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VAX-TRUST PROJECT

Addressing vaccine hesitancy in Europe

Project no. 965280

H2020-SCI1-2020-Single Stage-RTD

Deliverable 5.2

Guidelines for intervention methodologies

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Document Revision History

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Executive Summary

This deliverable includes guidelines for intervention methodologies of a model of tailored and evidence-based interventions for Target Regions. The common objective of the VAX-TRUST intervention is to increase awareness of the complexity of vaccine hesitancy among healthcare professionals involved in discussing childhood vaccines with parents.

The deliverable provides an overview of the analysis of systematic literature review and the analysis of the grey literature of each unit to arrive at the proposal of a flexible and tailored intervention model. The empirical path of this deliverable is closely linked to the theoretical basis of the interventions (Deliverable 5.1).

The deliverable 5.2 has been prepared by UNICLAM (Italy), Università degli Studi di Cassino e del Lazio Meridionale.

Abbreviations

CEV	Centre for Evaluation of Vaccination
D2.1	Deliverable 2.1
D2.2	Deliverable 2.2
D2.3	Deliverable 2.3
D3.3	Deliverable 3.3
ECDC	European Centre for Disease Prevention and Control
ECTS	European Credit Transfer Scheme
GLR	Grey Literature Review
HCP	Healthcare professional
HIT	Health information technologies
ICT	Information and Communication Technology
NHS	National Health System
NIL	National Doctors' Council
NIPiP	National Nurses and Midwives' Council
PHR	Personal Health Records
QCRI	Rayyan of the Qatar Computing Research Institute
RLOs	Reusable Learning Objects
SItI	Società Italiana di Igiene, Medicina Preventiva e Sanità Pubblica
SLR	Systematic Literature Review
WP	Work Package

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1. Introduction

According to the theoretical path presented in D5.1 on complex interventions in public health, there is a need to use intervention approaches and tools that are adaptable to the social context, and evaluable from the point of view of effectiveness. Considering the wide range of the determinants affecting the interventional actions and the determinants of the applicability of interventions in the Target Regions, it is necessary to consider the results of the updated and comprehensive Systematic Literature Review (SLR) accompanied by Grey Literature Review (GLR) from country teams for the purpose of the study.

The SLR presents the most recent interventions targeted at HCPs to address vaccine hesitancy and significant results in terms of approaches and tools: in-person educational sessions, asynchronous educational learning, role-play and scenario simulation, digital learning sessions.

The GLR focused on the latest interventions implemented in the Target Regions and on Medicine & Nursing schools' syllabuses on vaccinations and medical humanities in the Target Regions.

2. Grey literature

2.1 Aims and methods

At the same time as the SLR, a collection and analysis of existing interventions in the Target Regions was carried out to support the development of the WP5 intervention. The GLR included scientific articles published in national journals not covered by international databases, internal publications of public or private organizations, technical reports of bodies or commissions, research projects and reports; proceedings or abstracts of congresses, conferences and seminars (including computer-based multimedia presentations), internal publications of local authorities; any resources and experiences produced by national and local institutions, research bodies, associations, interest groups; dissertations and doctoral theses; regulations and policy documents.

The general objective of GLR is to support the systematic review of the international scientific literature to develop the guidelines for intervention methodologies.

Analysis of GLR took into consideration some criteria according to an applied PICO model:

- *FIRST CRITERION:* the intervention is directly targeted at healthcare professionals and students (including but not limited to: physicians, pharmacists, nurses, midwives). For instance: lessons, training, e-learning projects, incentives, health communication projects.
- *SECOND CRITERION:* the intervention has the aim of reducing vaccine hesitancy or increasing vaccine uptake among the healthcare workers/students who are attending the intervention or among the patients of the healthcare workers/students who are attending the intervention.
- *THIRD CRITERION:* the intervention has been carried out in the Target Region (or in multiple regions, including the target region).

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The teams from the Target Regions then independently applied the inclusion and exclusion criteria to the selected full texts and entered the collected information into an excel database. The final output of the review was a narrative summary of the characteristics and evaluations of the interventions, with a focus on intervention, target, and outcome types. To obtain more information on suitable interventions for WP5, a series of documents supporting the WP5 intervention was selected. They are described below.

2.2 Summary of results of Grey Literature Review

The GLR, along with the SLR, provided a useful information on the Target Regions' situation regarding potential interventions to reduce vaccine hesitancy.

No evidence on traceable intervention procedures was found: most of the documents found in the GLR focused on technical training of healthcare professionals (i.e., courses on vaccines and vaccinations). There was a lack of evidence on interventions specifically oriented to reduce patient's vaccine hesitancy or to enhance healthcare professionals' capacity and knowledge to encounter hesitancy and the hesitant patients.

However, the GLS showed that specific interventions have been carried out on the population in all Target Regions to reduce vaccine hesitancy.

3. Systematic Literature Review

3.1 Aims and methods

A systematic review to support the development of the intervention methodologies was conducted, to identify the most recent interventions targeted at healthcare professionals to address vaccine hesitancy.

Three scientific databases (PubMed, Scopus, and Embase) were searched, considering papers published in 2016 or after. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist was followed (Page et al., 2021). The review considered only interventions that meet the following two criteria: 1) the intervention is directly targeted at healthcare professionals and students who may interact with patients; 2) the intervention aims to reduce vaccine hesitancy or increase vaccine uptake among the patients of the health care workers/students who are attending the intervention. The intervention can also be part of a wider and multifaceted intervention that includes multiple actions.

Papers were independently screened for title and abstract using the web application Rayyan of the Qatar Computing Research Institute (QCRI) (Ouzzani et al., 2016). Then, researchers independently applied the inclusion and exclusion criteria to the selected full texts. In both phases, each paper was screened at least by two persons and researchers were blinded to each other's decisions. After selecting a final set of papers, data extraction was carried out using Excel spreadsheets. For each

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paper, at least one author extracted the data, and at least one other author checked the extracted data. In each phase, disagreements were resolved by a consensus-based discussion.

In the present document, to gain more insights on interventions suitable for WP5, a set of papers reflecting the main potential characteristics of the WP5 intervention (i.e., being brief and directly involving HCPs) was selected and described.

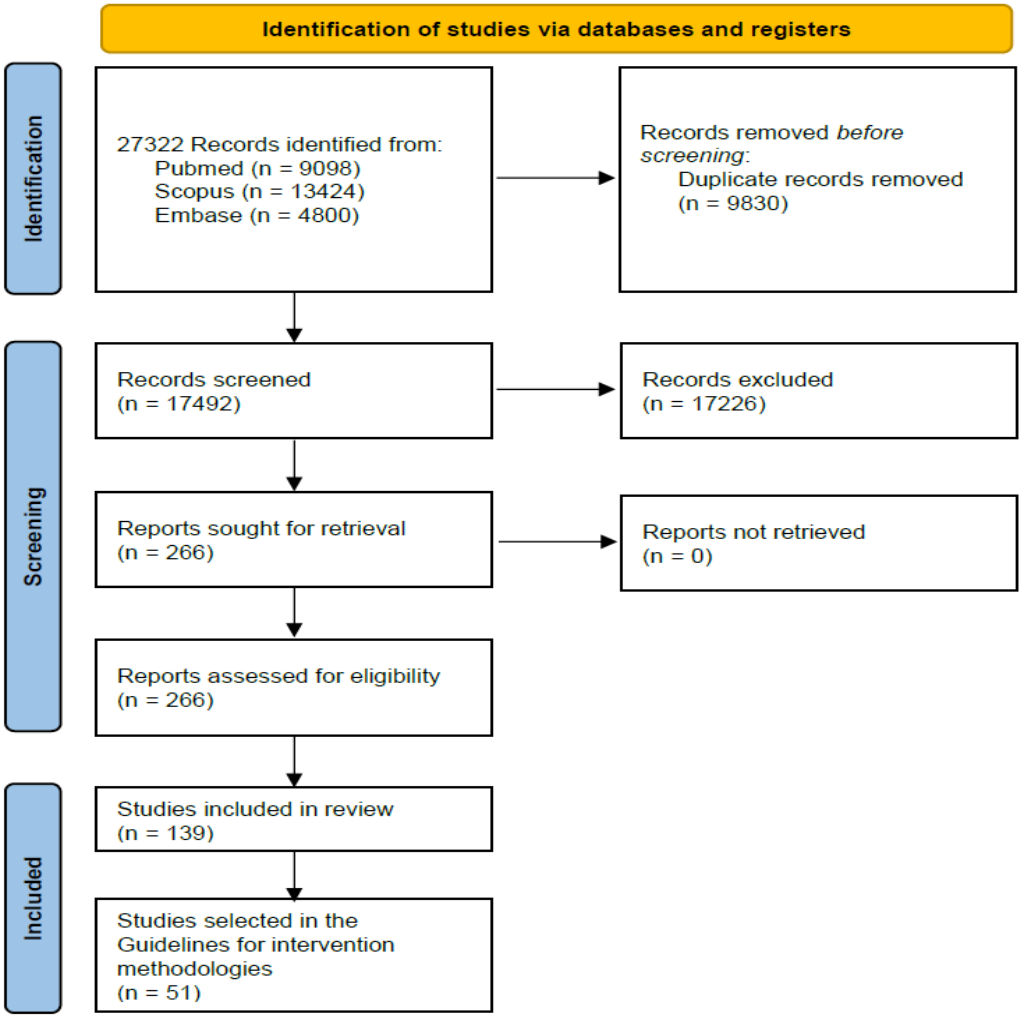
3.2 Results

A total of 17492 unique records were identified. A final set of 139 papers was selected for the review and, among these articles, 51 papers were selected for the present guidelines (Figure 1).

Among the 139 articles, the years when more papers were published were 2020 (n=32) and 2021 (n=32). A total of 110 papers were from the USA and only six papers were from Europe or the UK. Over half of the studies had a pre-post design without a control group (n=71). Only 33 studies were about vaccines and vaccine hesitancy in general, while the other focused on a specific vaccine or on a small group of vaccines (the most frequent was HPV vaccine with 57 dedicated papers). A total of 38 papers focused on a single-component intervention, 62 on multi-component interventions involving only HCPs and/or students, and 39 multi-component interventions involving HCPs and/or students and other figures.

Figure 1 Identification of studies via databases and registers

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A smaller set of papers (n=51) that reflected the main potential characteristics of the intervention (i.e., a brief and directly involving HCPs) was selected to inform the guidelines. Specifically, 88 papers meeting the following criteria were excluded at this stage: involvement of figures other than HCPs and/or students as main target (n=39); primary focus on organisational changes in workflow or supervision in a hospital/department (n=11); primary focus on feedback based on long-term performance analysis of a hospital/department (n=7); primary focus on how to do an injection (n=1); total length over 24 hours (n=30).

In this set of 51 selected papers, the majority was from the USA (n=37) and focused on vaccines in general (n=20) or HPV vaccine (n=22). These papers included interventions targeted at HCPs and students. It should be noted that the articles by Pampena et al. (2020) and by Shukla et al. (2019) were referred to the same intervention focusing on different outcomes, as well as the articles by Real et al. (2021) and by Bishop et al. (2021) and the two articles by Berenson et al. (2021 and 2020). Thus, the total number of considered interventions was 48. The main interventions' approach and tools were, as following: in-person educational sessions, asynchronous learning, role-play and scenario simulation, and other digital learning session.

A total of 34 interventions involved HCPs. Most papers had a pre-post design without a control group (n=19). A total of 12 interventions clearly reported that credits (e.g., Continuing Medical Education CME credits) were offered to participants. Most interventions (n=18) were targeted at a mixed group

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of HCPs (e.g., including physicians, nurses, residents, and other professional figures), while one was addressed exclusively to physicians, three to nurses, four to pharmacists, and five to medical residents. Lastly, one intervention was targeted at both HCPs and nursing students and two interventions at both medical residents and medical students.

A total of 14 interventions involved students. In addition, in this case, most studies had an uncontrolled pre-post design (n=9). Interventions were targeted at medical students (n=5), nursing students (n=4), both the previous students (n=1), mixed groups of health care students (n=1), and others (n=3).

3.3 Conclusions

Overall, the SLR highlighted as potential tools for the intervention to be developed in WP5: in-person educational session or asynchronous learning (possibly matched with the supply of educational material) to provide scientific updating on vaccines and vaccine hesitancy and information about communication strategies to be used with patients; role-play and simulations to practice and reinforce learning; digital learning session such as serious gaming and smartphone apps to improve knowledge and confidence in relationship.

Most interventions were evaluated through the assessment of short-term consequences on knowledge on vaccine and vaccine hesitancy issues, attitudes and perceptions towards vaccines, and confidence and self-efficacy in interacting with parents/patients. Overall, the results of the measurements of these outcomes were in favour of the use of the intervention, although an analysis of statistical significance was not always available.

Fewer interventions were evaluated through the assessment of improvement in vaccination rates among participants' patients. These evaluation approach reported a significant improvement less frequently, thus suggesting that interventions' effects on vaccination rates may not be revealed or at least it is difficult to be seen in the short term.

In addition, since most interventions were evaluated through uncontrolled studies, the evidence on the effectiveness of these interventions is not robust.

Last, it should be noted that few data on innovative tools were reported highlighting a substantial gap in innovation in this field, which could be filled and explored through the development of new instruments for intervention.

