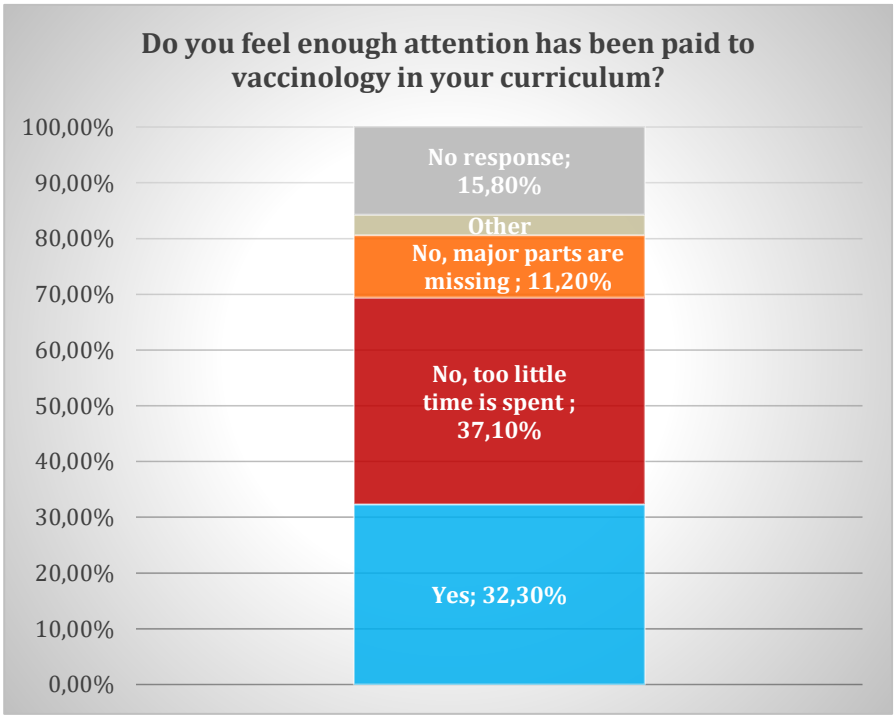


Fig 7: cumulative percentage of responding students who answered the question: "Do you feel enough attention has been paid on vaccinology in your curriculum?"

Do you feel enough attention has been paid to vaccinology in your curriculum? - Selected Choice					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1136	32.3	32.3	100.0
	No, too little time is spent on vaccinology	1303	37.1	37.1	64.0
	No, major parts of vaccinology are missing in my curriculum	392	11.2	11.2	26.9
	Other	130	3.7	3.7	67.7
	Participant didn't respond	554	15.8	15.8	15.8
	Total	3515	100.0	100.0	

Table 10: Measure of perceived attention paid to vaccinology in curriculum.

The responses were further split on the type of education of the respondents. Responses from midwifery students (24) were not included in this analysis as it is not representative for all midwife students.

Too little time spent on vaccinology & major parts are missing in their respectively curriculum

- 41.4% & 8.4% of medicine students,
- 28% & 10.4% nursing students and
- 50.3% & 18.4% pharmacy students

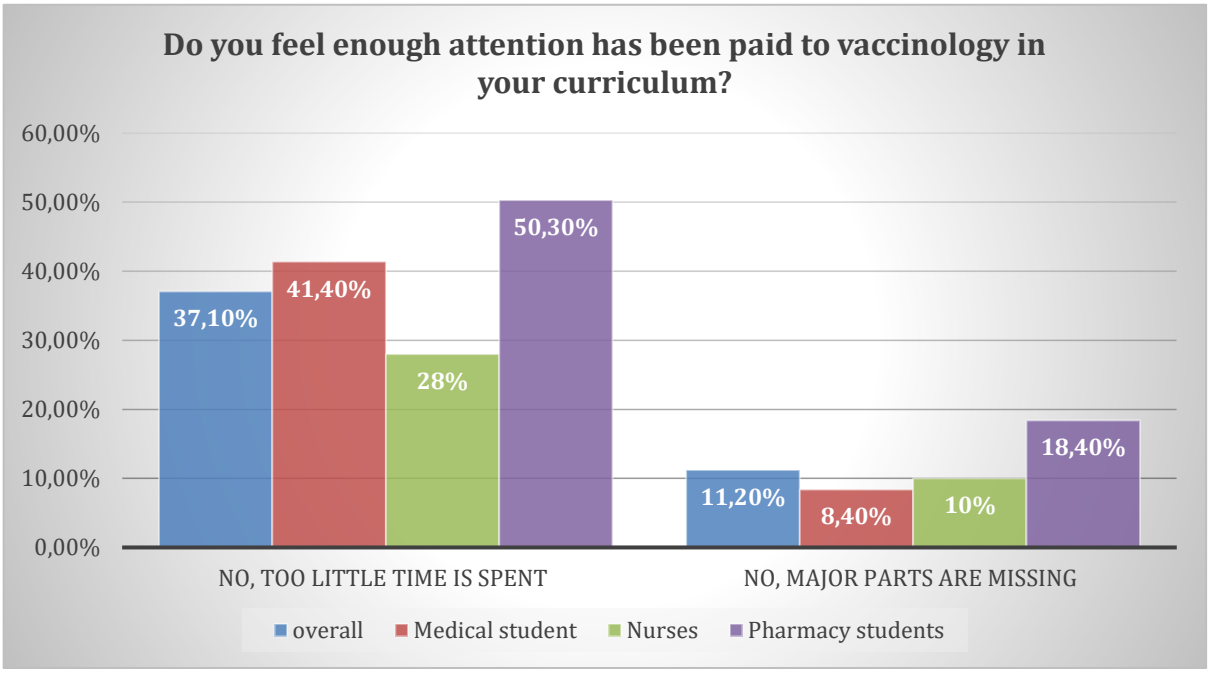


Fig 8: percentage of responding students by study type who answered the question: "Do you feel enough attention has been paid on vaccinology in your curriculum?"

The responders who reported other as their education type are not included in the report, but the results are included in the supplementary table files (see annex).

Student's attitude towards vaccines

The 4th and last section of the survey focused on determining para-medical students' attitude towards vaccines. The participants were asked their opinion on vaccines, different vaccines and the role they will play as a healthcare professional. The participants were asked their opinion with discrete options to determine their opinion about vaccines in general. **79.6%** reported to strongly **agree that vaccines are important for children** to have, **62.2%** strongly agree that **vaccines are safe**, while 20.5% tend to agree, **67.7% strongly agree that overall vaccines are effective,** while 15.6% tend to agree, and **71.2%** strongly agree that vaccines **are compatible with their religious beliefs** (Table 11).

How strongly do you agree or disagree with each of the following statements about vaccines?					
	Strongly agree	Tend to agree	Tend to disagree	Strongly disagree	Don't know/ No response
Vaccines are important for children to have	79.6%	4.2%	0.2%	0.1%	15.8%
OVERALL, I think vaccines are safe	62.2%	20.5%	0.9%	0.2%	16.2%
OVERALL, I think vaccines are effective	67.7%	15.6%	0.6%	0	16.1%
Vaccines are compatible with my religious beliefs	71.2%	3.7%	0.7%	0.9%	23.9%

Table 11: Measure of frequency for participants agreeing/disagreeing with statements about vaccines. The column about don't know/no response was combined with the number of participants who didn't respond to this question.

How strongly do you agree or disagree with the following statement about VACCINES in general? Vaccines are important for children to have						
	Strongly agree	Tend to agree	Tend to disagree	Strongly disagree	Don't know/ No response	Participant didn't respond/ Missing values
Medicine	82.6%	2.5%	0.1%	0.1%	0.2%	14.5%
Nursing	66.9%	7.8%	0.8%	0.4%	-	24.1%
pharmacy	78.2%	5.4%	0.2%	0.2%	0.4%	15.7%
Other	79.7%	5.1%	0.4%	-	-	14.9%

Table 11.1: Measure of frequency based on the type of education of participants agreeing/disagreeing with statements about vaccines

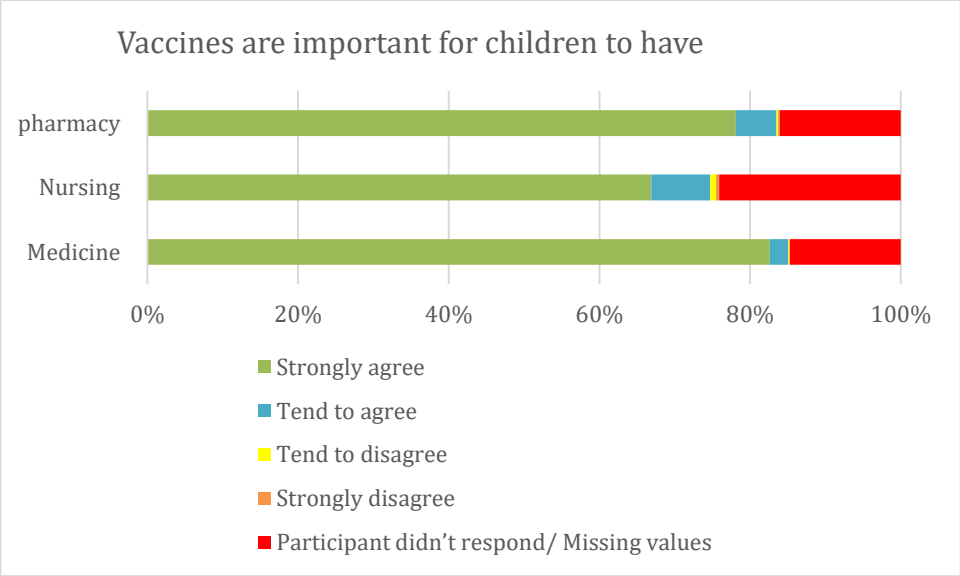


Fig 9: percentage of responding students by study type by stance on the question "Are vaccines important for children?"