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4. Results of interventions' methodologies analysis as emerged from SLR

4.1 Interventions summary

Figure 2 Interventions, in-person educational session

IN PERSON EDUCATION SESSION																						
	art. n.85	art. n.10	art. n.13	art. n.35	art. n.46	art. n.57	art. n.68	art. n.74	art. n. 9	art. n. 10	art. n.12	art. n. 1	art. n.13	art.n 14	art. n.16	art. n. 16	art. n. 165	art. n.17	art. n 19	art. n 20	art. n. 2	art. n 1051
Context	2	2	2	2	2	2	3	2	2	3	2	2	2	3	3	3	1	1	1	3	1	3
Objectives	2	3	2	0	2	5	2	4	2	2	5	3	2	1	4	4	7	4	7	4	4	4
Target	3	1	1	1	0	0	1	0	1	1	0	0	0	1	1	1	1	0	1	1	1	1
Correlation (0-5)																						
Tools	3	3	4	5	3	3	3	3	3	3	6	3	99	8	3	3	9	3	3	3	3	3
Resources provided	0	99	99	99	0	0	1	0	6	6	99	6	6	1	6	6	7	0	7	6	6	8
Technology used	1	0	0	1	1	0	99	1	1	99	1	1	1	1	99	99	99	1	1	99	99	99
Types of technologies	3	0	0	1	3	99	99	3	3	99	3	3	2	3	99	99	99	3	3	99	99	99
Evaluation of intervention	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1
Evaluation methodology	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2	2	2	2	2
Type of study																						
Advantages								1	1					1	1				1	1	1	1
Criticalities								1	1	1				1	1		1		1	1	1	1
Innovative intervention	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Attitudes and perceptions	1	0	0	0	1	0																
Impact term	2	0	0	0	0	0	2	0		0	0	0	0	1	0	0	1	0	2	2	0	1
Expected impact	0	0	1	1	0	99	0	0		0	1	1	0	5	0	4	2	0	6	0	0	0

Legenda	
Context	0 medical center; 1 hospital; 2 university; 3 outdoors
Objectives	0 decreasing esitancy; 1 contrast; 2 knowledge; 3 attitude; 4 knowledge and attitude; 5 behaviour change; 6 time frame; 7 improving communication; 8 knowledge, attitude and behaviour change; 9 improving communication and vaccination coverge
Target	0 students; 1 healthcare professionals; 2 parents; 3 students and HCP
Correlation (between method of intervention anc	0 no correlation, 1, very low correlation, 2 low correlation, 3 correlation, 4 high correlation, 5 very high correlation
Tools	0
Resources provided	0 professional health care; 1 facilitator; 2 sociologist; 3 psychologist; 4 technical; 5 graphic facilitator; 6 expert in the field of vaccination; 7 expert in communication; 8 Investigator/researcher; 9 experts in the field of vaccination and communication
Technology used	0 no; 1 yes
Types of technologies	0 poadcast; 1 video; 2 movie; 3 computer; 4 fad; 5 3D simulator; 6 serious game; 7 other game
Evaluation of intervention	0 no; 1 yes
Evaluation methodology	0 mix methods; 1 qualitative; 2 quantitative
Type of study	0 pilot; 1 case study; 2 screening; 3 monitoring; 4 multicentric; 5 case/control; 6 Cross sectional; 7 Randomized trial
Advantages	0 no; 1 yes
Criticalities	0 no; 1 yes
Innovative intervention	0 no; 1 yes
Attitudes and perceptions	0 no; 1 yes
Impact term	0 short term; 1 medium term; 2 long term
Expected impact	0 knowledge acquisition/improving; 1 improving skills; 2 improving communication strategies; 3 decreasing hesitancy; 4 enhancing trust; 5 knowledge and skills improving; 6 improving vaccination coverage

Se una di queste variabili non è esplicitata scriviamo 99

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Figure 3 Interventions, asynchronous education learning

ASYNCRONOUS EDUCATION LEARNING									
	art. n 25	art. n.60	art. n.7	art. n. 10	art. n 14	art. n.14	art. n. 8	art. n 185	
Context	----------	----------	----------	----------	----------	----------	----------	----------	----------
Objectives	8	7	7	9	9	0	7	4	
Target		1	1	1	1	1	0	0	
Correlation (0-5)									
Tools	10	11	12	11		11	13	7	
Resources provided		0	0	0	9	0	1	0	
Technology used		1	1	1	1	1	99	1	
Types of technologies		4	3	3	7	2	99	0	
Evaluation of intervention		1	1	1	1	0	1		
Evaluation methodology		2	2	2	2	0	2		
Type of study									
Advantages		1	1	1	1				
Criticalities		1	1	1	1				
Innovative intervention		0	0	0	0	0	0		
Attitudes and perceptions									
Impact term		2	2	0	99	99	0	99	
Expected impact		6	2	6	99	99	2	99	

Legenda	
Context	0 medical center; 1 hospital; 2 university; 3 outdoors
Objectives	0 decreasing esitancy; 1 contrast; 2 knowledge; 3 attitude; 4 knowledge and attitude; 5 behaviour change; 6 time frame; 7 improving communication; 8 knowledge, attitude and behaviour change; 9 improving communication and vaccination coverge
Target	0 students; 1 healthcare professionals; 2 parents; 3 students and HCP
Correlation (between method of inte	0 no correlation, 1, very low correlation, 2 low correlation, 3 correlation, 4 high correlation, 5 very high correlation
Tools	0
Resources provided	0 professional health care; 1 facilitator; 2 sociologist; 3 psychologist; 4 technical; 5 graphic facilitator; 6 expert in the field of vaccination; 7 expert in communication; 8 investigator/researcher; 9 experts in the field of vaccination and communication
Technology used	0 no; 1 yes
Types of technologies	0 poadcast; 1 video; 2 movie; 3 computer; 4 fad; 5 3D simulator; 6 serious game; 7 other game
Evaluation of intervention	0 no; 1 yes
Evaluation methodology	0 mix methods; 1 qualitative; 2 quantitative
Type of study	0 pilot; 1 case study; 2 screening; 3 monitoring; 4 multicentric; 5 case/control; 6 Cross sectional; 7 Randomized trial
Advantages	0 no; 1 yes
Criticalities	0 no; 1 yes
Innovative intervention	0 no; 1 yes
Attitudes and perceptions	0 no; 1 yes
Impact term	0 short term; 1 medium term; 2 long term
Expected impact	0 knowledge acquisition/improving; 1 improving skills; 2 improving communication strategies; 3 decreasing hesitancy; 4 enhancing trust; 5 knowledge and skills improving; 6 improving vaccination coverage

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Figure 4 Interventions, role-play and scenario simulation

ROLE PLAY AND SCENARIO SIMULATION																	
	Art. n.55	art. n.63	art. n.67	art. n. 73	art. n.79	art. n.90	art. n.95	int. n. 105	art. n. 114	art. n.101	art. n.145	art. n.157	art. n. 163	art. n.165	art. n.171	art. n. 1046
Context	1	5	3	1	3	4	0	2	1	3	4	3	2	0	0	2
Objectives	7	9	5	1	4	2	1	7	8	1	4	0	7	3	8	1
Target	1	4	5	2	1	1	1	1	0	2	6	3	0	1	1	4
Correlation (0-5)	1	0	2	2	3	0	4	1	1	5	3	1	4	3	8	4
Tools	3	11	3	3	3	11	3	4	13	10	7	1	13	7	8	6
Resources provided	0	7	7	7	1	1	0	7	0	6	7	0	0	0	3	1
Technology used	0	1	0	0	0	3	1	0	0	0	0	1	1	0	0	0
Types of technologies	99	3	99	99	0	0	3	99	99	99	99	2	1	99	99	99
Evaluation of intervention	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1
Evaluation methodology	1	2	1	3	1	2	2	1	1	2	2	3	2	2	0	1
Type of study	1	7	1	8	1	7	4	1	1	1	1	1	7	7	5	1
Advantages	3	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1
Criticalities	1	0	0	0	0	1	1	1	1	1	1	0	0	0	1	1
Innovative intervention	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	1
Attitudes and perceptions	0	1	1	0	0	1	1	1	1	1	0	1	1	1	0	1
Impact term	1	0	1	2	2	2	1		1	2	1	1	1	1	1	2
Expected impact	6	2	1	6	2	6	2		0	2	2	3	0	2	2	0

Legenda	
Context	0 medical center; 1 hospital; 2 university; 3 outdoors; 4 virtual; 5 pharmacie
Objectives	0 decreasing esitancy; 1 contrast; 2 knowledge; 3 attitude; 4 knowledge and attitude; 5 behaviour change; 6 time frame; 7 improving communication; 8 knowledge, attitude and behaviour change; 9 improving communication and vaccination coverge
Target	0 students; 1 healthcare professionals; 2 parents; 3 students and HCP; 4 pharmacist; 5 partents+doctor; 6 healthcare+student
Correlation (between method of interv	0 no correlation, 1, very low correlation, 2 low correlation, 3 correlation, 4 high correlation, 5 very high correlation
Tools	0
Resources provided	0 healthcare professional ; 1 facilitator; 2 sociologist; 3 psychologist; 4 technical; 5 graphic facilitator; 6 expert in the field of vaccination; 7 expert in communication; 8 Investigator/researcher; 9 experts in the field of vaccination and communication
Technology used	0 no; 1 yes
Types of technologies	0 poadcast; 1 video; 2 movie; 3 computer; 4 fad; 5 3D simulator; 6 serious game; 7 other game; 99 no one
Evaluation of intervention	0 no; 1 yes
Evaluation methodology	0 mix methods; 1 qualitative; 2 quantitative
Type of study	0 pilot; 1 case study; 2 screening; 3 monitoring; 4 multicentric; 5 case/control; 6 Cross sectional; 7 Randomized trial; 8 intervention mapping
Advantages	0 no; 1 yes
Criticalities	0 no; 1 yes
Innovative intervention	0 no; 1 yes
Attitudes and perceptions	0 no; 1 yes
Impact term	0 short term; 1 medium term; 2 long term
Expected impact	0 knowledge acquisition/improving; 1 improving skills; 2 improving communication strategies; 3 decreasing hesitancy; 4 enhancing trust; 5 knowledge and skills improving; 6 improving vaccination coverage

Se una di queste variabili non è esplicitata scriviamo 99

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Figure 5 Interventions, digital learning session

Casella Nome	DIGITAL LEARNING SESSION							
	Art. n. 25	art. n. 15	art. n. 8	art. n. 75	art. n. 27	art. n.5	art.5_1	
Context	1	1	4	1	4	2	sui vaccini NO esitazione. Utilizzano chatbot	
Objectives	0	0	9	3	2			
Target	1	2	1	0	1			
Correlation (0-5)	3	5	3	5	2			
Tools	1	10	14	15	11			
Resources provided	89	0	89	0	13			
Technology used	1	0	1	1	1			
Types of technologies	8	2	9	6	3			
Evaluation of intervention	1	1	1	1	1			
Evaluation methodology	2	1	1	2	2			
Type of study	9	0	9	5	0			
Advantages	1	1	1	1	1			
Criticalities	1	1	1	1	1			
Innovative intervention	1	1	1	1	1			
Attitudes and perceptions	1	1	1	1	1			
Impact term	1	2	1	2	1			
Expected impact	89	5	5	0	2			

Legenda	
Context	0 medical center; 1 hospital; 2 university; 3 outdoors; 4 virtual
Objectives	0 decreasing esitancy; 1 contrast; 2 knowledge; 3 attitude; 4 knowledge and attitude; 5 behaviour change; 6 time frame; 7 improving communication; 8 knowledge, attitude and behaviour change; 9 improving communication and vaccination coverge
Target	0 students; 1 healthcare professionals; 2 parents; 3 students and HCP
Correlation (between method of interve	0 no correlation, 1, very low correlation, 2 low correlation, 3 correlation, 4 high correlation, 5 very high correlation
Tools	0
Resources provided	0 professional health care; 1 facilitator; 2 sociologist; 3 psychologist; 4 technical; 5 graphic facilitator; 6 expert in the field of vaccination; 7 expert in communication; 8 Investigator/researcher; 9 experts in the field of vaccination and communication; 13 no human resources; 89 multiprofessional
Technology used	0 no; 1 yes
Types of technologies	0 poadcast; 1 video; 2 movie; 3 computer; 4 fad; 5 3D simulator; 6 serious game; 7 other game; 8 Immersive VR; 9 App
Evaluation of intervention	0 no; 1 yes
Evaluation methodology	0 mix methods; 1 qualitative; 2 quantitative
Type of study	0 pilot; 1 case study; 2 screening; 3 monitoring; 4 multicentric; 5 case/control; 6 Cross sectional; 7 Randomized trial; 9 educational
Advantages	0 no; 1 yes
Criticalities	0 no; 1 yes
Innovative intervention	0 no; 1 yes
Attitudes and perceptions	0 no; 1 yes
Impact term	0 short term; 1 medium term; 2 long term
Expected impact	0 knowledge acquisition/improving; 1 improving skills; 2 improving communication strategies; 3 decreasing hesitancy; 4 enhancing trust; 5 knowledge and skills improving; 6 improving; 89 multi (3+2)

Se una di queste variabili non è esplicitata scriviamo 99

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4.2 In-person educational session: methodology

Target Group: *HEALTHCARE PROFESSIONALS*

Technical team

- Physician or educator to improve/update knowledge on vaccination-preventable diseases and vaccines.
- Expert in communication for training on tools and approaches to be used for improving communication to address parental vaccine hesitancy and to provide an effective recommendation to adhere to vaccination.

Approach and Tools

The *in-person educational session* involves the use of traditional tools such as the projection and commentary of explanatory slides and active lessons (question-&-answer sessions), group-work. The in-person educational session may include a part of the interventions focusing mainly on role-playing and simulation.

They must also include a part dedicated to providing participants with educational material such as instructional videos and handouts, or educational toolkits containing tips, handouts, and bibliographical references (Table 1).

Table 1 In-person educational session. An example based on TIDieR checklist

In-person educational session. An example based on TIDieR checklist	
	VAX-TRUST: Addressing vaccine hesitancy in Europe
	TRAINING INTERVENTIONS
1.	**BRIEF NAME** VAX-TRUST-vaccine hesitancy Intervention – In-person educational session method
2.	**WHY** ANT and Social Worlds Framework theories provided useful information to identify the supposed mediators of the intention to improve knowledge, increase confidence and change behaviour that are specific goals of the educational intervention.
3.	**WHAT (materials)** The educational package includes PowerPoint presentations, accompanied by a class discussion, distribution of a booklet summarising the key messages of the intervention and simulations. Detailed information on the intervention content and the training programme is available at (URL, login and password).
4.	**WHAT (procedures)** All health workers participating in the educational intervention will be given a KAB (Knowledge, Attitude, Behaviour) questionnaire pre- and post-intervention, followed by 6 hours of training on the description of diseases and routes of infection transmission;

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	general characteristics of vaccinations and their local legislation; most appropriate and effective communication approach. Key messages will be based on information and recommendations on vaccines efficacy and safety, and on the importance of HPCs-patient communication.
5.	**WHO PROVIDES** Expert in communication; experts in the field of vaccination and communication; Investigator/researcher; social psychologist.
6.	**HOW** The in-person intervention includes the use of traditional tools such as the projection and commentary of explanatory slides and active lectures (question and answer sessions) and includes a part of the interventions focused mainly on role-plays and simulations.
7.	**WHERE** The in-person intervention will be delivered at the university or hospital or vaccination centres.
8.	**WHEN and HOW MUCH** from January 2023 to May 2023 time 6 Hours In the in-person intervention, it was agreed that the schedule of the educational intervention (6 hours in total) could be divided into: - 2 sessions of 3 hours each or - 1 session of 6 hours.
9.	**TAILORING** In person intervention: if the participants have mixed training, i.e., doctors, nurses, pharmacists etc. or trainees and students, a mixed type of intervention can be adopted with traditional lectures and simulations for professionals and role-plays for trainees and students.
10.	**CHANGES AND ADJUSTMENTS** Due to recruitment problems, the start of the course is postponed, a member of the expert team who is to deliver the training is no longer available so the part for which he or she is responsible could be delivered differently (distance) or replaced with a related one.
11.	**INTERVENTION IMPLEMENTATION AND INTERVENTION DELIVERY** The training will be carried out independently in each Target Region. To ensure standardised training, all teams must apply the same training methodology, but they are free to choose the approach or tool most appropriate to their context. The training will be shared with all trainers. Furthermore, the project leader as an observer during the first

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	two training sessions in each team will provide feedback to the trainers in order to further standardise the training.

Two potential tools, *presumptive/CASE approach,* and *Motivational Interviewing (MI)* are presented to gain vaccine acceptance.

Healthcare professionals (HCPs) need tools and training to help themselves to engage effectively in vaccination acceptance conversations with parents and other patients.

To achieve the goal of improving doctor/patient communication skills, the degree of patients' hesitancy must be considered. In the case of minimally hesitant individuals, the *presumptive/CASE approach* (Tab. 1), a strategy considered effective in achieving vaccine acquisition during the interventions with the physician, is suggested.

CASE is the acronym for "*Corroborate, About me, Science and Explain/advise"*, such an approach provides the physician with the ability to talk about the vaccine with the hesitant patient by confirming awareness of their hesitancy while identifying and underlying shared value or concern. Subsequently, the physician will be able to make a statement about himself, describing how he sought a scientific answer to the concern (Jacobs, 2013; 2014; 2019; Singer, 2010). The clinician then summarises the science underlying the recommendation and/or explanation addressing concerns. Finally, the clinician explains advice to the patient.

The *CASE approach* connects the patient to the clinician through the shared value or concern (*corroborate*), recognizes the professional standing of the clinician (*about me*), relies on science to address the concern (*science*), and allows the clinician to reframe the recommendation addressing the concern of the patient (*explain/advise*).

By using the *CASE* approach, it is possible to connect emotionally with those who are hesitant to be immunized and engage them in a thoughtful, respectful conversation that could, indeed, change their mind.

In the case of individuals who are strongly opposed to vaccination, *Motivational Interview* (MI) is suggested, which seems more useful for developing and maintaining a long-term trusting relationship (Dybsand et al., 2020).

Many physicians are not confident in communicating with parents who express strong concerns about vaccines. To address these barriers, the feasibility and effectiveness of using Motivational Interview (MI) with HCPs was explored. MI is a well-established, evidence-based, patient-centred framework for behaviour change that is effective even when administered in a single session. The three essential elements of MI – conversing, leveraging intrinsic motivation for behaviour, and putting the person at the centre of the conversation – make it suitable for use with HCPs. The PIVOT (Presumptively Initiating Vaccines and Optimising Talk with Motivational Interview) strategy involves clinicians starting the conversation about vaccines with patients, including parents of young children, using the presumptive format and, among those who resist vaccines, switching to using MI (Opel et al., 2020).

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The PIVOT intervention with MI acts combining two evidence-based vaccine communication strategies in a stepwise approach: the use of the presumptive format to initiate the recommendation of childhood vaccines with all parents, followed using MI if a parent verbally resists the recommendation. In order to train physicians in the use of the PIVOT communication strategy with MI, a multifaceted curriculum that includes several approaches based on adult learning theory was developed. These approaches include interactive and personalized training, physician rehearsal and coaching, verification, and feedback, recall learning sessions and change agents (Table 2).

Table 2 PIVOT intervention with MI intervention components

Intervention components	**Key Characteristics**
Online video module	Introduces the PIVOT with MI communication strategy
A 60 min in-person interactive clinician training session	Includes (A) a brief didactic session on vaccine hesitancy, how the PIVOT with MI strategy addresses vaccine hesitancy, and practice data on vaccination coverage and vaccine hesitancy prevalence (B) baseline assessments of clinician skills using the presumptive format and MI (C) modelling of elements of the PIVOT with MI intervention followed by clinician rehearsal through role-playing and training by the study team. If clinicians are unable to attend the in-person session, they can use an online version of this session.
Reference sheets	Provide brief and accessible summaries of the communication behaviours, with example statements for key steps in the PIVOT with MI communication strategy.
Two 30–60 min in-person refresher trainings at 3–6 and 9–12 months after the start of the intervention	Includes a question and answer session regarding barriers for implementing the PIVOT with MI intervention. Also includes role-playing and coaching, with the 9–12 months of refresher training including a review of recorded encounters of intervention clinicians with vaccine-hesitant parents. The aim is to provide feedback for how to improve incorporation of PIVOT with MI into the vaccine discussion. Online versions of these sessions are available.
Practice study champion	Will routinely collect feedback from intervention clinicians on the PIVOT with MI intervention and liaise frequently with the study team help address implementation issues.

PIVOT with MI = Presumptively Initiating Vaccines and Optimizing Talk with Motivational Interviewing Adapted from: Opel et al., 2020. *BMJ Open*, 10(8): e039299.

***Timing*:** It was agreed that the schedule of the educational intervention (6 hours in total) can be divided into:

- 2 sessions of 3 hours each; or
- 1 session of 6 hours.

Analysis: It is suggested to carry out a KAB (Knowledge-Attitudes-Behaviour) survey before the beginning of the intervention and at the end, by a specific questionnaire to measure:

- Knowledge: evidence of new learning;

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- Skill: feeling equipped with useful knowledge;
- Attitude: views towards vaccines/change in views.

Finally, the degree of perceived satisfaction could be measured, through key indicators such as:

- most liked elements;
- least liked elements;
- Recommendation to others.

4.3 Asynchronous education learning: methodology

Nowadays, the use of Web-based Education (WbE) in distance learning is considered an innovative method. This leads to a conscious renewal of teaching materials and to the creation of a flexible structure that promotes the individualization of learning. The proposed model aims to implement technological lessons through the Internet, offering a flexible use of means and tools, enabling a synthetic presentation of selected bibliographic texts covering a cognitive object, developing a cooperative spirit, and individualising the learning procedure (Table 3).

Table 3 Asynchronous education learning. An example based on TIDieR checklist

Asynchronous education learning. An example based on TIDieR checklist	
	VAX-TRUST: Addressing vaccine hesitancy in Europe
	TRAINING INTERVENTIONS
1.	**BRIEF NAME** VAX-TRUST-vaccine hesitancy Intervention – Asynchronous education learning method
2.	**WHY** ANT and Social Worlds Framework theories provided useful information to identify the supposed mediators of the intention to improve knowledge, increase confidence and change behaviour that are specific goals of the educational intervention.
3.	**WHAT (materials)** The asynchronous education learning intervention will consist of online modules that can be viewed via computer, tablet, or smartphone. This educational session will make use of short, self-contained, web-based multimedia resources that include audio, text, images and/or video and engage the learner in interactive learning using and assessment (RLO-Reusable Learning Objects).

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4.	**WHAT (procedures)** All health workers participating in the educational intervention will be given a KAB (Knowledge, Attitude, Behaviour) questionnaire pre- and post-intervention, followed by 6 hours of training on the description of diseases and routes on infection transmission; general characteristics of vaccinations and their local legislation; most appropriate and effective communication approach. Key messages will be based on information and recommendations on vaccines, on their efficacy and safety, on the importance of HPCs-patient communication.
5.	**WHO PROVIDES** Expert in communication; experts in the field of vaccination and communication; Investigator/researcher; social psychologist.
6.	**HOW** The development of the RLO can be realized using the ASPIRE methodology, which utilizes principles of participatory co-design and focused on the development of a "community of practice" of experts and potential future users who collaborate at each stage of the process to identify learning needs and create content with the support of instructional designers and multimedia developers. This is a methodology used and validated for the development of RLO and is optimally suited to the requirements for the design of high-quality digital training in healthcare. It must be also included a part dedicated to providing participants with educational material such as instructional videos and handouts, or educational toolkits containing tips, handouts and bibliographical references.
7.	**WHERE** The contents will be made available online to HPCs.
8.	**WHEN and HOW MUCH** From January 2023 to May 2023 time 6 hours It was agreed that the schedule of the educational intervention (6 hours in total) could be divided into: - 2 session of 3 hours each or - 1 session of 6 hours
9.	**TAILORING** An asynchronous educational learning intervention if the participants have mixed training, i.e., doctors, nurses, pharmacists etc. or students, a mixed type of intervention whit traditional lectures and online workshop activities can be adapted, which may include the construction of the AIMS method for handling conversations about vaccination.
10.	**CHANGES AND ADJUSTMENTS** Due to recruitment problems, the start of the course is postponed, a member of the expert team who is to deliver the training is no longer available so the part for which he or she is responsible could be delivered differently (distance) or replaced with a related one.

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11.	**INTERVENTION IMPLEMENTATION AND INTERVENTION DELIVERY** The training will be carried out independently in each Target Region. To ensure standardised training all teams must apply the same training methodology, but free to choose the approach or tool most appropriate to their context. The training will be shared with all trainers. Furthermore, the project leader as an observer during the first two training sessions in each team will provide feedback to the trainers in order to further standardised the training.

Target Group: *HEALTHCARE PROFESSIONALS*

Technical team:

- Physician, educator to improve/update knowledge on vaccination-preventable diseases and vaccines.
- Expert in communication for training on tools and approaches to be used for improving communication to address parental vaccine hesitancy and to provide an effective recommendation to adhere to vaccination.

Approach and Tools

The asynchronous education learning intervention will consist of online modules that can be realised via computer, tablet, or smartphone. The content will be made available online to HPCs. This educational session will use short, self-contained, web-based multimedia resources that include audio, text, images and/or video and engage the learner in interactive learning, using activities and assessment (RLO- Reusable Learning Objects).

The reusability of a RLO is established through licensing models such as the Creative Commons Licence, which allows the owner of the material to freely distribute RLOs for use while retaining ownership.

The development of the RLO can be realized using the ASPIRE methodology (Figure 6), which utilizes principles of participatory co-design and focuses on the development of a "community of practice" of experts and potential future users who collaborate at each stage of the process to identify learning needs and create content with the support of instructional designers and multimedia developers. It is a methodology used and validated for the development of RLO and is optimally suited to the requirements for the design of high-quality digital training in healthcare.

They must also include a part dedicated to providing participants with educational material such as instructional videos and handouts, or educational toolkits containing tips, handouts, and bibliographical references.

One potential tool is **AIMS** (*Announce, Inquire, Mirror, Secure*). **AIMS** is a method for managing vaccination conversations and involves the following four steps (Fig. 7):

- *Announce:* Announce vaccination will happen; assume people are ready to be vaccinated (or vaccinate their children);
- *Inquire*: Use open-ended questions to understand the person's concern;

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- *Mirror*: Reflect back what you have understood to make the person feel heard;
- *Secure*: Consolidate each conversation by securing trust.

AIMS thus combines a presumptive approach with tested and teachable methods to foster receptivity and trust in conversations (Attwell et al., 2019; Barton et al., 2022; Blake et al., 2022; Wolynn and Hermann, 2021).