How strongly do you agree or disagree with the following statement about VACCINES? OVERALL, i think vaccines are SAFE						
	Strongly agree	Tend to agree	Tend to disagree	Strongly disagree	Don't know/ No response	Participant didn't respond/ Missing values
Medicine	68.4%	16.1%	0.6%	-	0.3%	14.7%
Nursing	47.8%	24.5%	2.4%	0.4%	1.2%	23.7%
pharmacy	58.1%	24%	1.1%	0.4%	0.6%	15.8%
Other	59.8%	23.6%	0.7%	-	1.1%	14.9%

Table 11.2: Measure of frequency based on the type of education of participants agreeing/disagreeing with statements about vaccines

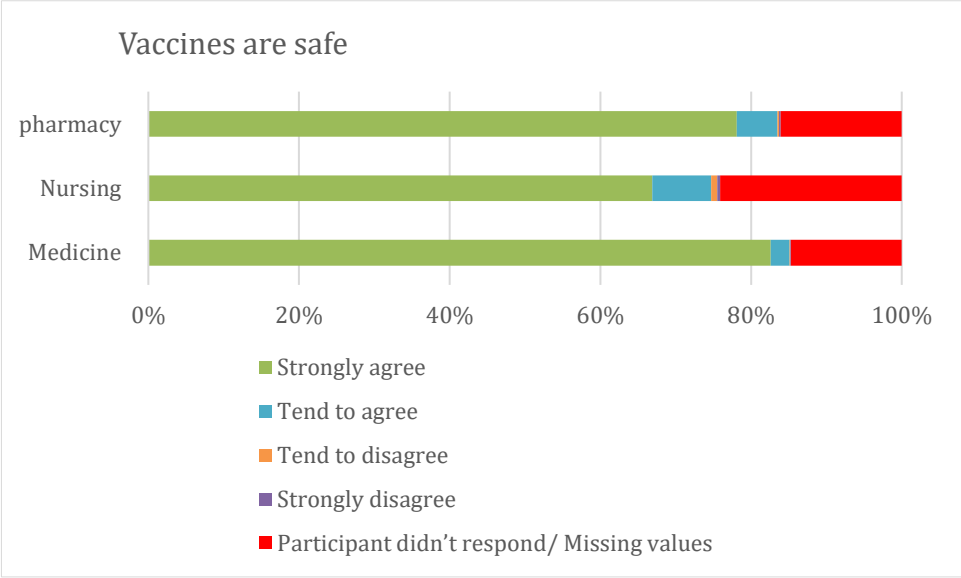


Fig 10: percentage of responding students by study type by stance on the question "Are vaccines safe?"

How strongly do you agree or disagree with the following statement about VACCINES? OVERALL, i think vaccines are effective						
	Strongly agree	Tend to agree	Tend to disagree	Strongly disagree	Don't know/ No response	Participant didn't respond/Missing values
Medicine	70.7%	14%	0.3%	-	0.3%	14.7%
Nursing	49%	24.5%	1.6%	0.4%	0.8%	23.7%
pharmacy	67.9%	15.2%	0.7%	-	0.3%	15.9%
Other	65.2%	18.8%	0.7%	-	-	15.2%

Table 11.3: Measure of frequency based on the type of education of participants agreeing/disagreeing with statements about vaccines

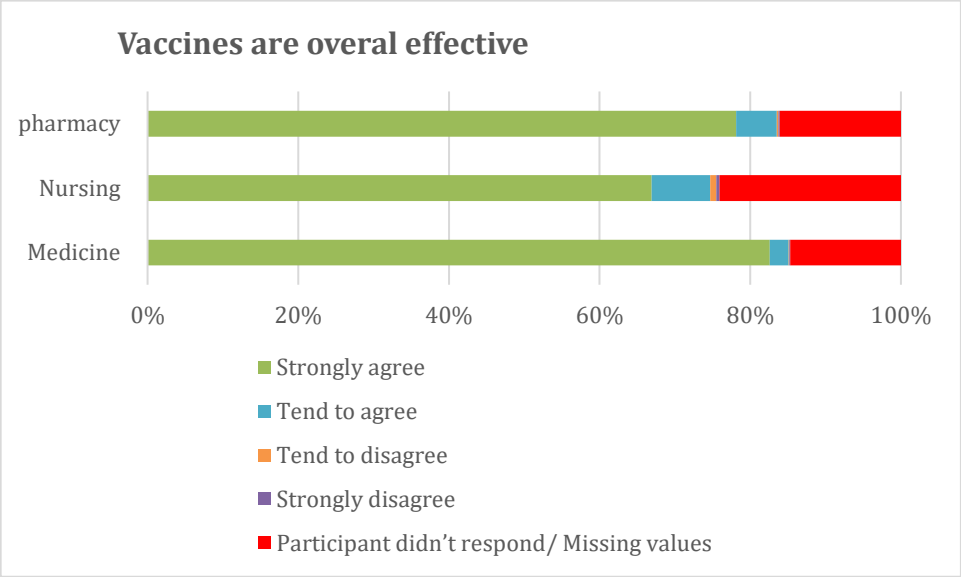
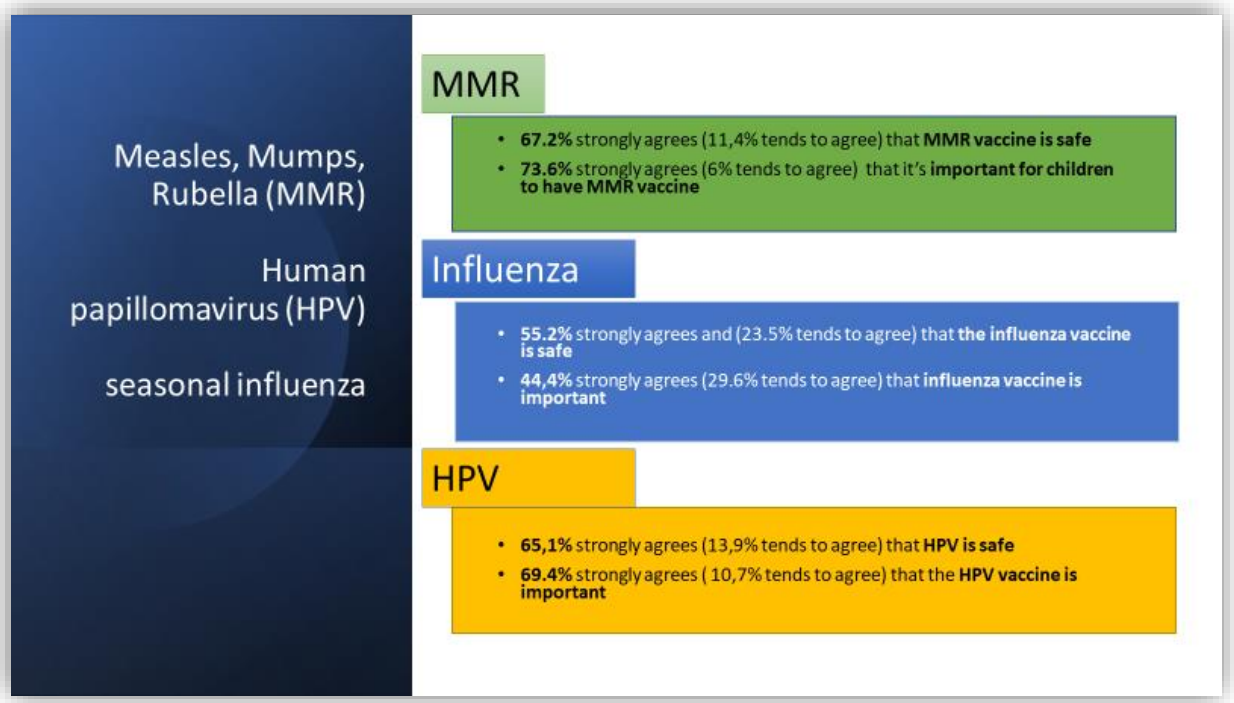


Fig 11: percentage of responding students by study type by stance on the question "Are vaccines overall effective?"

How strongly do you agree or disagree with the following statement about VACCINES? VACCINES ARE COMPATIBLE WITH MY RELIGIOUS BELIEFS						
	Strongly agree	Tend to agree	Tend to disagree	Strongly disagree	Don't know/ No response	Participant didn't respond/Missing values
Medicine	75.4%	2.4%	0.1%	0.3%	7.1%	14.7%
Nursing	55.9%	7.8%	2.9%	2%	7.8%	23.7%
pharmacy	69.4%	4.1%	0.9%	1%	8.8%	15.8%
Other	68.8%	4.3%	1.1%	2.2%	8.7%	14.9%

Table 11.4: Measure of frequency based on the type of education of participants agreeing/disagreeing with statements about vaccines

The survey further investigated the view of healthcare students about specific vaccines such as Measles, Mumps, Rubella (MMR), Human papillomavirus (HPV) and seasonal influenza vaccines. The participants were asked how strongly they agree or disagree with the statement shown in Table 12. **67.2%** strongly agree that **MMR vaccines are safe**, **55.2%** strongly agree and 23.5% tend to agree that **the influenza vaccines are safe**. The participants were further asked how important they think it is to have these vaccines. **73.6%** strongly agree that it is **important for children to receive MMR vaccines**, **44.4%** strongly agree and 29.6% tend to agree that **influenza vaccines are important**, and **69.4%** strongly agree that the **HPV vaccine is important**.