***Timing*:** It was agreed that the schedule of the educational intervention (6 hours in total) can be divided into:

- 2 sessions of 3 hours each; or
- 1 session of 6 hours.

***Analysis*:** It is suggested to carry out a KAB survey through the administration, to the participants before the beginning of the intervention and at the end, of a specific questionnaire constructed ad hoc to measure:

- Knowledge: evidence of new learning;
- Skill: feeling equipped with useful knowledge;
- Attitude: views towards vaccines/change in views.

Finally, the degree of perceived satisfaction could be measured, through key indicators such as:

- most liked elements;
- least liked elements;
- recommendations to others.

4.4 Role-play and scenario simulation: methodology

Target Group: *HEALTHCARE PROFESSIONALS*

Role-playing was found in 10 interventions and simulated patient scenarios in four interventions (one intervention included both) (Table 4). Role-play refers to simulations in which learners represent different character roles, whereas scenarios with simulated patients involve people devoted to playing the role of patients (e.g., professional actors, patients who have been trained to play a patient role, trained facilitators) (Lane et al., 2007).

The role-play always combines with other elements, with the total duration of the intervention varying from one hour to one day. The in-person educational session was the component most frequently combined with the role-play (n=9). In seven interventions, the role-play was preceded by an in-person educational lecture containing both scientific updates and communicative strategies.

***Technical team*:** The training team must be made up of healthcare professionals, communication experts, facilitators; social psychologists.

Approach and Tools: The most used tools were related to traditional training such as oral interventions using workshops, etc. (5 interventions out of 16). They were followed by other

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instruments such as: Blended Learning; Reusable Learning Objects; online training; simulation-based experience (SBE).

Other tools were video, in-person educational session, podcast, metaphors, asynchronous learning. Two in-person educational sessions matched with role-play were exclusively on communication strategies (announcement/presumptive approach). Considering vaccination rates among participants' patients, both interventions reported significant and non-significant results for the measured outcomes. On the other hand, significant improvement in attitudes and self-efficacy highlighted.

Contents:

- scientific updating and communication strategies (lectures or asynchronous learning);
- communication strategies;
- strategies for building trust and acceptability;
- knowledge about vaccines and vaccination national plan.

***Timing*:** It was agreed that the schedule of the educational intervention (6 hours in total) can be divided into:

- 2 sessions of 3 hours each; or
- 1 session of 6 hours.

***Analysis*:** It is suggested to carry out a KAB survey through the administration, to the participants before the beginning of the intervention and at the end, of a specific questionnaire constructed ad hoc to measure:

- Knowledge: evidence of new learning;
- Skill: feeling equipped with useful knowledge;
- Attitude: views towards vaccines/change in views.

Finally, the degree of perceived satisfaction could be measured, through key indicators such as:

- most liked elements;
- least liked elements;
- recommendation to others.

Table 4 Role play and scenario simulation intervention. An example based on TIDieR checklist

Role play and scenario simulation intervention. An example based on TIDieR checklist	
	VAX-TRUST: Addressing vaccine hesitancy in Europe
	TRAINING INTERVENTIONS
1.	**BRIEF NAME** *VAX-TRUST-vaccine hesitancy Intervention – role playing and scenario simulation method*

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2.	**WHY** We assume that the most suitable theories for complex interventions in public health are ANT and Social Worlds Theory. Both approaches have a sociological background and are based on the analysis of **social action, interaction, communication, the interconnection of all elements - individual and structural, human and non-human - that participate in the action.**
3.	**WHAT (materials)** • Power Point presentations, articles, and publications on the issue • discussion and interaction between trainees and between trainees and trainer(s) • presentation of the story/dialogue for building the role play experience • information and material posted on the website (of the hospital or medical centre or vaccination centre or University; it depends on the organisation or facility where the intervention is performed and/or the professional target)
4.	**WHAT (procedures)** 6 hours intervention divided in 2 sessions. First session (3h): – lesson on vaccines, vaccination policy of the country/region; protection function of the vaccines; communication in healthcare context, with patients or vaccine hesitant parents; effective communication for building trust between professionals and patients, in order to decrease vaccine hesitancy. Lunch break (1h) Second session (2h). This session should be led by a trainer and a facilitator to follow and help the groups. – The trainer proposes the story or dialogue to be recited. Alternatively, he/she invites the group to choose and write a story to be acted out. This part could also be activated by a video or other material. – The trainees (2 or more) are invited to act out the chosen story, swapping their roles one or more times. – Trainer, facilitator, and non-acting trainees observe, listen, take notes of the actors' words, gestures, attitudes. Alternatively, the performance can be filmed. – At the end of the performance, the actors return to the group and are asked what they felt during their play. – All participants are asked to talk about their impressions, feelings, reflections. Furthermore, they are invited to point out communication and relationship errors between the players (professional and patient/parent and/or others) and then to propose better and more effective ways of communication. – Finally, trainer and facilitator draw conclusions. A KAB (Knowledge, Attitude, Behaviour) questionnaire should be administered before and after the intervention to collect data on trainees' perceptions, satisfaction, knowledge, and change.
5.	**WHO PROVIDES** • Vaccination and communication experts • Investigator/researcher in sociology or social sciences • Social psychologist expert of behavioural change (or behavioural science) • Facilitator/classroom tutor • Graphic/technician expert (if it needs)

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6.	**HOW** 6 hours intervention divided in 2 sessions: 1. Face-to-face lesson: eventually using digital or media tools (PPT, video, pictures, cartoons, advertisements, etc.); 2. Activating session: role playing, simulation, case study, etc. (See above "what procedures")
7.	**WHERE** it depends on the trainees' target, the availability of the facility, convenient place. It is important to build a suitable, easily accessible set that can guarantee the highest effectiveness of the intervention.
8.	**WHEN and HOW MUCH** From Jan. 2023 to May 2023 Time 6h divided in 2 sessions, in one day.
9.	**TAILORING** It depends on the trainees' target: kind of professionals (physicians, nurses, midwives, etc.); age, gender. Usually, in person intervention is better tailored for adult professionals while students and young professionals are more used to digital and asynchronous training sessions. If the participants are of mixed training, i.e., doctors, nurses, pharmacists etc... or trainees and students, a mixed type of intervention can be adopted with traditional lectures and simulations for professionals and role-plays for trainees and students
10.	**CHANGES AND ADJUSTMENTS** Due to recruitment problems, the start of the course is postponed, a member of the expert team who is to deliver the training is no longer available so the part for which he/she is responsible could be delivered differently (distance learning) or replaced with a related one.
11.	**INTERVENTION IMPLEMENTATION AND INTERVENTION DELIVERY** The training will be carried out independently in each target region. To ensure standardised training, all teams must apply the same training methodology, but free to choose the approach or tools most appropriate to their context. The training will be shared with all trainers. Furthermore, the project leader, as observer during the first two training sessions, in each team will provide feedback to the trainers in order to further standardise the training.

4.5 Digital learning session: methodology

Target Group: *HEALTHCARE PROFESSIONALS*

Digital learning session was found in 6 interventions (Table 5). Amid these only 2 seemed to be interesting using virtual reality, 1 alone and 1 with asynchronous learning (Real et al., 2017).

One intervention focused on a virtual reality with simulated scenarios: a 3-dimensional, computer-generated environment in which users interact with graphical characters known as avatars (about 15 minutes of length) (Real et al., 2017). The authors measured the refusal of vaccination among participants' patients and showed a significant reduction.

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The other intervention was a virtual training through a smartphone app based on evidence-based recommendation practices (total of 25 minutes), preceded by 1-hour online modules on an asynchronous learning platform (Bishop et al., 2021; Real et al., 2021). The intervention showed significant improvement in knowledge, attitudes, and self-efficacy.

***Technical team*:** Most of the cases have used general experts. It is not specified whether the authors specialise in interventions or training to conduct the interventions.

Approach and Tools: Digital learning session mainly refers to a type of related approach to decreasing hesitancy or improving communication and vaccination coverage.

Three of the tools used were traditional and three innovative, such as Reusable Learning Objects, APP, or games. Two papers described the asynchronous learning intervention (Bishop et al., 2021; Real et al., 2021).

An interesting intervention consisted of a video and a writing exercise (Koski et al., 2018). The video was based on the researcher's conversations with parents focusing on conjugated vaccines. On the video, the conversations were carried out in health meetings based on the real experiences of the parents. The parental beliefs were explored through diagrammatic visualizations and an artist-scientist dialogue. The writing exercise also involved the students with role-play, and they were asked to respond to their role as a doctor, imagining if the parent was sitting in front of them. From the qualitative assessment of students' reactions to the videos and writing exercises, different reactions emerged after the videos in the classroom and the writing exercise at home.

Interestingly, some interventions used a chatbot-based learning approach to gain professional knowledge. This has reported a significant improvement in knowledge and self-efficacy measured after the intervention during the qualitative interviews (Chang et al., 2021).

One intervention was a game**:** the "Flu Bee Game" is a web application. Participants answer random questions: if they get a question correct, they build a *honeycomb path* that leads them to 'Queen Bee' status. Participants can share their success and invite colleagues to play via social media. The game takes approximately 90 seconds to play. Players receive feedback and information on each question they answer. It reported a significant improvement in knowledge and encouraging results in attitudes (Mitchell et al., 2021). Most interventions assess the short-term consequences on vaccine knowledge, vaccine hesitancy issues, attitudes and perceptions towards vaccines, and confidence and self-efficacy in parent/patient interaction. Overall, the results of the measurements of outcomes favoured the use of the intervention, although an analysis of statistical significance was not always available.

Fewer interventions were evaluated by assessing the improvement in vaccination rates among participants' patients. However, these evaluations reported significant improvement less frequently, thus suggesting that the consequences on vaccination rates may not be present or at least difficult to see in the short term. In addition, several interventions were carried out without checking the effects of the impact of the project on the target population. Evidence on the effectiveness of these interventions is, therefore, not solid.

***Timing*:** It was agreed that the schedule of the educational intervention (6 hours in total) can be divided into:

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- 2 sessions of 3 hours each; or
- 1 session of 6 hours.

Analysis: It is suggested to carry out a KAB survey through the administration, to the participants before the beginning of the intervention and at the end of a specific questionnaire constructed ad hoc to measure:

- Knowledge: evidence of new learning;
- Skill: feeling equipped with useful knowledge;
- Attitude: views towards vaccines/change in views.

Finally, the degree of perceived satisfaction could be measured, through key indicators such as:

- most liked elements;
- least liked elements;
- recommendation to others.

Table 5 Digital Learning Session. An example based on TIDieR checklist

Digital Learning Session. An example based on TIDieR checklist	
	VAX-TRUST: Addressing vaccine hesitancy in Europe
	TRAINING INTERVENTIONS
1.	**BRIEF NAME** VAX-TRUST-vaccine hesitancy Intervention – Digital Learning Session
2.	**WHY** According to SRL results, Digital tools, Serious game, Smartphone app improve knowledge and confidence in counselling.
3.	**WHAT (materials)** 🕐 Graphical characters (Avatar). 🕐 3-dimensional programme generating environment for users' interaction 🕐 Smartphone app for virtual training. 🕐 Asynchronous learning platform 🕐 RLO (Reusable Learning Objects 🕐 Serious Game 🕐 Papers describing Asynchronous intervention
4.	**WHAT (procedures)** 6 hours intervention divided in 2 sessions. First Session 1. Face-to-face or asynchronous lesson Second session 1. Starting virtual activity by Serious Game and discussion.

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5.	**WHO PROVIDES** • General experts • epidemiologist • Public health expert • Facilitator/learning game expert
6.	**HOW** 6 hours intervention divided in 2 sessions. 1. Face-to-face lesson: eventually using digital or media tools (PPT, video, pictures, cartoons, advertisements, etc.) 2. activating session: virtual training/serious game Three interesting types of intervention resulting from the SLR: 1. Video and a writing exercise (Koski et al., 2018). The video is a conversation with parents focusing on conjugated vaccines with the everyday life of parents. They have been carried out health meetings based on the real experiences of the parents, parental beliefs explored through diagrammatic visualizations and an artist-scientist dialogue. The writing exercise also involved the students with role-play, and they were asked to respond to their role as a doctor, imagining if the parent was sitting in front of them. From the qualitative assessment of students' reactions to the videos and writing exercises, different reactions emerged after the videos in the classroom and the writing exercise at home. 2. Some interventions used a chatbot-based learning approach to gain professional knowledge. This has reported a significant improvement in knowledge and self-efficacy. It was measured after the intervention during the qualitative interviews (Chang et al., 2021) 3. Serious Game: the "Flu Bee Game" is a web application. Participants answer random questions: if they get a question correct, they build a honeycomb path that leads them to 'Queen Bee' status. Participants can share their success and invite colleagues to play via social media. • The game takes approximately 90 seconds to play. • Players receive feedback and information on each question they answer. It reported a significant improvement in knowledge and encouraging results in attitudes (Mitchell et al., 2021). A KAB (Knowledge, Attitude, Behaviour) questionnaire should be administered before and after the intervention to collect data on trainees' perceptions, satisfaction, knowledge, and change
7.	**WHERE:** it depends on the trainees' target, the availability of the facility, convenient place. Regarding virtual lessons and serious game, they should be played at or in another place chosen by the professionals or students.
8.	**WHEN and HOW MUCH** From Jan. 2023 to May 2023 Time: 6h divided in 2 sessions, in one day

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9.	**TAILORING** It depends on the trainees' target: kind of professionals (physicians, nurses, midwives, etc.); age, gender. Usually, students and young professional are used to digital and asynchronous training sessions. If the participants are of mixed training, i.e., doctors, nurses, pharmacists etc... or trainees and students, a mixed type of intervention can be adopted with traditional lectures and simulations for professionals and role-plays for trainees and students
10.	**CHANGES AND ADJUSTMENTS** Due to recruitment problems, the start of the course is postponed, a member of the expert team who has to deliver the training is no longer available so the part for which he or she is responsible could be delivered differently (distance) or replaced with a related one.
11.	**INTERVENTION IMPLEMENTATION AND INTERVENTION DELIVERY** The training will be carried out independently in each target region. To ensure standardised training, all teams must apply the same training methodology, but free to choose the approach or tools most appropriate to their context. The training will be shared with all trainers. Furthermore, the project leader, as observer during the first two training sessions, in each team will provide feedback to the trainers in order to further standardise the training.