How strongly do you agree or disagree with each of the following statements about the MMR, HPV and seasonal influenza vaccines?

	Strongly agree	Tend to agree	Tend to disagree	Strongly disagree	Don't know/ No response
Overall, I think the Measles, Mumps and Rubella (MMR) vaccine is safe	67.2% (2363)	11.4%(399)	0.5% (17)	0.1 (2)	20.9% (734)
Overall, I think the seasonal influenza vaccine is safe	55.2% (1942)	23.5% (826)	2.6% (91)	0.3% (11)	18.4% (645)
Overall, I think the Human Papillomavirus (HPV) vaccine is safe	65.1% (2288)	13.9% (489)	1.6% (57)	0.2% (7)	19.2% (674)
Overall, I think the Measles, Mumps and Rubella (MMR) vaccine is important for children to have	73.6% (2588)	6.0% (211)	0.5% (16)	0.1% (2)	19.9% (698)
Overall, I think the seasonal influenza vaccine is important	44.4% (1559)	29.6% (1041)	6.3% (220)	1.0% (34)	18.8% (661)
Overall, I think the Human Papillomavirus (HPV) vaccine is important	69.4% (2440)	10.7% (375)	1.5% (51)	0.2% (8)	18.3% (647)

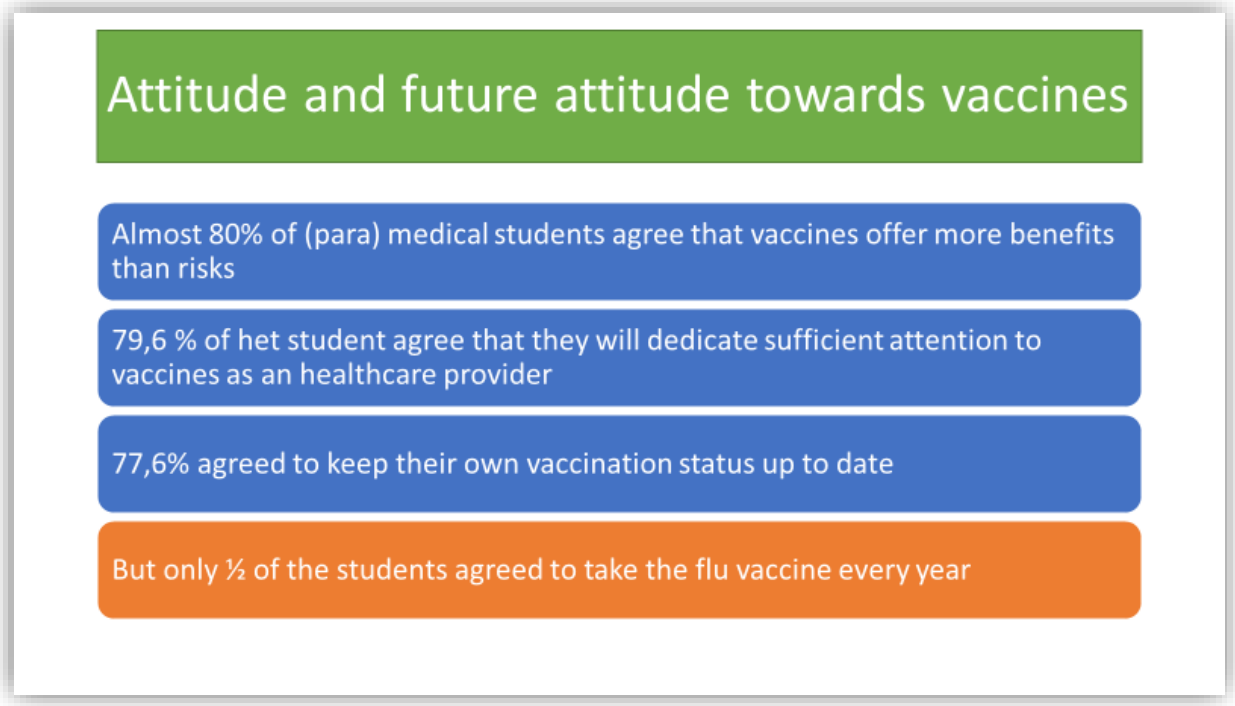
Table 12: Measure of responses of survey participants agreeing/disagreeing to statement about MMR, HPV and Influenza vaccine

In order to understand and analyze para-medical students' attitudes towards vaccination, participants were asked their opinion about different statements concerning vaccines, such as responsibility as a healthcare provider towards vaccines, towards recommending vaccines, including the Covid-19 vaccine, and taking vaccines themselves. Table 13 below summarizes the reported responses.

- **71.9%** of the para-medical students **strongly** agreed **that vaccines offer more benefits than risks, 9.3%** tend to agree that vaccines offer more benefits than risks.
  18.1% didn't know or didn't respond whereas

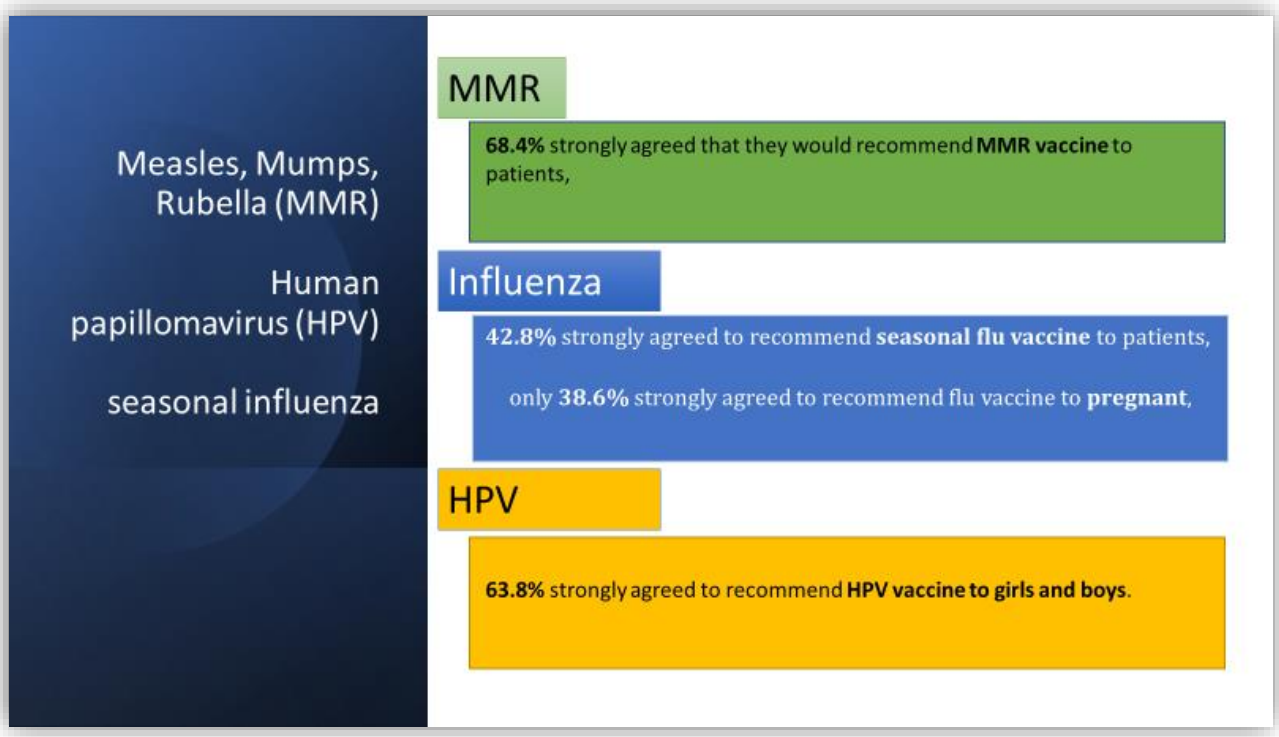
- **64.6%** strongly agreed that as a healthcare provider **they will dedicate sufficient time to vaccines, 15.2%** tend to agree and **19%** didn't know or didn't respond whereas

- **61.8%** strongly agreed that they will keep their **own vaccination schedule up to date** at all times and **only 27.8% strongly** agreed (27.6% agreed) to take the flu vaccine each year.



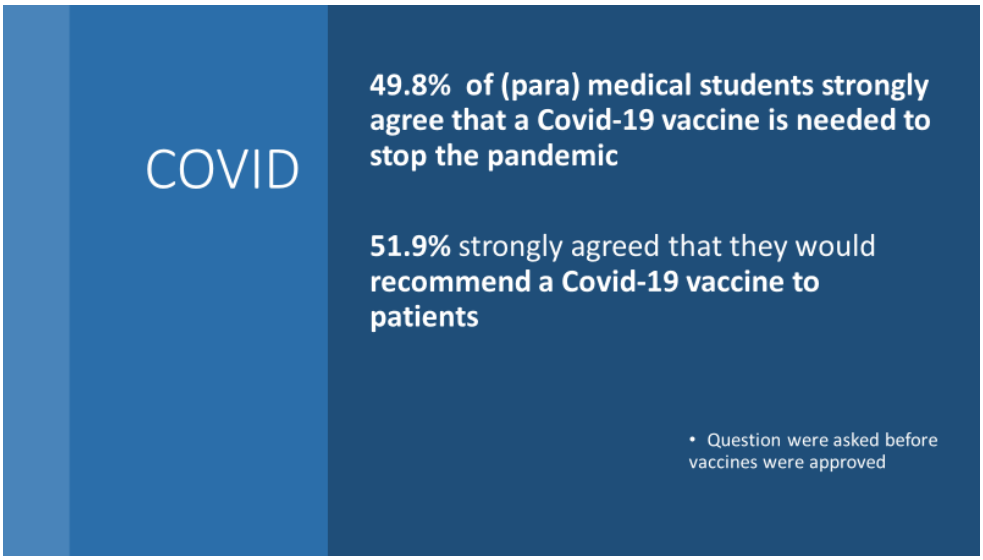
The survey participants were also asked if they would recommend different vaccines to patients, as a future healthcare provider;

- **68.4%** strongly agreed that they would recommend **MMR vaccine** to patients,
- **42.8%** strongly agreed to recommend **seasonal flu vaccine** to patients,
- only **38.6%** strongly agreed to recommend flu vaccine to pregnant,
- whereas **61.4% strongly agreed** to recommend appropriate vaccines to **pregnant women**, and
- **63.8%** strongly agreed to recommend **HPV vaccine to girls and boys**.



The survey participants were also asked for their opinion on the **Covid-19** pandemic and vaccination.

- Only **49.8%** of the survey participants strongly agreed that they are convinced **that a Covid-19 vaccine is needed to stop the pandemic** and
- **51.9%** strongly agreed that they would **recommend a Covid-19 vaccine to patients**. It is important to note that this questionnaire was finished before the first Covid-19 vaccine was approved/authorized for emergency use.



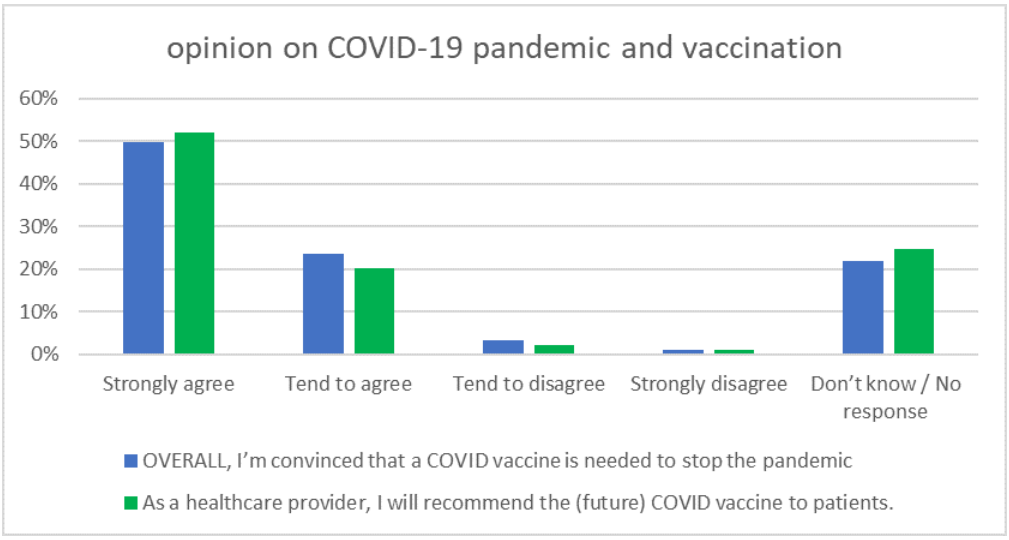
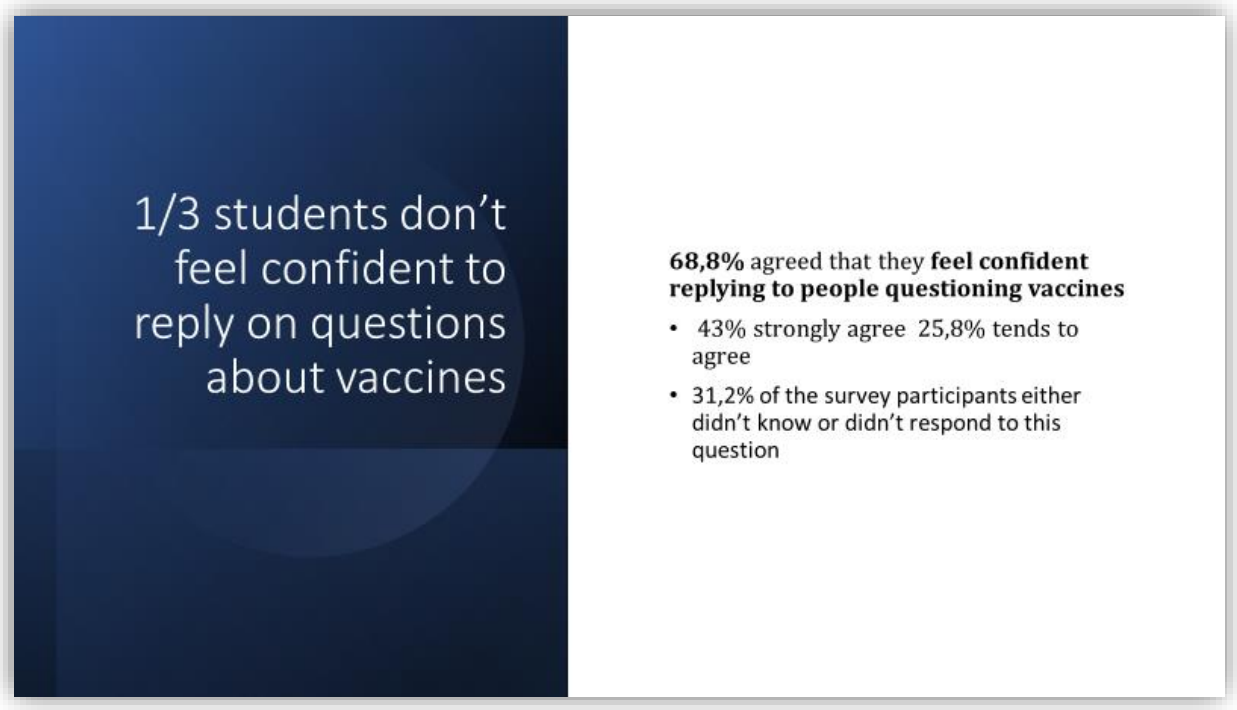


Fig 12: opinion of (para)-medical students on the COVID-19 pandemic and vaccination
-note: this questionnaire was completed when no approved COVID vaccines were available

This section also focused on determining if the para-medical students feel confident to communicate about vaccines.

- **43%** strongly agreed that they **feel confident replying to people questioning vaccines**,
- **25.8%** tend to agree and
- 22% of the survey participants either didn't know or didn't respond to this question.



How strongly do you agree or disagree with each of the following statements?					
	Strongly agree	Tend to agree	Tend to disagree	Strongly disagree	Don't know / No response
OVERALL, I am confident that vaccines offer more benefit than risks	71.9% (2529)	9.3% (326)	0.5% (17)	0.1% (4)	18.1% (639)
As a healthcare provider, I will dedicate sufficient attention to vaccines	64.6% (2270)	15.2% (536)	1.0% (35)	0.1% (5)	19% (669)
I will keep my vaccination status up to date at all times	61.8% (2171)	17.5% (616)	1.2% (42)	0.3% (9)	19.2% (677)
As a healthcare provider, I will recommend the Measles, Mumps and Rubella (MMR) vaccine to patients	68.4% (2404)	9.2% (322)	0.5% (16)	0.1% (4)	21.9% (769)
I will take the seasonal flu vaccine every year	27.8% (977)	27.9% (979)	13.2 (465)	4.8%(169)	26.3% (925)
As a healthcare provider, I will recommend the seasonal flu vaccine to patients	42.8% (1505)	28.7 (1008)	5.3% (187)	0.8% (27)	22.4% (788)
As a healthcare provider, I will recommend the seasonal flu vaccine to pregnant women	38.6% (1358)	20.1% (706)	4.7 (166)	1.2% (42)	35.4% (1243)
As a healthcare provider, I will recommend appropriate vaccines to pregnant women	61.4% (2158)	12.9% (452)	1.2% (43)	0.5% (19)	24 (843)
As a healthcare provider, I will recommend the Human Papillomavirus (HPV) vaccine for girls & boys	63.8% (2244)	12.1% (425)	1.7% (58)	0.6% (21)	21.8% (767)
OVERALL, I'm convinced that a COVID vaccine is needed to stop the pandemic?	49.8% (1752)	23.6% (830)	3.4% (121)	1.1% (40)	22% (772)
As a healthcare provider, I will recommend the (future) COVID vaccine to patients.	51.9% (1824)	20.2% (709)	2.2% (79)	1% (35)	24.7% (868)
OVERALL, I feel confident replying to people questioning vaccines	43% (1513)	25.8% (907)	7.5% (263)	1.7% (60)	22% (772)

Table 13: Measure of frequency of survey participants agreeing and disagreeing with the statement concerning recommending vaccines to patients, communicating about vaccines and keeping up to date their own vaccine schedule.

The survey also focused to understand the attitudes of current para-medical students as a future healthcare provider and the roles they foresee themselves playing as a healthcare provider in their country of residence. Survey participants could choose multiple options.
Medicine students believe their role as a future HCP to be: 25% to be dispensing vaccines, 12.4% developing vaccines, 47.3% vaccinating, 40.9% foresee it as active promotion of vaccination and 22.4% believe to be integral part of delivering the vaccine programs.
Nursing students believe their role as HCP to be: 22.9% believe to be involved in dispensing vaccines, 49% vaccinating, 22% focused on passive advice and support to patients, 44.1% foresee actively promoting vaccination, and 18% believe they would be integral part of delivering vaccines (Table 14).