Table 6 Comparing the four types of interventions targeted at healthcare professionals to address vaccine hesitancy

	IN-PERSON EDUCATIONAL SESSION	***ASYNCHRONOUS EDUCATION LEARNING***	***ROLE-PLAY AND SCENARIO SIMULATION***	***DIGITAL LEARNING SESSION***
Target group	*Healthcare Professionals*	*Healthcare Professionals*	*Healthcare Professionals*	*Healthcare Professionals*
Technical team	*Expert in the field of vaccination and communication* *AND* *Social psychologist and expert in communication*	*Social psychologist and expert in communication* *AND* *Expert in the field of vaccination and communication*	*Social psychologist and expert in communication* *AND* *Expert in the field of vaccination and communication* *AND* *Facilitators*	*General experts* *AND* *Facilitators*

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Formative modalities	*Interventions through the projection and commentary of explanatory slides AND/OR* *Active lessons (question-&-answer sessions)* *AND/OR* *Group work*	*Online modules that can be seen via computer, tablet, or smartphone. The content will be made available online to HPCs*	*Traditional training as oral lectures using, workshop, etc.* *OR* *Blended Learning;* *OR* *Online training; simulation-based experience (SBE).*	*Serious Game*
Tools and Approaches	*Presumptive/* ***CASE*** *(Corroborate, About me, Science and Explain/advise) approach* *AND* ***MI (****Motivational Interviewing)*	*Reusable Learning Objects* ***(RLO)*** ***AIMS*** *(Announce, Inquire, Mirror, Secure)*	*Announcement/* *presumptive approach*	*Reusable Learning Objects (RLO)* *APP*
Timing	*2 sessions of 3 hours each* *OR* *1 session of 6 hours*	*2 sessions of 3 hours each* *OR* *1 session of 6 hours*	*2 sessions of 3 hours each* *OR* *1 session of 6 hours*	*2 sessions of 3 hours each* *OR* *1 session of 6 hours*
Analysis	***KAB*** *survey through the administration, to the participants before the beginning of the intervention and at the end of a specific questionnaire constructed ad hoc to measure*	***KAB*** *survey through the administration, to the participants before the beginning of the intervention and at the end of a specific questionnaire constructed ad hoc to measure*	***KAB*** *survey through the administration, to the participants before the beginning of the intervention and at the end of a specific questionnaire constructed ad hoc to measure*	***KAB*** *survey through the administration, to the participants before the beginning of the intervention and at the end of a specific questionnaire constructed ad hoc to measure*

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5. Design of intervention in each Target Region

5.1 The TIDier Checklist of Finland

Item 1. Short name:

VAX-TRUST Intervention to increase awareness of the complexity of vaccine hesitancy among healthcare professionals through a combination of an in-person educational session and digital methods.

Item 2. Why:

The objective of this intervention is to sensitize healthcare professionals to sociological knowledge regarding vaccine hesitancy in their regional, national, and international context in order to enhance reflexivity on the way in which the healthcare professionals encounter vaccine hesitant parents. Previous research conducted in the VAX-TRUST project heavily informed the design of this intervention: Work Package 2 provided information on the most recent previous sociological research on vaccine hesitancy and highlighted the importance of attaching vaccine hesitancy to contextual factors; Work Package 3 gave insight into the public discussion on vaccine hesitancy and its marginalising and polarising tendencies; Work Package 4 produced an intimate understanding of the interactions between HCPs and parents. All these results are integrated into the intervention.

The GLR produced as part of the project provided information on previous interventions in the national and regional context. Interventions producing reusable learning objects (RLOs) had previously and recently been conducted in Finland, and an online study module on vaccine competency featuring information on vaccine hesitancy was already in place for public health nurse students. The VAX-TRUST intervention is aimed at providing something novel and unique to the Finnish context, namely an intervention aimed at public health nurses already employed in child health clinics and featuring a comprehensive in-person component missing from existing interventions.

As recommended in the evaluability report, D6.1, the Finnish intervention is closely aligned with the specificities of the target region. The national context, where children's vaccinations are but one part of general health check-ups based on lasting HCP-patient relations, heightens the importance of positive interactions both as a method of affecting vaccination behaviour and as a way to ensure the continuance of parents' adherence to child health clinic services. Finnish WP4 results suggest a possibility of alienation from these services altogether, if an aggressive or pressuring orientation is assumed by HCPs. On the other hand, an understanding, non-pressuring, and friendly orientation can be more fruitful in bringing about a change in vaccination attitudes, and at the very least, in ensuring parents will not be alienated and will continue to use these voluntary healthcare services. The triggering of reflexivity regarding ways to encounter hesitant parents this intervention seeks to generate is thus especially important in the specific target region and closely aligned with the main goals of VAX-TRUST interventions.

Theoretically, this intervention is based on the social worlds model, which enables an understanding of vaccination encounters as encompassing a host of different actors, both human and non-human. These constituting actors are accompanied by their perspectives, orientations, and properties and shape each encounter in a unique way, ensuring that no two vaccination encounters are completely

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alike. The reflexivity this intervention aims to trigger is based on this understanding of the inherent difference and uniqueness of each vaccination encounter and the sensitivity thus required for optimal interaction. Specifically, it seeks to offer HCPs insight into these encounters by providing in-depth information and understanding on the different orientations and perspectives of parents and HCPs as well as the combined implications they can have in concrete vaccination-related situations, or the social worlds of vaccine encounters.

Item 3. What (materials):

The intervention will be comprised of a 2-hour remote learning session followed by a 4-hour in-person session combining for a 6-hour intervention. It thus combines an element of asynchronous educational learning with an in-person educational session.

The in-person educational session includes three PowerPoint presentations mainly based on WP4 but also summarizing some key points from WP2 and WP3 and other previous studies on vaccine hesitancy in Finland. Case examples describing scenarios for group work as well as the social worlds of vaccine encounters model will be printed out and handed to participants. The figure created during WP4 (see D4.5) is used here to encourage public health nurses to think about their own motives and actions in their encounters with vaccine-hesitant parents and to help them understand the individual needs and specificity of each vaccine-hesitant parent. The intervention pre-assignment will feature an article or report on vaccine hesitancy and/or video on vaccine hesitancy available online as well as the use of Padlet as a platform to gather thoughts provoked by these materials to be discussed during the in-person session.

The pre- and post-measurements will comprise of qualitative questionnaires to be filled out by participants. These questionnaires will attempt to provide pre-measurements on intervention participants' perceived preparedness and their self-understanding about their existing tools for interactions with vaccine hesitant parents and post-measurements on the perceived usefulness of the intervention and the perceived ability of the intervention to increase preparedness and to offer new tools for encounters with vaccine hesitant parents.

The pre-measurements will be gathered via open-ended questions like:

- What issues do you see as important for encounters with vaccine hesitant parents?
- How do you prepare for meeting with vaccine hesitant parents?
- What tools/procedures/ways of communication do you possess and employ for encounters with vaccine-hesitant parents?

The post-measurement questionnaire will feature slightly different but similar questions, like:

- How useful did you feel the intervention to be? In what ways?
- Did you gain new insights on vaccine hesitancy and hesitant parents? What?
- Do you feel this intervention increased your preparedness to interaction with vaccine-hesitant parents? How?
- Did you gain new tools/procedures/ways of communication for encounters with vaccine-hesitant parents? What?

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Item 4. What (procedures):

The intervention will comprise of a premeasurement, pre-assignment, in-person educational session, post-measurement gathered after the in-person session, and interviews of willing participants two weeks after the in-person session. The pre- and post-measurements will be conducted through open-ended guiding and assisting questions. The interviews will be semi-structured and seek to generate information on the experienced usefulness (or perceived effectiveness) of the intervention and increases in awareness about vaccine hesitancy. The questionnaire and interview data will be analysed through qualitative content analysis to provide an evaluation of the intervention's ability to achieve its goals. The pre-assignment will include reading of an article and/or a compilation of the research done in WP4 and/or watching a video on vaccine hesitancy and describing one's thoughts using the online-based educational tool Padlet. The pre-measurement and pre-assignment will be delivered to participants via email one week prior to the in-person session. The nurse managers will aid in this: they will distribute the pre-measurement and pre-assignment to the participants. The nurse managers will be instructed to this task in separate online or in-person meetings with them about one month in advance of the intervention.

The in-person session will start with an unpacking of the thoughts raised by the pre-assignment using the Padlet tool. These thoughts will be reflected on and discussed together with participants with the lead of the intervention team. This discussion will be followed by three PowerPoint-aided 20 min lectures on vaccine hesitancy based on Work Packages 2, 3, and 4. These lectures will be divided roughly to feature firstly, the parents' perspective, secondly, the healthcare professionals' perspective and thirdly, a combinatory perspective presenting practical implications. Group work sessions will be held after each lecture and will feature printed out copies of fictional, but realistic, case examples prepared by the intervention team beforehand. Participants will organise into groups of 3-4 in which to discuss and ponder on best practises in a given situation aided by some guiding questions, after which these cases and suggested courses of action are communally discussed with the lead of the intervention team. These activities are followed by a summary of the in-person session, in which the social worlds of vaccine encounters are elaborated on with the help of a printed out copy of visualisation of the encounter and its participants (figure of D4.5). Lastly, at the end of in-person session, the participants will be asked to fill in a questionnaire with open-ended questions as post-measurement to provide information on the experienced usefulness (or perceived effectiveness) of the intervention.

Interviews with volunteering participants and interventions' implementers will be carried out two weeks after the in-person session by the evaluator of the intervention. We estimate that we will gather all together 30 interviews, 25 with participants and 5 with implementers. The questionnaire gathered after the in-person session and the interviews will combine to provide post-measurement data. This data will be analysed through qualitative content analysis by the evaluator to provide an evaluation of the intervention.

In sum, the elements of the intervention are:

- Premeasurement through qualitative questionnaire
- Pre-assignment – reading or watching article/video on vaccine hesitancy and written assignment in Padlet

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- In-person educational session
  - Unpacking of the pre-assignment
  - Three PowerPoint-aided 20-minute presentations on vaccine hesitancy
  - Group work session
  - Summary of the in-person session
  - Qualitative questionnaire
- Interviews with volunteer participants and implementers
- Evaluation

Item 5. Who provided:

There are three professionals involved in the delivery of the intervention. Together they form a team responsible for the co-creation and implementation of the intervention as part of their work activities. The intervention team includes:

- Sociologist, researcher, and Principal Investigator of the VAX-TRUST project. Expert in alternative healthcare regimes and vaccine hesitancy. Background in nursing.
- Social psychologist and researcher. Expert in professional communication and interaction, vaccine hesitancy, and HCP-patient relations.
- Sociologist and researcher. Expertise in vaccine hesitancy, vaccine-critical activism, and vaccine-hesitant parents' attitudes.

The facilitator role is shared between all the providers of the intervention and switched according to the cases and questions being discussed.

Item 6. How:

The intervention will be conducted with three target groups of participants as a combination of an in-person session and asynchronous learning. The asynchronous learning portion will be completed online independently by participants one week before the in-person session. The leader of the team responsible for intervention design, Dr Pia Vuolanto, has contacted and negotiated with the representatives of participants by arranging meetings with the nurse managers in each public health clinic. The three groups which have agreed to the intervention consist of 15, 40-50, and 75 public health nurses.

The differences in numbers of participants between three target groups are largely explained by the upcoming reform of Finnish healthcare, social welfare, and rescue services. We conducted the WP4 research in public health clinics in 2022, which at that time were small local units of the different municipalities. As of the start of 2023, the responsibility of providing these services will be transferred from municipalities to wellbeing services counties. The counties will be bodies governed by public law and they will exercise autonomy within their own areas. The transfer from municipalities to wellbeing services counties has been done gradually, which has also an effect on the target groups of our interventions. Our first target group will be part of wellbeing services county A, which is comprised of the same small local unit where we conducted the WP4 study. The second target group of county B and the third target group of county C are larger wellbeing services counties, where we conducted WP4 research in some of the local units, i.e., former local public health clinics. County B and County C expressed their willingness to open up the interventions for the whole wellbeing services counties,

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which we accepted because it means that we can reach more potential participants for the intervention. The wellbeing services counties A-C are all situated in the Target Region.