The survey respondent who chose Other as one of the options were asked to elaborate on their role as a future HCP. **Majority of the participants chose other because they didn't know what their role could be as a future HCP**.

What role do you believe you will HAVE? when working as a healthcare provider, related to vaccination in the country IN WHICH YOU ARE BASED?									
	Dispensing vaccines	Developing vaccines	Vaccinating	Not vaccinating	Passive advice	Active promotion of vaccination	Integral part of delivering the vaccine programs	No role	Other
Medicine	25%	12.4%	47.3%	0.5%	40.9%	63.2%	22.4%	2.6%	0.6%
Nursing	22.9%	9%	49%	1.2%	22%	44.1%	18%	5.3%	1.2%
Pharmacy	44.3%	32.6%	34.4%	7.4%	56.9%	48.4%	22.2%	4.7%	1.2%
Other	9.1%	34.4%	19.6%	1.1%	25%	35.1%	15.2%	10.1%	2.2%

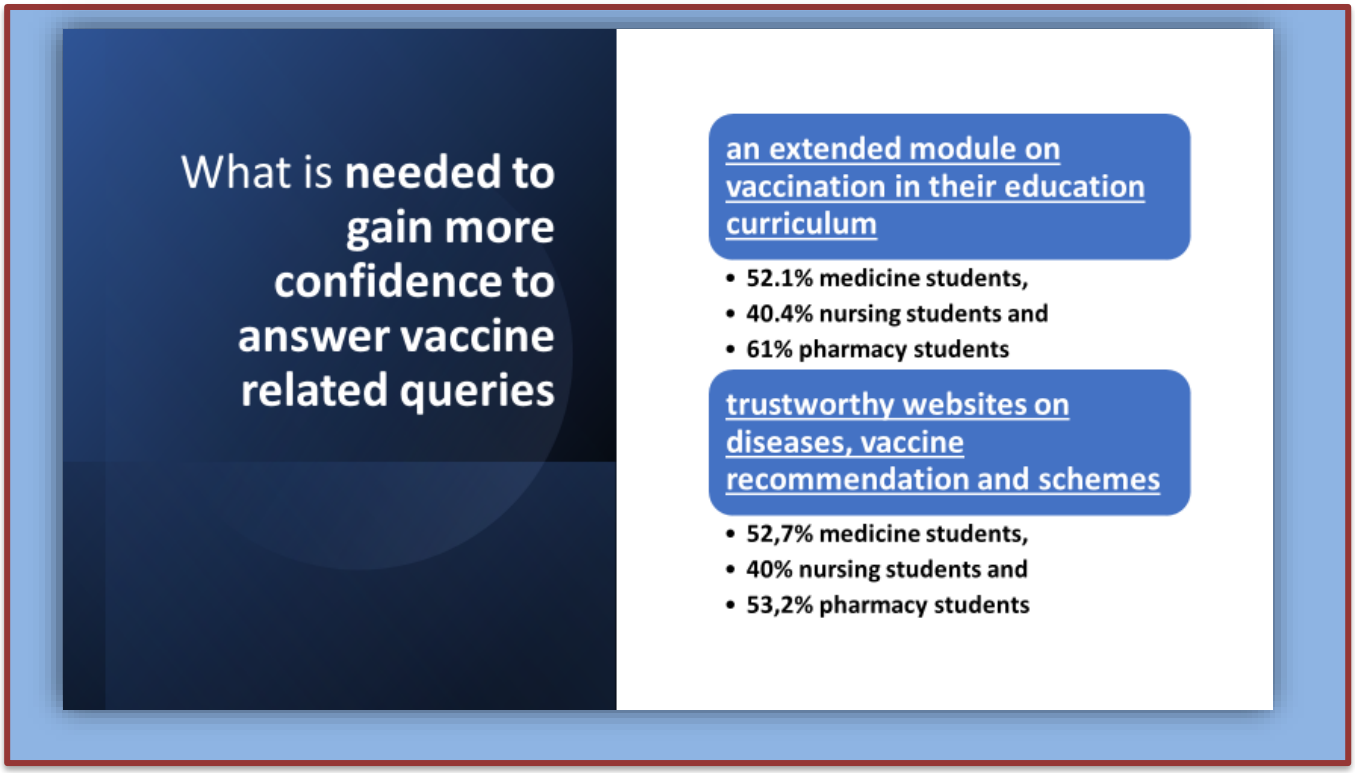
Table 14: Participants were asked to choose as many options as applicable. The outcome is reported in number of times each option was chosen.

The survey participants were asked what they would **need to gain more confidence to answer vaccine related queries**. The responses are split on the type of education to better understand the added value of each suggestion proposed in the respective type of education. Majority of the participants such as **52.1% medicine students, 40.4% nursing students and 61% pharmacy students** reported that they would **need an extended module on vaccination in their education curriculum to confidently answer vaccine related questions**.
52.7% medicine students, 40% nursing students and 53.2% pharmacy students reported that trustworthy **websites on diseases, vaccine recommendation and schemes** would be needed as well (Table 15).

What would you need to gain confidence to answer vaccine related questions or anti-vaccine statement and opinions? Select all that apply							
	Extended module on vaccination in my education curriculum	Trustworthy website or app with information on diseases, vaccines, recommendations & vaccination schemes	Other information sources, like leaflets, reference works, YouTube videos	FAQ system (e-system to find the answers to frequently asked questions)	Government recommendation campaigns	24/7 helpline (via telephone or email)	Other
Medicine	52.1%	52.7%	27.8%	35.5%	46.7%	14.7%	1.3%
Nursing	40.4%	40%	22.9%	19.2%	30.6%	12.2%	0.4%
pharmacy	61%	53.2%	28%	32.8%	41%	17.9%	0.7%
Other	50.7%	44.6%	28.6%	26.1%	35.9%	12%	0.4%

Table 15: Participants were asked to choose as many options as applicable. The outcome is reported in number of times each option was chosen.to indicate what would be needed to increase the confidence in answering vaccine related questions

The responders who chose Other as an option were asked to elaborate in an open text entry box. Some of the reported responses were awareness campaigns, easier access to valid information about vaccines, building and promoting continuous dialogues among colleagues, trustworthy articles, understanding concerns of anti-vax population, early education on vaccination, denouncing fake websites, vaccine focused workshops, hand on learning experience on vaccine communication among para-medical students



Conclusions of the student survey

Thanks to the collaboration with the student organisations represented in the Coalition for vaccination, **European Medical Student Association (EMSA), European Nursing Student Association (ENSA), European pharmacy Student Association (EPSA), European Midwives Student Association,** we had a very high participation rate on the different types of healthcare workers in the different European countries. As we are dealing with a large data set, to draw correct conclusions we should first do a very profound statistical analysis, but meanwhile from the descriptive analysis we can already draw some trends and preliminary conclusion.
The overall result after the descriptive statistical analysis of 3515 responses on the EU JAV student survey done in light of the Sub-task 4.3.1.3: Sustainable guidelines for learning outcomes and the workplan of an Immunization course or module in the pre-service training could be summarized as follow:

- **Vaccination status of Students**
  - Most of the students who participated in this survey were fully vaccinated
- **Student's knowledge**
  - Most of the students indicate to know the childhood vaccination recommendations in their country
  - But they are less aware about the recommendation for pregnant women, travellers and people with underlying chronic diseases
  - In general nurses are better informed
- **Attention given to vaccination in their curriculum**
  - 1/5 students responded that little information on vaccination was covered in their curriculum especially for nurses and pharmacist; they especially were missing: Practical skills, communication about vaccines, immunization policies and recent and future developments
  - Almost half of the students who participated in this survey mentioned that too little time was spent on vaccination in their curriculum and that major parts were missing in their curriculum.
- **Student's attitude towards vaccines and vaccination**
  - The majority of the student responded that they strongly agree that vaccine is important for children but more than one third are doubting that vaccines are safe and overall effective
  - In particular, the effectiveness and safety of influenza and HPV vaccines is questioned less than that of MMR vaccines, resulting in less than half of the students willing to recommend seasonal flu vaccines to their future patient, compared to 1/3 who don't agree to strongly recommend HPV vaccine to girls or boys.
  - COVID (at the time of the survey no COVID vaccine was yet approved): only half of the students strongly agreed that COVID vaccine was needed to stop the pandemic and would recommend vaccination
- **Student's vaccine confidence**
  - More than 1/3 students don't feel confident to reply on questions about vaccines
  - Half of the Medicine, nurses and especially pharmacy student indicate that an extended module on vaccination in their education curriculum as well as a trustworthy website on diseases, vaccine recommendation and schemes could help to increase their confidence to answer questions on vaccines.

These results supported the idea that improved education on vaccination in the different (para) medical educations in Europe needed some improvement to secure future vaccination programs.

Besides serving as a basis to advocate for improving the curriculum of future HCPs by including a more extensive vaccinology module, the extensive database of the EU JAV students' survey needs some further statistical analysis to give more specific advised on local and specialism level if statistically justified. The usefulness of this profound and in-depth analysis will be first investigated but meanwhile all data will be shared with EPSA, ENSA and EMSA for a more targeted approach in the different (para)-medical education types. It may support EPSA ENSA and EMSA within their organisations to improve training on vaccination amongst their members.

Part 3: Develop criteria and evaluation tools for optimal in-service training in immunisation

Introduction

Based on the outcome of sub-task 4.3.1.1. and 4.3.1.3 it has become clear that an optimal in-service and pre-service training in immunization is needed and would be appreciated by HCPs. For that purpose, a curriculum for in-service training was drafted to meet the educational requirements of HCPs.
As the curriculum should be tailored to the needs of the HCPs, the curriculum is made up of modules. Based on the input of the Vaccine Training Barometer, specific trainings can be tailored to the individual or group needs of the target population.