There will be three intervention sessions. The first session will be conducted with the target group of 15 public health nurses, who are working in a child health clinic with which we collaborated in WP4. Most of them (i.e., 12 nurses), therefore, took part in the research interviews/observations. However, the public health nurses working in other child health clinics in county A will not be partaking in the intervention. The situation will be different in terms of counties B and C. In these cases, the intervention is open not only to the public health nurses who participated in research interviews/observations of WP4, but also to all other public health nurses working in the child health clinics located in these counties. Consequently, the second intervention session will be conducted with 40-50 participants out of which 7 nurses participated in WP4. The final intervention session will consist of 75 participants out of which 6 nurses participated in WP4.

Basically, the three target groups involve two 'types' of participants. First, there will be 25 participants (interviewed HCPs) who have already been sensitized to the topic of vaccine hesitancy through their involvement in WP4. Second, there will be 105-115 participants who have not been sensitized to the topic in the same way. It might be, therefore, interesting to compare the reception of the intervention between these two types of groups.

Item 7. Where:

The in-person educational sessions will be organised in maternity and child health clinics and/or wellbeing services county premises. More details will be available following planning meetings scheduled for January 2023. In all cases, the intervention will be delivered to participants in their preferred location. Participants will attend the intervention as part of vocational training and will thus be compensated for their time by their employers.

Item 8. When and how much:

The intervention will be delivered three times in the spring of 2023. The first intervention will be conducted on 15 March, the second in April or May, and the third in May. Exact dates will be set during planning meetings with the nurse managers in January-February 2023. Each intervention delivery will include a 2-hour pre-assignment sent to participants via email one week prior to the in-person session. This assignment is to be completed online and in one's own time. The in-person sessions will be four hours long totalling the training time to six hours.

Item 9. Tailoring:

The in-person session of the intervention can be subject to tailoring, pending confirmation on the number of participants in each group. It is possible, that if target groups vary in size as expected (between 15 to 75 participants), the group work element of the in-person session must be adjusted accordingly. One possibility for, for example, larger groups is to go through group work communally, with the lead of the intervention team so that the whole group takes part in the dissection of each case example. In other words, the intervention team would show each scenario for group work on a big screen and coordinate a session of communal deliberation on best approaches for the specific scenario. This approach could also incorporate discussions with persons sitting next to each other, in

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order to preserve an element of deliberation amongst peers. The details of the group work element will be decided after the planning meetings with the nurse managers.

Item 10. Changes and adjustments:

The intervention planning and implementation stage will coincide with the above-mentioned reform of healthcare, social welfare, and rescue services in Finland in 2023. Some uncertainty remains on whether and how this reform could affect future commitments, like the VAX-TRUST interventions. The risks associated with this reform have been mitigated by contacting all participant groups well in advance, as well as by setting up further planning meetings with representatives of these groups for January-February 2023, when this reform will have taken effect. By this time, the risks and challenges should be clearer and appropriate action(s) can be taken.

There is a risk that not all public health nurses in Counties A-C will be able to participate in the intervention which may reduce the number of participants of our intervention. We will mitigate this risk by organising meetings with nurse managers of each county well in advance of the intervention. It is possible for us to organise the intervention a couple of times within one county so that as many HCPs per county as possible may be reached.

Interventions will take place in child health clinics or other locations preferred by the participants, which will require that the intervention team travel to the location. In case of any problems getting to a given site, there is the possibility of holding necessary parts of the in-person session (such as the 20-minute presentations) remotely. All members of the intervention team are also prepared to take on the responsibilities of each other, should such a need arise.

A potential lack of willing participants for interviews poses a possible risk concerning the evaluation of interventions. Public health nurses generally have tight schedules, and it is not a given that enough of them will have the time and inclination to participate in interviews. This risk can be mitigated by the possibility of interviewing the supervisors of participating public health nurses, who have functioned as the contacts with whom the times and sites of interventions have been planned.

The potentially polarising nature of the topic of vaccine hesitancy can pose some foreseeable problems for interventions. There is a possibility that tensions, conflicts, and even animosity among participants and towards the intervention team could arise. This risk is sought to be mitigated by the consideration of this possibility in advance, as well as devising ways by which to diffuse any arising disputes.

Item 11. Intervention implementation and intervention delivery:

The intervention will be delivered by the team responsible for its creation, thus ensuring adherence, optimal effectiveness, and understanding of its objectives. Additionally, several planning meetings with the intervention team will be held prior to intervention events. These meetings will seek to reinforce a common understanding of intervention objectives, the roles of each team member, and crucial factors for a successful delivery of the intervention. During WP4, the researcher responsible for interviewing public health nurses and observing their work activities simultaneously made efforts to market the intervention in a way that would evoke public health nurses' interest in and motivation toward it.

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A report of every intervention event will be made for the internal collaboration of the intervention implementer team. This report will make use of feedback from the participants and include reflections on intervention performance, roles of implementers, the interventions design and evaluation as well as unexpected reactions during the intervention (e.g., strong disputes among HCPs) and the reactions of implementers and participants to unexpected reactions.

5.2 The TIDier Checklist of Portugal

Item 1. Short name:

Building a family centred approach towards vaccination in Lisbon and the Tagus Valley.

Item 2. Why:

In Portugal, the National Immunization Program (NIP) was implemented in 1965 and provides the recommended paediatric vaccines free of charge to all people living in the country. The paediatric vaccines are not compulsory (except for tetanus and diphteria) and are usually administered in healthcare centers by nurses. Despite of having one of the highest childhood vaccination rates in Europe (≥95%) (DGS, 2020), there is evidence that as age increases the proportion of children immunised according to the NIP decreases (Conselho Nacional de Saúde, 2018). Following the global trend, there has been an increase of anti-vaccination groups in Portugal which can compromise herd group immunity and promote the emergence of diseases that were once considered eradicated (WHO, 2019). In fact, two outbreaks of measles took place in 2017 in the region of Lisbon and Tagus Valley and in Algarve, highlighting the need to gain a deeper understanding about the motives underlying vaccination postponement or rejection. This is in line with the VAX-TRUST major aim of reducing vaccine hesitancy through acquainting and tackling parents' concerns regarding vaccination practices by giving them voice to overtly express their views on this subject. In this regard, data was collected through ethnographic observations and interviews allowing us to outline a profile of vaccine hesitant parents as usually following 'alternative lifestyles' based on natural living practices such as: de-medicalization of birth and childhood, personalized medicine, extended breastfeeding, vegetarian/macrobiotic diet, and alternative educational models. Based on these practices, vaccine hesitant parents relied on natural living as an immunity booster and considered it as an alternative to vaccination, making it needless (Mendonça & Hilário, *in prep.*). Moreover, when reasoning about their choices on vaccination, parents' arguments relied mostly on their interaction with healthcare professionals which was anchored in a standardized process and, thus, not sensitive to individual characteristics and needs. In this regard, parents described healthcare professionals as usually adopting a paternalistic model of communication by using an authoritarian tone and being directive in their discourse. Thus, parents are expected to behave in a passive manner by listening and following uncritically healthcare professionals' indications. In general, parents were not asked permission regarding vaccination practices and, sometimes, children even got vaccinated without their parents' knowledge, especially in the case of vulnerable groups such as migrants. Additionally, episodes of coercion to vaccinate were also reported, namely by frightening and holding parents accountable for their children's health issues. In one case, a mother of a two-years old child was mistreated because her son's health issues were erroneously attributed to the lack of vaccination when, in fact, they were derived from an autoimmune disorder.

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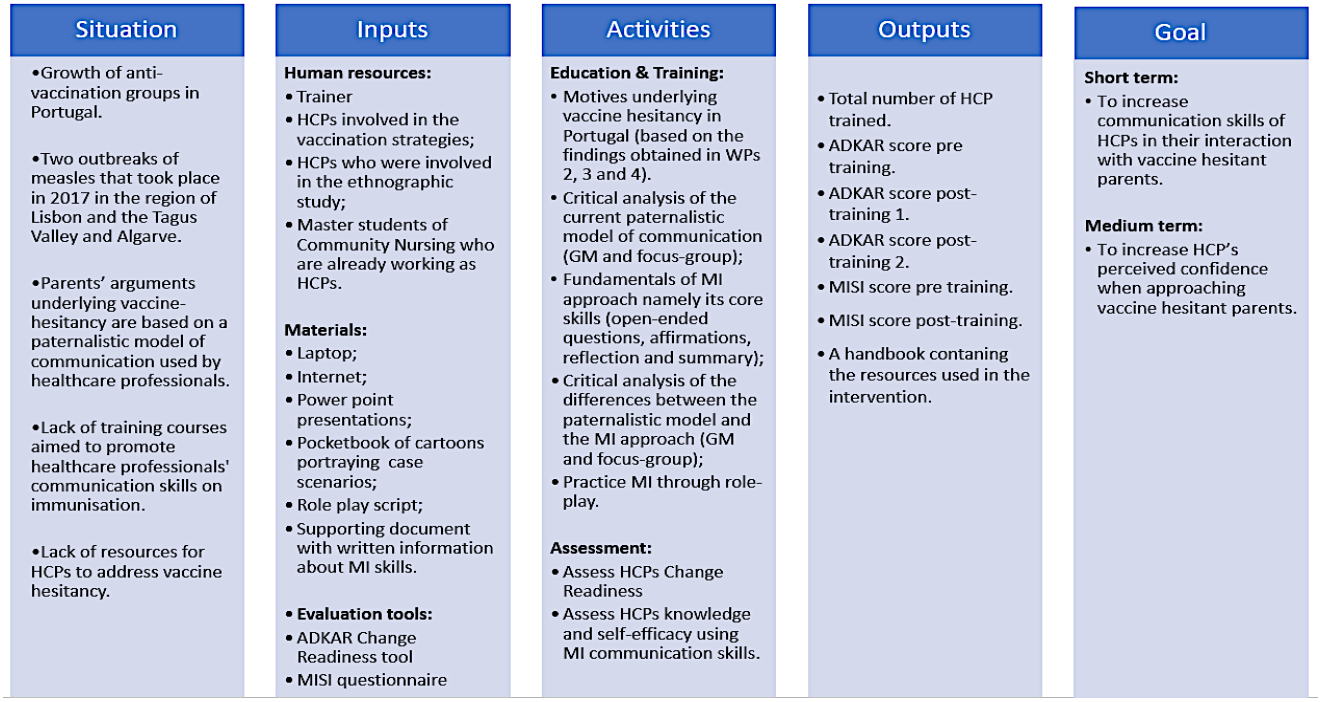
Parents also reported poor communication regarding vaccines' importance and possible side effects. Regarding the former, parents had questioned healthcare professionals about certain vaccines' relevance getting no or only evasive answers such as the argument that a vaccine is important just because it is included in the National Immunisation Program. Parents' doubts about the need for certain vaccines aroused early, right after birth, focusing on the hepatitis B vaccine which is targeted at new-borns. This vaccine was usually postponed by parents who did not understand its relevance and did not obtain any valuable feedback from healthcare professionals on this matter. With respect to the latter, healthcare professionals tended to focus on vaccines' short term side effects such as fever or swelling, undervaluing possible long-term ones, and thus, not discussing them with parents. For example, in some cases, parents' concerns about vaccines' possible side effects were based on the (unproven) correlation between the measles vaccine and autism. In addition, parents were often not informed about how to manage vaccines' possible side effects, accusing healthcare professionals of withholding relevant information.

The devaluation of parents' concerns regarding vaccination extended to other health topics, undermining their trust on healthcare professionals. For instance, in one case, a mother shared with the nurse that she was facing some difficulties related to breastfeeding asking for her advice on how to increase maternal milk production. The nurse did not reply to this mother's concerns and did not observe the breastfeeding latch nor mentioned the importance of breastfeeding stimulation. Furthermore, in some cases, healthcare professionals showed a lack of empathy towards parents, namely in the face of their children's suffering. For example, a first-time mother of a premature new-born was feeling powerless about the pain usually associated with the RSV vaccine and therefore asked the doctor if it was possible to administer the vaccine while the baby was sleeping. The doctor replied that it was not possible because it was not safe for the baby and the auxiliary laughed about the situation in a completely disrespectful way, increasing this mother's anxiety and feeling of lack of support.

In a nutshell, our findings pointed out communication as the main barrier underpinning vaccine hesitancy among parents, which is based on the current paternalistic model not responsive to individual characteristics and needs. Following this train of thought, the present intervention aims to address this gap by replacing the current model by a person-centred one (Santana et al., 2018) with communication between healthcare professionals and families as the cornerstone. Thus, the main goal of this intervention is to improve the communication skills of healthcare professionals in their interaction with vaccine hesitant parents through the development of an in-person educational session. To achieve this goal, this intervention suggests the adoption of an evidence-based approach – motivational interviewing (MI) – which is based on a person-centred framework. This approach advocates the use of certain communication skills by healthcare professionals when interacting with vaccine hesitant parents such as open-ended questions, affirmations, reflection and summary in order to tackle vaccine-hesitancy in an effective way (e.g., Gagneur et al., 2019). The short-term goal of the intervention is to train HCP in motivational interviewing and thereby increase their communication skills with vaccine hesitant parents. The medium-term goal is that HPC's feel comfortable to use motivational interviewing in clinical practice and therefore increase their perceived confidence when approaching vaccine hesitant parents. To accomplish these goals several tools will be used: focus group discussion, role play and graphic medicine (e.g., "*the use of sequential visual storytelling to share health-related experiences and information*" (King, 2017, p. 523).

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Figure 6 Logic Model of the Intervention



Another theoretical assumption is that healthcare professionals' perceptions of need for change are crucial to the effectiveness of interventions (Hulsman et al., 1999). This is in line with the ADKAR model of change which represents a framework for understanding change at an individual level. The ADKAR model is constituted by 5 stages: awareness (a person's understanding about the need for change), desire (a person's desire to participate and support the change), knowledge (information and training required to know how to change), ability (the implementation of the change) and reinforcement (internal and external factors that support the change) (Hiatt, 2006). A logic model of the intervention is provided below (Figure 6) for a better understanding of the reader.

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Theoretical assumptions

- HCPs have a great influence on individual vaccination decisions (Raude et al., 2016).
- HCPs play a key role in building confidence in the safety and value of vaccines (Kennedy at al., 2011).
- The MI is an evidence-based program by using a person-centred framework.
- There are studies showing the efficacy of MI on vaccine hesitancy (e.g., Gagneur et al., 2019).
- Effective training need to be experiential and participatory (Parry, 2008).
- Trainees' perceptions of need for change are crucial to the effectiveness of interventions (Hulsman et al., 1999).

Item 3. What (materials):

The present intervention will follow an in-person educational session with focus group, role play methodology and graphic medicine (e.g., "*the use of sequential visual storytelling to share health-related experiences and information*" (King, 2017, p. 523). These two tools will be used in a complementary way. A pocketbook of cartoons will be elaborated depicting an encounter between a healthcare professional and a parent focusing on vaccine hesitancy differently: one based on the current paternalistic model (traditional approach based on education and counselling) and the other cartoon based on a motivational interviewing approach. Beyond the pocketbook, other materials will be used in the two sessions: a power point presentation, a role play script, a supporting document with written information about motivational interviewing skills and two questionnaires aimed to assess the efficacy of the intervention.

Item 4. What (procedures):

Before the intervention took place, preparatory activities will be developed: the elaboration of a power point presentation with the main findings arising from certain VAX-TRUST work packages (WP2, WP3 and WP4), a pocketbook of cartoons representing different approaches to vaccination (traditional vs. motivational interviewing), a role play script and a brochure with written information about motivational interviewing skills.

A detailed description of the scheduling of the sessions is described below.

Session 1:

All healthcare professionals participating in the intervention will be asked to fill two questionnaires: the Change Readiness Assessment Questionnaire and a Motivational Interviewing Skills in Immunisation (MISI) questionnaire pre-intervention followed by an icebreaker activity. After that, there will be an introduction of the topic of vaccine hesitancy based on the main findings obtained in

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WP2, WP3 and WP4 through the projection of explanatory slides. After the coffee break, there will be a presentation of a cartoon depicting an encounter between a healthcare professional and a vaccine hesitant parent. In this cartoon, the healthcare professional will adopt the current paternalistic/directive approach as an attempt to tackle parental vaccine hesitancy. The presentation of this cartoon will be followed by a drawing activity where HCPs will be asked to draw a scene or a symbol of vaccine hesitancy. After that, a focus-group discussion about the main barriers in the interaction (both from the parent's and HCP's point of view) will be developed. The session will conclude with an activity summary of the main topics addressed and link to the following one. At the end, participants will be asked to answer to the Change Readiness Assessment (post-training 1).

Session 2:

Session 2 will begin with a summary of the main topics addressed in the previous session. Then, a theoretical exposure of the main fundamentals underlying the motivational interviewing approach will be performed with a particular focus on its applicability to address vaccine hesitancy. In a similar fashion with the session 1, there will be a presentation of a cartoon depicting an encounter between a healthcare professional and a vaccine hesitant parent but, this time, the healthcare professional will use motivational interviewing skills to address vaccine hesitancy rather than the traditional approach. The presentation of this cartoon will be followed by a focus group about the main differences between the motivational interviewing and the traditional approach. After the coffee break, healthcare professionals will be asked to role play using the motivational interviewing approach based on a script with possible issues that may arise in consultation with parents as well as a supporting document with written information about motivational interviewing skills. At the end, there will be a summary of the main topics addressed in the session followed by two post-test questionnaires: the Change Readiness Assessment Questionnaire and a Motivational Interviewing Skills in Immunisation (MISI) (post-training 2). The session will be concluded by sharing the intervention handbook along with complementing website, which will make all intervention related resources available for a wider audience. These will allow participants to review the intervention contents at any time as well as allowing the intervention to be replicated in other contexts.

Item 5. Who provided:

The present intervention was designed by the ICS-ULisboa team composed by sociologists and a social psychologist. The intervention will be delivered by a social psychologist with previous experience in conducting intervention programs, which is in line with the VAX-TRUST deliverable 5.1 guidelines (p.14 and p.28).

The team responsible for the design of the intervention consists of a social psychologist and researcher who is an expert in interventions and two sociologists and researchers specializing in two different fields: sociology of health and illness and science communication. The implementation of the intervention will be carried out by the social psychologist mentioned above along with a sociologist and researcher.

Item 6. How:

This intervention is targeted at three groups comprising a convenience sample: healthcare professionals involved in the vaccination strategies (n = 25), healthcare professionals who were

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involved in the ethnographic study (n = 25) and Master students of Community Nursing who are already working as healthcare professionals (n = 25). The choice of three different targets was based on the access to those potential participants along with the willingness to engage in the intervention showed by the healthcare units' heads as well as by the coordinator of the Master in Community Nursing from a University. In the case of healthcare professionals, this intervention aimed at improving their communication skills, making them feel more confident when interacting with vaccine hesitant parents. In addition, giving healthcare professionals the chance to engage in this intervention was a key aspect to get their collaboration in the ethnographic observations and interviews. For master students of Community Nursing who are already working, we believe that this is an opportunity to sensibilize the youngsters to the topic of vaccine hesitancy and to give them innovative tools to deal with it in their daily practice. Finally, the results to be obtained could inform future initiatives aiming to address vaccine hesitancy regarding the effectiveness of the intervention for each target.

The intervention will be delivered in-person and in-group. It includes traditional tools such as the projection and group discussion of explanatory slides, as well as the use of more creative tools like the visualisation, and discussion of cartoons (e.g., focus group) and role-play activities.

Item 7. Where:

The intervention will be delivered at HCPs' work context: health care centre, private clinic and hospital; in the case of students, the intervention will occur in the university. The availability of these spaces will be guaranteed through the collaboration from the heads of the healthcare units and the university for HCPs and master students of Community Nursery, respectively. Initial contacts were already established, and positive feedback was obtained regarding the interest and willingness to collaborate in the intervention.

Item 8. When and how much:

The present intervention is planned to took place in March and April 2023[1] accordingly to the availability of the three target groups. Activities will be developed in two sessions, each one with the duration of three hours, for a total of six hours which is in line with the grant agreement. The option for splitting the intervention into two sessions was made due to three main reasons. First, it will allow a better articulation with the physicians' work assignments, increasing their availability to engage in the proposed activities. Secondly, the non-condensation of the intervention into a single session will avoid the fatigue of HCPs who already have to deal with an overload of work in their daily routine. In third place, it will give time to HCPs to assimilate the knowledge acquired by promoting a greater reflection on the transmitted contents.

Item 9. Tailoring:

The planned sessions can be adjusted, depending on HCPs' availability. In this regard, there may be a need to concentrate the intervention into a single 6-hour session.

[1] The schedule of the intervention may change according to participants' availability.

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Item 10. Changes and adjustments:

Modifications to the planned intervention may occur due to several reasons and, in these cases, changes will be applied accordingly. Considering the scheduling of the planned activities, the major threat to the present intervention is the loss of attendees between sessions, compromising the assessment of the intervention's impact. As a mitigation strategy, we planned two different moments of post-training assessment: one after the first session (post-training 1) and another one after the second session (post-training 2). In both cases, participants will be asked to answer the ADKAR Change Readiness Tool and, only after the second session, the MISI questionnaire will be also applied. Following this risk plan, we will be able to assess the impact of the first session of the intervention (by comparing baseline with post-training 1 data), therefore minimising the negative impact of attendees' possible withdrawal between sessions. Moreover, this evaluation design will allow us to measure differently, on one hand, the impact of the first session solely and, on the other hand, the impact of the overall intervention.

Item 11. Intervention implementation and intervention delivery:

The same approach and tools will be applied in all the in-person educational sessions organised. The training will be standardized and applied by the same team. A handbook will be produced, and this will ensure standardisation. The protocol and the results will be published in a scientific article so the community will have access to this information and will be able to replicate this intervention.

5.3 The TIDier Checklist of Italy

Item 1. Short name:

The Vaccination Challenge: triggering healthcare professionals' reflexivity on vaccine hesitancy.

Item 2. Why:

The main objective of the intervention is to enhance healthcare professionals' reflexivity about their representations and practices related to the relationship with parents, particularly with vaccine-hesitant parents.

This main objective is declined in the following sub-objectives (D5.1):

1. to improve healthcare 'professionals' knowledge of the multifaceted and heterogeneous phenomenon of 'parents' vaccine hesitancy;

2. to increase healthcare 'professionals' awareness of their own assumptions (which might be synthonic but also dystonic with 'parents' ones, in order to communicate with parents in more self-confident and empathetic ways.

To do so, we will communicate and discuss the typology of 'parents' vaccine-hesitant attitudes drawn from the WP4 international team ethnography results, in line with the Social World Framework theory (presented in D4.5 and in D5.1). Moreover, we will use, if ethically appropriate, visual methods

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(photos, comics strips) to enhance healthcare 'professionals' critical thinking, in line with the more recent literature on healthcare 'professionals' training and socialization.

Item 3. What (materials):

The intervention package will not complement existing materials on the topic of vaccine hesitancy. It will consist of a combination of two in-person sessions both aimed at communicating the main results of WP4. A first in-person session (4 hours) will be devoted to feedback on the interaction and communication between parents and HCPs and the second in-person session (2 hours) will be focused on rethinking hesitancy. Both sessions will include lectures and participatory activities (World café and Nominal group). The two sessions will possibly be replicated in the two vaccination sites. Slideshows will be provided to participants and made available through the organisations' websites.

Item 4. What (procedures):

The baseline data will be both ethnographic fieldnotes and the transcriptions of interviews to healthcare professionals. These qualitative empirical materials will be then translated into quantitative information through the use of an analytical grid, applied by the evaluator. We will read, and carefully codify data, in line with template analysis (King, 2002; Cardano, 2020). Then we will quantify the qualitative data. The same analytical grid will be used to codify the transcription of the materials produced during participatory activities and of the focus group.

- The intervention is composed of two in-person group meetings, and each will involve between 35 and 50 HCPs: 10-15 doctors, 10-15 nurses, 10-15 paediatricians, 5 members of the administrative staff. All healthcare professionals involved in the intervention (those participating in the research activities) will be invited to the two in-person group meetings. The latter will be carried out in natural settings, namely in the two main fieldwork sites. The in-person group meetings will be conducted by the researchers themselves. A visual tool will possibly be structured around the six main ideal types of hesitant parents identified in the comparative team ethnography. It will be created with some forms of creative writing and will be used as an elicitation before and after the in-group meetings.

- The post-intervention phase will be conducted with a focus group in the natural settings with a sample of the HCPs involved in the intervention (about 12).

Item 5. Who provided:

In total three different professional categories will be included in the development of the intervention tool:

- **Researchers/Sociologists**: The Turin VAX-TRUST team will design the intervention, conduct the focus groups and support a specific Communication Agency to translate the sociological research results into visual contents under their direct guidance and an expert's visual expertise.
- **Visual expert**: will be possibly hired by the VAX-TRUST team, in accordance with our goals, to develop visual tools to use during in-person meetings. We will also rely on 'one member of the team's visual expertise. They will be reimbursed for their time.

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- **Experts in the field of communication**: The intervention will be developed in cooperation with local stakeholders (2 HCPs, at least one with a responsibility role) from vaccination centres. They will not be incentivised or reimbursed for their time, yet they will be consulted when needed.

Item 6. How:

The intervention will be delivered in-person and will involve about 35-50 HCPs. The focus group will include a sample of 10-12 HCPs included in the intervention, representative of the different professional profiles (doctors, nurses, paediatricians and administrative staff).

Item 7. Where:

The intervention will be offline (the in-person meetings will be organised in natural settings, namely vaccination centres).

Item 8. When and how much:

Our intervention concerns two in-person group meetings (six hours in total) which will be delivered in natural settings, and which could be replicated in the two vaccination centers within two months. Moreover, we will provide both the slideshows and, if ethically appropriate, the materials (posters) produced during the participatory activities to the organisations involved in the intervention. They will post them within their websites and, whenever possible, also on the websites of their professional associations (doctors, nurses and paediatricians). This way, the intervention will possibly reach as many healthcare professionals as possible.

Item 9. Tailoring:

The intervention is planned to be tailored to the professionals working at the local vaccination centres and the paediatricians involved in fieldwork activities. It is based on the results of the qualitative research carried out in the Target region and on the study's policy implications. At the Local Health Department, and more generally in our countries, both nurses and doctors are involved in consultations. Therefore, the module will address both, being focused on revisiting 'parents' vaccine hesitancy and showing the many expressions of this phenomenon.

Item 10. Changes and adjustments:

Modifications to the planned intervention may occur due to several reasons. We will update the PI and the WP5 and WP6 leaders, as well as adapt the intervention accordingly. We will predict the following risks: 1. Some participants may not show up, being involved in their professional activities; 2. Some participants may have transfer costs; 3. All of them may perceive the training activities as a form of criticism towards their attitudes and professional activities. To prevent these risks, we designed the following mitigation strategies: 1. Every participant receives a certificate with documentation for CME points. All the healthcare professionals have to achieve these credits, and this can represent an incentive to attend the training meetings. 2. We will replicate the meetings in each of the vaccination centres, to limit transfer costs. 3. We will adopt a participatory and empathetic training style, to make participants feel involved in the process, to foster their reflexivity and to prevent participants from feeling judged by trainers.