By using this approach, an all-inclusive curriculum has been created, that is suitable for all types of HCPs that are involved in the vaccination process, as well as students following their standard education to become an HCP.

Methods

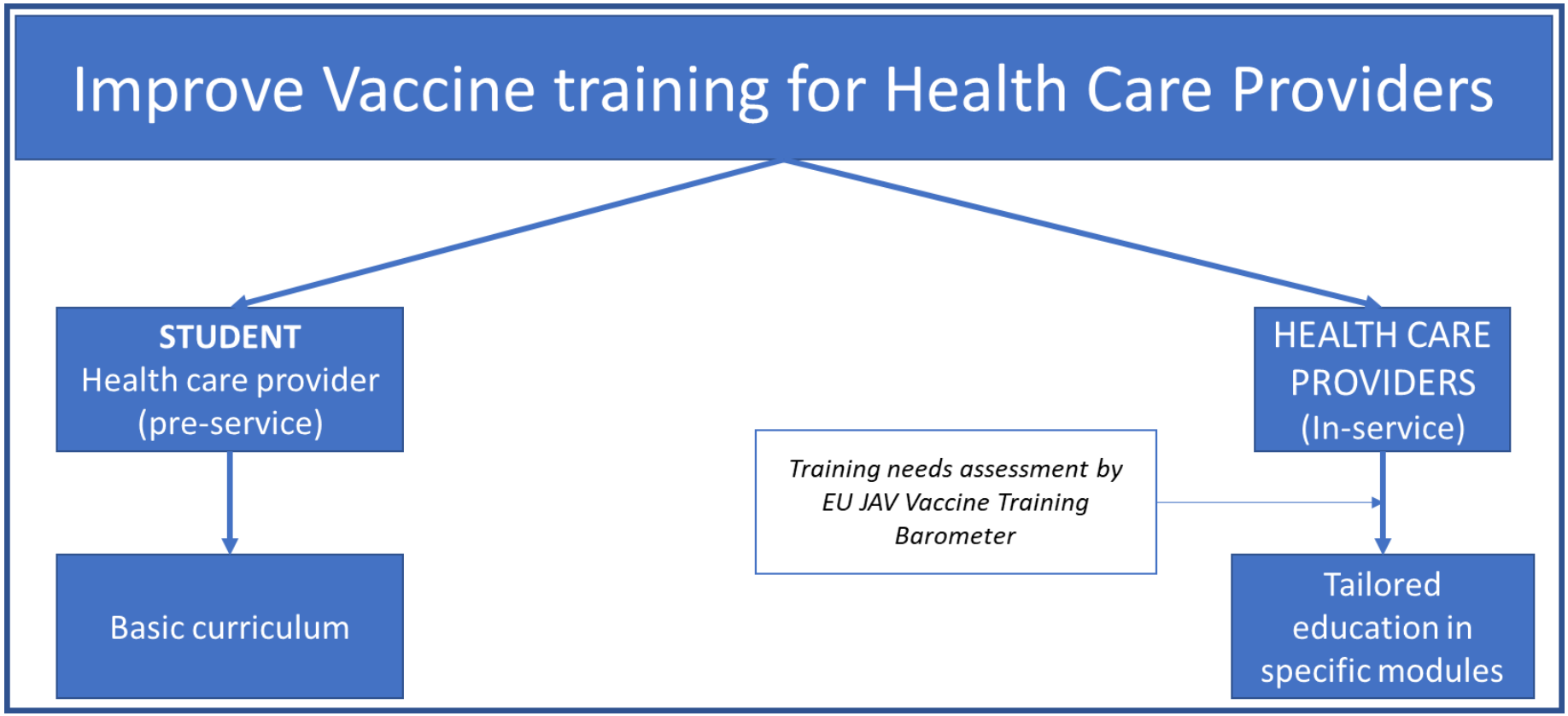
The basis of the curriculum was the outline of many available courses on immunisation, such as the VACSATC criteria, ECDC materials, WHO materials, all European courses listed in the global vaccinology training e-portal and other found via Google search/collaborating networks. The curriculum has been revised in light of the changed needs of the HCPs related to the COVID-19 pandemic (ex. Focus on communication about vaccines and development of new vaccines). Please note that an abundance of new materials has been published in 2020-2021. The curriculum was reviewed by experts in vaccinology and communication.

Results

The curriculum is shown below.

Curriculum Vaccines and Vaccination for Health Care Providers and Students

Co-funded by
the Health Programme
of the European Union



Health Care providers*: Nurses, Midwives, Pharmacists, Medical doctors and all other persons and involved in all facets of vaccination from the administering, counselling, to organising vaccination

Sources for updated Curriculum

1. Basis:

A summer school on vaccinology: Responding to identified gaps in pre-service immunisation training of future health care workers. Vorsters A, Tack S, Hendrickx G, Vladimirova N, Bonanni P, Pistol A, Metlicar T, Pasquin MJ, Mayer MA, Aronsson B, Heijbel H, Van Damme P. Vaccine. 2010 Feb 25;28(9):2053-9. doi: 10.1016/j.vaccine.2009.12.033. Epub 2009 Dec 25.

2. 2019/2021 Revision
   - ECDC guidelines for mid-career professionals: https://www.ecdc.europa.eu/sites/default/files/documents/VPD%20Competencies%20Training_Short_Technical%20report_final_0.pdf
   - John Hopkins course
   - Curricula Spain (Angela Dominguez Garcia, angela.dominguez@ub.edu)
   - https://www.global-vaccinology-training.com/ (European courses; 1/10/2019)
   - Directive on Mutual Recognition of Professional Qualifications (2005/36/EC) and amended version (Directive 2013/55/EU) and EFN Competency Framework
   - CanMEDS criteria
   - Summer School on Vaccinology annually organized by the Center for evaluation of Vaccination, Vaccine and Infectious disease institute (VAXINFECTIO) University of Antwerp, Belgium
   - Expanded Programme on Immunization Prototype Curriculum for nursing/ midwifery schools in the WHO African Region (2015)
   - https://www.tephinet.org/training-programs (2020) --> no curriculum available
   - LIVE (with the support of the Erasmus+ Programme of the European Union): addition from Global vaccinology training e-portal (region: Europe, 08/03/2021)
   - Vaccinology training program – Emory University School of Medicine
   - Advac course program 2021
   - Imvacc international master in vaccinology
   - Human and Veterinary Vaccinology – Department for continuing education, University of Oxford
   - Clinical vaccine development and biomanufacturing – Department of continuing education, University of Oxford
   - Center for vaccine development and global health vaccinology course – university of Maryland, School of medicine
   - Literature overview: (Dutch) Vaccine communication – report Aurélie De Waele (overheidsopdracht)

This curriculum is freely available on EU JAV - Curriculum | Centre for Evaluation of Vaccination | University of Antwerp (uantwerpen.be)

Co-funded by
the Health Programme
of the European Union

Curriculum Vaccines and Vaccination

Health Care Providers * Health care Students

Module		Target group	Minimum Content Basic Curriculum	MAXIMUM content In depth Education	Learning outcome
			Training Content		
	Topic	**STU** (student/ pre-service) **HCP** (Health care provider/ In-service)	*This represents the minimum material that all trainers/curriculum managers should include in STU/HCP training, to be presented in the format and order most suitable to the students' existing knowledge and needs*	*This represents material which may be presented additionally to STU/HCP, depending on existing knowledge of students (based on assessment) and their anticipated role in delivering vaccines.*	
Rationale, context and history of	History	STU	Vaccines in their historical perspective		Learn from the past to better answer questions about vaccines and understand the context of vaccinology
		STU/HCP	historical impact of vaccine-preventable diseases		
	Context	STU/HCP	The rationale for implementing immunisation programmes		
		STU/HCP	Concepts of control, elimination and eradication related to vaccine-preventable diseases in historical		

			perspective, including the importance of herd immunity		
		STU/HCP		Long term implications of vaccine programmes	
		STU/HCP		"One Health" approach (One Health (who.int))	
	Definitions	STU/HCP	List of different key-words + explanation		Understand conversation about all topics of vaccines and vaccination
	Stakeholders	STU	Who is involved		Knowing all stakeholders and their role in the vaccination process
		STU/HCP	Role of all stakeholders in the vaccination process focusing on the health care providers		
		STU/HCP		National/region legislations Professional guidelines and directives: - CanMEDS Physician Competency Framework EU directive 2013/55/EC (EFN Competency Framework)	
Vaccine Immunology and	**Immune system**	STU	Introduction to the Immune System		Explain what the role is of the immune system to people interested in vaccination
		STU/HCP	Compare innate and adaptive immunity		
		STU/HCP	State the functions of B-cells and T-cells		
	Immune response	STU/HCP	The role of antibodies and antigens		Explain the role of the immune system after vaccination
		STU/HCP	Vaccine-induced vs. naturally gained immunity		

		STU/HCP	Immune response to a vaccine	Immune response to innovative vaccines (incl Therapeutic vaccines)	
		STU/HCP	List conditions that affect the immune response		
		STU/HCP	Assessment of the capacity of the immune system		
		STU/HCP	Primary and secondary immune response (booster)		
		STU/HCP	Vaccines and immunological memory; how long does a vaccine protect against a vaccine-preventable disease		
		STU/HCP		Immune system of new-borns, pregnant women and elderly	
		STU/HCP		The role of maternal antibodies	
		HCP		Immunology and cancer	
		HCP		Mucosal immunity	
		HCP		Interactions between the immune system and microbiota	
		STU/HCP	Key words/ key abbreviation list		

Key aspects vaccine safety,	Vaccine	STU	Definition of a vaccine		Explain the different types of vaccines and their composition – the importance of intervals of schedules
		STU/HCP	Prophylactic and Therapeutic vaccines		
		STU/HCP	The components and composition of vaccines, incl. vaccine adjuvants, and explain their function		
		STU/HCP		In dept, the role of the different adjuvants	
		STU/HCP	different types of vaccines		

		STU/HCP	Co-administration of vaccines and importance of intervals between vaccines/schedules		
		HCP		Switching between vaccines of different manufacturers	
	Side-effects and limitations	STU/HCP	Expected side-effects per type of vaccine, limitations and non-specific effects		Identify and explain possible side effects and contra indications of the different vaccines
		STU/HCP	Assessment of causal relationships between vaccines and side-effects		
		STU/HCP	Contraindications for each type of vaccine		
		STU/HCP	Vaccination before pregnancy (child wish), during pregnancy and during breastfeeding		
	Vaccine development	STU/HCP	The stages in vaccine development, including quality management: ○ discovery, ○ preclinical testing, ○ process development, ○ manufacturing, ○ clinical development, ○ immune response analysis, ○ regulatory affairs, ○ activity outsourcing ○ GMP, ICH Guidelines of Good Clinical Practice		You can answer questions of patients (laymen) on the development of vaccines
		STU/HCP	Clinical Vaccine trials – Why, When, how		

		HCP		difference between pharmaco-vigilance (after authorisation) and clinical trial information	
		STU/HCP		Funding sources for vaccine development and research	
		STU/HCP		Criteria of the vaccine industry for the choice of developing a new vaccine; Go / no-Go in the vaccine development process	
		STU/HCP	The role of animal science in vaccine development		
	Vaccine safety and quality	STU/HCP	Procedures of safety control and monitoring of efficacy: difference between pharmaco-vigilance (after authorisation) and clinical trial information		Explain how safety of vaccines can be secured
		STU/HCP	Role of regulatory agencies in vaccine testing and licensure		
	Vaccine manufacturing	STU/HCP	List Vaccine manufacturers		Explain the role of industry in the vaccination process
		STU/HCP		The importance of GMP in production of vaccines	
		STU/HCP		Role of vaccine industry for meeting global needs; Globalisation of vaccine production	
		HCP		Vaccine Manufacturing	
		STU/HCP		Explain procedures related with emergency use authorization	
		STU/HCP		Vaccine availability issues -out of stock issues	

Vaccine preventable diseases	Disease epidemiology	STU/HCP	the epidemiology and pathology (nature, frequency, infection, transmission, effects, incubation, symptoms, complications, surveillance, mutations), incidence, prevalence, burden of disease, degree of endemicity for each disease		Explain the severity of the vaccine preventable disease (in your country)
		STU/HCP		Pathogen variability and host-pathogen interactions	
		STU/HCP	The current prevalence and/or incidence of each disease (in your country)	The current prevalence and/or incidence of each disease, in Europe and on a global scale	
			Disease prevention and management (outbreak management) – how to prevent spread of disease		Explain preventive measures
	Vaccine strategy	STU	The importance of pathogens for vaccination strategies		Explain why vaccines are recommended or mandatory for certain people in your country (region)
		STU/HCP	The population at risk for each disease; elaborate on immune compromised individuals, travellers, healthcare personnel, different age groups, pregnant women, occupational risk groups, patient risk groups, …		
		HCP		Preventive measures can be taken for each disease	
		STU/HCP	Historical impact of vaccination on the epidemiology and the burden of disease of the relevant diseases.		
	Source of information	STU/HCP	sources of information about the diseases, epidemiology and their		Know where to find information on vaccine preventable disease and vaccines

			vaccines / list (local) reliable sources for vaccine information		
Immunization policy and schedules	Infection Control	STU/HCP	infections spread; outbreaks and control		Explain how prevention can stop the spread of a disease and why prevention activities including vaccines are installed.
		STU/HCP	Herd immunity and its importance		
		HCP (STU)		why mathematical modelling of diseases is used and how it is a tool in analysing vaccine policy options	
		STU/HCP		The role of economic evaluation of a vaccination programme	
		STU/HCP		Funding of vaccination programs and vaccines, including cost-effectiveness/cost-benefit	
	Vaccine policy	STU/HCP	The different factors and stakeholders involved in evidence-based policy decisions		You can explain which stakeholders are involved in the vaccination policies that affects the person who asked the question and how decisions are taken
		STU/HCP	How national schedules are defined; which vaccines are part of routine immunization schedules and which vaccines are recommended additionally		
		STU/HCP		Country specific immunization program management	
		STU/HCP	The organisation and role of disease surveillance systems		
		STU/HCP	Legislation – ethical issues on mandatory vs voluntary vaccination;		

			Should we enforce mandatory vaccination?		
		STU		How to develop a new program of immunization	
	Vaccination coverage/ monitoring	STU/HCP	Vaccination monitoring – Immunization reporting system		Explain the success or failure of the vaccination program
		STU/HCP		Why and how to document a vaccination correctly in all relevant records	
		STU/HCP	The role and importance of vaccination coverage data		
		STU/HCP	Name factors that influence immunisation coverage		
		STU/HCP		Success stories in under-served populations (migrants, prison, special religious groups ….) and how to follow up migrant populations (tailored immunization programs)	
		STU/HCP		Historical changes in national vaccination programs	
		STU/HCP		Differences in access to vaccination in different countries and on a global level	
		STU/HCP	How immunisation programmes are monitored and evaluated (importance of post-vaccination surveillance, how to record vaccine related adverse effects)		
		STU/HCP		How to Access and use current vaccine schedules, deal with variations and find their updates	

		STU/HCP		Catch-up campaigns, vaccine registration, outbreak response and vaccination policy towards special populations	
		HCP	Vaccination coverage by age for vaccine-preventable-diseases such as measles, flu, HPV and COVID-19		
Future perspectives	New Vaccines	STU/HCP	List new target diseases		Explain what vaccines can be expected in the future
		STU		Processes of early clinical development	
		STU/HCP	Which vaccines are in the pipeline		
		STU/HCP		New Therapeutic vaccines	
	New administration techniques	STU/HCP	New ways of administration		Knowing which new techniques will be available soon.
		HCP		Current research on components and techniques, eg. Vaccinomics: the future of vaccinology?	
		HCP		Current developments for HIV, dengue, malaria, hepatitis C, …	
		HCP		Fighting co-infection by vaccination	
		STU		Education and formation in vaccinology: new methods	
Understanding, active	**Understanding behaviour and barriers & active listening**	STU/HCP	Determinants of vaccine hesitancy/acceptance: Understand issues that affect and influence potential vaccinees, parents and caregivers in their decision-making and acceptance of vaccination		Listen and understand public/vaccinee perceptions that affect vaccination acceptance

		STU/HCP	Understand the importance of public perception		
		STU/HCP	Understand provider-patient negotiation		
				Respect differing views through listening	
		STU/HCP	Listen non-judgmentally to health beliefs and research parents do about vaccination		
		STU/HCP	Acknowledge the anxiety of individuals		
		HCP	Gain insight in the perceptions and attitudes of the different population and of health care workers towards (specific) vaccines (how do concerns vary in the different groups and how should communication should be adapted)		
		STU/HCP	Understand the difference between vaccine hesitancy and antivax sentiments. the need to avoid 'categorising' people: every case is different and requires a different approach. Adapt Languages/words		
		STU/HCP		Insight in current anti-vax and vaccine hesitancy (data)	
		HCP	Understand the relation between vaccine hesitancy and vaccine refusal/acceptance		
		STU/HCP	Acknowledge the role of the health care worker in vaccine acceptance. How to build a relation based on trust		

	Communication Theory and practice	STU/HCP	Principles of communication on vaccination ○ Monitoring & research, ○ content of the message, ○ formulation of the message, ○ messenger, receiver (target group) ○ channels		Possess the communication skills to improve vaccine acceptance
		STU/HCP	Be committed to offer the best professional advice on vaccination		
		STU/HCP	How to communicate about vaccine effects and the role of vaccination among other preventive measures		
		STU/HCP	State key facts, advantages and risks that need to be communicated		
		STU/HCP	Understand behavioural science principles to influence and change behaviour on vaccination; risk communication. communicating about uncertainty in science, side effects		
		STU/HCP	Myths/ misconceptions and facts relating to (current) immunisation controversies		
		STU/HCP	How to communicate and combat/debunk myths and misconceptions		
		STU/HCP		Critically evaluate media reporting of vaccine issues, understand the impact of social media & how to respond	

		STU/HCP	How to talk to the media (media training)		
		STU/HCP	How to deliver vaccinology-related messages to different subgroups / underserved populations		
		STU/HCP	List key points for responding to parents' fear		
		STU/HCP		Respond to objections raised by anti-vaccine movements, with careful consideration of the potential impact	
		HCP	Direct others to reliable and appropriate sources of trustworthy vaccine information		
		STU/HCP		Lessons learnt from the previous pandemic (COVID-19, Flu) – the defining role of Communication in this period	
Practical skills	**Administration – theory**	STU/HCP	Description of a correct immunisation site		Knowing the theoretical approach of all steps that will be necessary to administer vaccines. It may help to explain the vaccinee what will happen and why (vaccine confidence).
		STU/HCP	Different immunisation techniques + perform		
		STU/HCP	cold chain and the importance of its maintenance		
		HCP		Specify minimum/maximum temperatures for vaccine storage	
		STU/HCP	Identify vaccine sensitivity to light, heat and freezing		
		STU/HCP	Differences between vaccination of children, newborns and adults		

		STU/HCP	Correct dose and site of administration of all vaccines for each age group		
		STU/HCP	Overview of contraindications and side effects to be monitored		
		STU/HCP	Anaphylactic shock (Distinguish between anaphylaxis and fainting)		
	Administration Practice	STU/HCP	Check if all material/ safety concerns are available in the vaccination room/place		You know how to administer correctly a vaccine and you can perform is independently and correctly
		STU/HCP	Prepare and dispose vaccination equipment; waste management		
		STU/HCP	Assess if a patient is fit to receive safe and effective vaccination (assess contraindications/previous adverse reactions)		
		STU/HCP	Prepare vaccines, Reconstitute vaccines correctly		
		STU/HCP	Correct Administration (practice theory)		
		STU/HCP	Monitor possible side effects (inclusive anaphylactic shock) Early identification of signs and symptoms of occurrence of adverse reactions and anaphylactic reactions	Repeat if needed: interventions to coop side effects and anaphylactic reaction (life support)	
		STU/HCP		Communication tips to limit fear and build vaccination trust	
		STU/HCP	Vaccine and side effect registration		

Recommended use of this Curriculum – evaluation criteria of existing vaccination courses

The developed modular curriculum should be seen as an aid for curriculum managers to create an optimal training, to improve the knowledge and confidence of all health care providers so that they can be involved in all parts of the vaccination processes and at least can answer people's questions about vaccines.
Since we wanted to create a curriculum as complete as possible for healthcare professionals as well as for students, the curriculum became very extensive but has therefore been divided into different modules and sections so that it can be used in its entirety but also in parts depending on the needs of the target group.

Each module also was based on different leaning outcomes, which can be used as evaluation criteria for exciting course.

Before creating a vaccine training course for Healthcare providers as well as optimizations of the student curriculum is it recommended to survey the needs for training of the target population to investigate which topics or even complete modules should be included in the training.

To Facilitate the use of this curriculum a toolkit will be developed for each module to extensively describe them an to refer to existing trainings if available

Co-funded by
the Health Programme
of the European Union

Part 4: summary and sustainable outcome of the surveys and the In-service/ pre-service vaccinology trainings-module

Introduction

Following the Council Recommendations of 7 December 2018 *on strengthened cooperation against vaccine-preventable diseases* the European Commission published in May 2019 a Roadmap for the implementation of actions. In accordance with this Roadmap, the European Commission has convened a Coalition for Vaccination to bring together European associations of healthcare providers (HCPs) as well as relevant students' associations in the field, to commit to delivering accurate information to the public combating myths and exchanging best practice. With this action, the importance of all healthcare providers and their impact on vaccination coverage, not only during the pandemic but for all vaccination campaigns was underlined.

Since in different 'attitudes toward vaccination' studies, including the Eurobarometer (488), it was shown that HCPs were the most relevant and trusted source of information on vaccines for the general public, it is very important to improve the ability and confidence of these HCPs and health students, in communication on vaccination.

To investigate the training needs of the HCP, different surveys were developed and tested during this project:

The **Vaccine Training Barometer** has been developed in the form of an on-line survey to assess the need of in-service training of HCPs. The Barometer assesses a part of the HCPs in some EU-countries, measuring indicators of vaccine hesitancy and mapping unmet needs of in-service healthcare professional's training and communications skills. Through the barometer, HCPs gets the opportunity to report questions they receive from their patients, which they consider challenging for them and difficult to address. The willingness to follow extra training and the most appreciated format of this additional training are also surveyed with the Barometer. After performing the Vaccine training Barometer in a representative number of HCPs, this outcome will be helpful to optimize HCP training(s) offered by International (ECDC, WHO….) or national/regional health organizations (tailor-made trainings).
Repeating the survey over time (e.g., every six months) would provide insights into the evolving needs of the HCPs that are related to the current situation, and could also be used to evaluate the impact of training activities. The survey is currently available in Dutch, English and Spanish, and can be easily expanded with other languages. The web-based survey will be available for all potential interested institutions in the different member states.

Since health **students** (medical as well as para-medical) are the future vaccinators, it was important to evaluate the attention given to vaccinology in their education, their attitudes towards vaccination and their confidence to answer questions about vaccination. Thanks to the collaboration with the student organisations represented in the Coalition for Vaccination, the response of more than 3,500 students could be analysed. These results supported the notion that improved education on vaccination in the different (para) medical courses is needed to

better support the role of future HCPs in vaccination programs. The data of this survey can be used to convince students' organizations, curriculum managers, and public health heads in all the EU member states to invest in improving vaccine education of health students.

Based on the input of these different surveys, it became clear that an optimal in-service and pre-service training in immunization is needed and would be appreciated by HCPs. Therefore an **all-inclusive curriculum on vaccines and vaccination** has been created, that is suitable for all types of HCPs that are involved in the vaccination process, as well as future HCPs (health students following their standard education). In this curriculum all different topics are divided in 8 different modules with their specific learning outcomes: 1. Rationale, context and history of immunization, 2. Immunology/ immunopathology, 3. Key aspects vaccine safety, development, quality, 4. Vaccine preventable diseases, 5. Immunization policies and schedule, 6. Future perspectives, 7. Understanding, active listening and communication about vaccines and 8. Practical skills. The aim of this curriculum it to serve as a guideline for optimal in-service as well was pre-service HCP vaccination training, furthermore it can be used as a quality evaluation tool for existing trainings.
This curriculum adaptation proposal aims at being disseminated via EU Ministries of health and/or Education in charge of the curricula of future HCPs (through European Credits Transfer System [ECTS] points and within the mandate of the EUs).

Options for sustainability, integration and future activities

Vaccine Training Barometer

Options for integration at National level

- At the national level by each MS, the training barometer can assess the needs for vaccinology training of the HCPs, mapping unmet needs of in-service HCPs' training and communications skills and can be used as a barometer to monitor the HCPs' vaccines attitude in the country.
- The barometer can provide inputs for subsequent HCP trainings.

Options for sustainability at EU level

- The dissemination of the training barometer (results and methodology) could be undertaken by the Coalition for Vaccination.
    - It has already served as a basis for several European projects (H2020, EU HP-PJ-2020) and a survey ran within the scope of the EU project IMMUNION (2021-2023) and the Coalition for Vaccination. Results from the survey will be published on the IMMUNION website
- The renewed mandate of the ECDC, along with the Regulation on serious cross-border threats to health, highlight the role of the ECDC, with the support of the European Commission, to organize trainings for the healthcare staff. It is aimed at increasing preparedness in Member States, including vaccinology training; the Barometer in some selected population to better identify the needs in training across different countries.
- At EU-level, the training barometer could support training activities organized by EU bodies, in particular to evaluate needs prior to designing the trainings, but also as a tool to evaluate the effectiveness of the trainings, and the progress made by HCPs through a periodic assessment. The ECDC has recently commissioned the Association of Schools of Public Health in the

European Region (ASPHER) to conduct trainings needs assessment in vaccinology. Integrating the barometer could allow the ECDC to build this capacity from within in the future.

- The Barometer can also be used to collect frequently asked questions (FAQ) that could not be answered by the HCPs. This FAQ can be used to create a chatbot or a FAQ database to inform HCPs who doesn't feel confident to talk about vaccines.

Future steps

- Adapt the training barometer in more European languages;
- Further disseminate the Vaccine Training Barometer to all EU Member States, the Coalition for vaccination or other European health organisations;
- Perform in different countries and in specific situations trend analysis of Barometer's results, to further evaluate the monitoring capacity;
- Upgrade the barometer (if more funding available) based on the results of different countries results to make it applicable as an evaluation tool for training and communication needs.

All-inclusive curriculum vaccines and vaccination

Options for integration at National level

The in-/pre-service vaccinology module for medical and paramedical students could:

- Be used by EU Member States (via e.g. academia, deans, curriculum managers, public health responsible,…) to reinforce their pre-service and in-service training curricula
- Be disseminated via Ministries, via student associations, universities/medical schools or by collaborating with DG Education

Options for sustainability at EU level

As mentioned in the previous section, the, ECDC and the European Commission are planning projects to conduct training for HCPs in Europe, including vaccinology training.

- As such, the modules could also be sustained at EU-level by feeding into the HCP training projects of the ECDC or the European Commission. In particular, the ECDC is planning to organize a competencies-based course on vaccinology, for which it opened a call in 2020 (see ECDC's project for training in the area of vaccination and vaccine hesitancy for primary healthcare professionals). This project is linked to the new ECDC mandate (articles 3 §2 (i), 5a §2 and 9 §6). The curriculum could therefore be used by the ECDC and inform or evaluate their project.

- Moreover, other European or international organisations, including WHO Euro, may use this curriculum to evaluate their existing trainings courses or to guide them in the creation of new vaccinology courses.

Future steps

- Disseminating the curriculum among the target group described above
- (When extra funding is available) create a complete training package (toolbox) based on the different described training modules to which existing training will be linked or for which new training packages will be developed, so that a complete training arises which can be consulted and delivered by trainers after cultural adaptation if needed.

Finally, all these deliverables (the Vaccine Training Barometer, the Students' survey and, above all, the Curriculum on Vaccine and Vaccination) can be easily translated in other European languages; they therefore represent valuable tools for monitoring and measuring the need for training of HCPs involved in vaccines delivery, and as such can be sustained and integrated into national vaccine policies to improve the health (vaccine) literacy among (future) HCPs.