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Item 11. Intervention implementation and intervention delivery:

To ensure adherence to the intervention, we will use communication strategies with the trainees based on involvement, co-production, mutual respect and engagement. World café (Brown, 2010; Steier et al., 2015) and Nominal Group (Harvey & Holmes, 2012) are well known, and effective participatory techniques used in action research, even in clinical settings. While world café is a conversational process that helps groups to engage in constructive dialogue around critical questions, to build personal relationships, and to foster collaborative learning (Fouché & Light, 2011), nominal group is a method for generating priority information and for obtaining group consensus. The latter technique proved to produce information in a hierarchy of perceived importance and identified real world problems and therefore it is effective in ensuring the effectiveness of the intervention and to foster 'participants' compliance. Nominal Group Technique elicits responses from a group of experts to structured questions. The collaborative nature of Nominal Group increases the experts' ownership of the research results and therefore increases the likelihood of changing clinical practice and policy. Finally, the World Café can favour the cross-pollination of ideas through rounds of information exchange and allows the sharing of information in an equitable and non-threatening manner.

5.4 The TIDier Checklist of Belgium

Item 1. Short name:

Vaccine hesitancy in Flanders: an RLO to enhance awareness of the complexity of vaccine hesitancy among healthcare professionals

Item 2. Why:

Drawing upon existing social science literature as well as the VAX-TRUST Grant Agreement, we want to provide sociological insights on vaccine hesitancy to healthcare professionals involved in childhood vaccination, by facilitating awareness through reflection.

Building on Adele Clarke's theoretical insights, we focus on the "Flemish childhood vaccination arena", which consists of multiple social worlds. The social worlds framework focuses on meaning-making amongst groups of actors and are deeply relational. The social worlds framework highlights that there are multiple worlds organized around issues of mutual interest and commitment to action.

The aim of our intervention, namely to sensitize HCPs to sociological knowledge in WP2-WP4 about vaccine hesitancy in their regional, national, and international context in order to trigger reflexivity on the way in which the healthcare professionals encounter vaccine hesitancy, can be framed under the Social Worlds framework.

Specifically, we claim that in the Flemish childhood vaccination arena, all actors, including social worlds as collective actors, have their own perspectives, sites of work and commitments to action vis-à-vis the substantive situation/arena. As social worlds intersect or grow to become arenas, their joint courses of commitment and (inter)action are articulated through discourses.

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The concept of staged intersections—one-shot or short-term events where multiple social worlds in a specific arena come together—is Garrety's (1998) particular conceptual contribution to social worlds theory. The key feature of staged intersections is that despite the fact that this may be a one-time-only meeting for representatives of those worlds, the events can be highly consequential for the future of all the social worlds involved, for that arena—and beyond. We find this theory and conceptualization highly applicable to the Flemish childhood vaccination arena, where the meaning of vaccination is created by different groups of actors (parents and HCPs), under unique infrastructures, meeting at specific times.

Item 3. What (materials):

The intervention in Flanders is an asynchronous educational learning with digital tools. The educational package will consist of several learning materials. Complementing an already existing online webinar on vaccine hesitancy, provided by a healthcare professional working at Kind en Gezin (*Child and Family Agency)*, three video presentations of circa 15 minutes will be provided. These video presentations will be co-created by an expert in vaccination and an expert in online learning tools, both working at Kind en Gezin (Child and Family Agency*)*. A quantitative pre- and post-questionnaire, taking place immediately before and after the HCPs have completed the asynchronous educational learning session, will assess changes in HCPs' awareness of the complexity of vaccine hesitancy

The tool will be constructed in co-creation with the expert team on vaccination and educational tools at the Child and Family Agency, this means that at each stage, several rounds of feedback will take place. Our goal is that once the first version of the tool is constructed, that a pilot test can take place in which a small group of HCPs, i.e., around 5-10 HCPs and the experts on online learning tools at the Child and Family Agency as well as the experts on vaccination at the Child and Family Agency, can take part in the asynchronous educational learning and share their experiences and feedback. We will ask them about ease of use and feedback on the content. The tool will be adjusted accordingly by the intervention facilitator. Afterwards, once the final version of the tool is fine-tuned, the asynchronous educational learning will be implemented by our facilitator uploading the digital tools on the e-learning platform of the Child and Family Agency. This intervention targets healthcare professionals (both nurses and GP's) working at Kind en Gezin (Child and Family Agency), which is the leading vaccinator in Flanders. All healthcare professionals make use of the e-learning platform of the agency, on which the tool will be made available. In 2020, 1.442 employees were working for Kind en Gezin (Child and Family Agency). During the VAX-TRUST intervention implementation, we aim that our intervention reaches 70 to 100 HCPs. The intervention facilitator will send out an e-mail to all members working at the Child and Family Agency – Vaccination team to participate in the construction of this tool. In combination, we will ask the expert on vaccination, who is part of the Child and Family Agency's board on vaccination, to promote this intervention model.

Overall, we aim to reach as many employees as possible, by employing two recruitment strategies: (i) an active recruitment strategy, through which the employees are invited to take part in the RLO through e-mail (ii) making the RLO permanently available on the Kind en Gezin (Child and Family Agency) intranet, so that the intervention is durable and can reach vaccine stakeholders, even after the end of the VAX-TRUST project.

Item 4. What (procedures):

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The procedures in delivering the intervention based on an asynchronous learning tool (RLO) can be realized using the ASPIRE methodology. This methodology is used and validated for the development of RLO and is optimally suited to the requirements for the design of high-quality digital training in healthcare and utilizes principles of participatory co-design, which is in line with the design of the Flemish VAX-TRUST intervention in co-creation with Kind & Gezin (Child and Family Agency). Below, we discuss all procedures, activities and process used in delivering the intervention, according to the ASPIRE framework.

Aims: To enhance reflexivity among healthcare professionals in Flanders, by having them participating in the intervention by accessing an online learning tool.

Storyboard: By having meetings with the Child and Family Agency, the UGent VAX-TRUST team will co-create the aim and exact learning objectives that the RLO should have.

Populate/produce: Content will be created by the UGent VAX-TRUST team, based on findings from the VAX-TRUST's work packages on the situation analysis and statistical findings, the results of the media analysis, and the results of the qualitative study. The content will be revised by the Child and Family Agency and adjustments will be made accordingly.

The content will exist out of an introduction to the online learning tool, given by an expert in the field. They will emphasize (i) the importance of the interaction between HCP and parents and (ii) the importance of empathy and reflexivity the vaccine encounter and during conversations with vaccine hesitant parents. A pre-intervention measurement will take place, where the participants will be asked to respond to a short questionnaire related to their ability, confidence and comfort discussing concerns and doubts related to childhood vaccination with parents. The questions will be closed-ended, apart from one open-ended question where participants can leave an extra remark or reflection. The questionnaire will also gather some information on the demographic details of participants and their healthcare role.

Three informative video-modules will be made available in the RLO. The topics of interests will be key issues that arose from WP4 ethnographic study, as well as the WP3 media analysis, and the WP2 situation analysis. The contents of the videos will focus on different visions on vaccination, in accordance with the results of previous work packages. Reflexivity and awareness of different vaccination views and concerns will be the main focus of the videos. Links to further information, such as empirical studies and useful websites will be provided for those who want to read more information

We aim for each video-module to take about 15 minutes; however, HCPs can go through the information at their own pace and rewind or slow down where needed.

Immediately after completing the RLO, participants will respond to a questionnaire which asks them to rate their ability, confidence and comfort to discuss concerns and doubts related to childhood vaccination with parents.

Integration: The content of the RLO will be developed into a technical tool, which can be accessed online.

Release: The intervention tool will be released on the online learning platform of Kind & Gezin (Child and Family Agency) and will become available to all employees at the agency. An email will be sent to

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all employees working specifically in the field of vaccination at the agency, inviting them to take part in the tool.

Evaluation: The data collected in the pre-and post-measurements will form the basis for the evaluation and will take place immediately before and after the participants have completed the asynchronous educational learning. The local evaluator will analyse and compare both datasets, looking for changes between both.

Note from the team: *We would like to emphasize that we will collaborate with the Child and Family Agency for the development of the intervention. While we will administer the intervention framework according to the VAX-TRUST deliverables, the concrete intervention will be tailored to the organizational needs and interests. Therefore, we opt to develop the intervention in a flexible way.*

Item 5. Who provided:

In total three different parties will be included in the development of the intervention tool:

- **Researcher/Sociologists**: The UGent VAX-TRUST team, consisting of **four** members, will support an intervention facilitator in their process of developing the intervention content-wise. In order to do so, one intervention facilitator will be hired, who has a background in sociology and health promotion, i.e., to reassure that the sociological research results can be translated into a public health intervention correctly. This person is specifically recruited for the study and is reimbursed for their time. In total, the intervention will be reviewed and discussed by the five members of the UGent VAX-TRUST team.
- **Two experts in the field of vaccination and online learning tools**: The intervention will be developed in cooperation with the Child and Family Agency. Since we aim to build further on their existing intervention, we will collaborate closely with their educational team as well as the GP who is on the board of vaccination at the agency. They will not be incentivised or reimbursed for their time, yet they will be consulted when needed.
- **One technological expert**: A technological expert will be hired to develop the intervention technical-wise. We will look either at students who are in the Master of Communication and who have an expertise to do so, or at a video-marketing company.
- **One expert on communication**: We aim to involve an expert on Motivational Interviewing in one of the thematic video modules. This can be a PhD student, a researcher, a Post-doc or professor who has experience in this topic of study.

Item 6. How:

The asynchronous learning tool includes informative video modules, further information on content and interactive parts of the module remains to be discussed with the Child and Family Agency, in order to cater to the organizational needs. The intervention will be available online to all healthcare professionals at the Child and Family Agency. We count on the aid of the Child and Family Agency to recruit participants for this intervention and to promote the online tool among their healthcare professionals.

Item 7. Where:

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The intervention will be delivered online. The Child and Family Agency intranet provides an online learning space accessible to all healthcare professionals, i.e., nurses and GPs, working at the agency. This allows that the tool will be easily and continuously available to all healthcare professionals working at the agency.

Item 8. When and how much:

As our intervention concerns an asynchronous learning tool, we aim for it to be available on the Child and Family's online learning space. During the VAX-TRUST intervention, we hope that this learning tool can reach approximately 70 to 100 HCPs. However, the tool will stay available on the online learning platform even after the project ends. This way, we hope that the intervention can reach as many healthcare professionals as possible. Considering (i) HCPs' busy schedules and (ii) that questions around VH parents may arise at different moments in time, the intervention will be available over a longer period of time and HCPs can access it as many times as is needed. Once the learning tool is made available, all healthcare professionals working at the agency will get notified. The asynchronous learning tool will allow HCPs to digest the information at their own pace. Specifically, we will design three video-modules of approximately fifteen minutes each, which HCPs can complete at their own pace. These video-modules are complemented by the pre- and the post-measurement. Also, extra information (links to existing studies and more relevant information) will be provided as well for the HCPs to read. In addition, the existing webinar module complements the RLO. This webinar is an extensive source of information, consisting of approximately 140 PowerPoint slides. In total, the combination of the already existing and the newly provided asynchronous learning material will take between 5 and 6 hours to complete.

Item 9. Tailoring:

The intervention is planned to be tailored to the professionals working at the Child and Family Agency. During the VAX-TRUST intervention implementation period, we aim for a target group of at least 70 to 100 HCPs. At the agency, both nurses and GPs engage in administering vaccines and having conversations with parents around vaccinations. At the Child and Family Agency, all learning tools are available to all HCPs. However, by notifying the HCPs involved in the vaccination branch of the agency, we aim to target this group specifically. Furthermore, we tailor the intervention by optionally giving additional references and information which are relevant to nurses and/or doctors specifically.

Item 10. Changes and adjustments:

Modifications to the planned intervention may occur due to several reasons. We will update the VAX-TRUST consortium as well as the Child and Family Agency on these changes and adapt the intervention accordingly. Modifications may occur due to changes that happen during the development or implementation of the RLO.

First, financialchanges may occur. We are currently in the process of negotiating offers for the technical development of the online learning tool. If the technical development were to be estimated at a price which is too high, we might have modify our RLO and cut down on the video-modules which will be developed (e.g. we will develop two video-modules instead of three).

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Another potential risk is that not a significant number of participants will interact with the tool during the implementation time of VAX-TRUST, however, we aim to counter this risk (i) by co-creating the tool with the Child and Family Agency, relying on their expertise and experience of which tools work and which don't, (ii) by involving the Child and Family Agency in the distribution of the online tool, and (iii) by sharing the tool with the participants of the qualitative study who also work at the Child and Family Agency (WP4).

Item 11. Intervention implementation and intervention delivery:

The use of an RLO for healthcare interventions has proven its utility in previous scientific studies. The development of an RLO in co-creation with the main vaccinator in Flanders, an agency which has experience in providing online learning modules to healthcare professionals in the field of vaccination, ensures a certain level of expertise for the application of such an intervention in our target region. From the WP4 interviews, we know that HCPs in Flanders have a great interest in such learning tools. The pre- and post-measurements will allow us to evaluate to what extent the RLO was successful in reaching its objectives. Furthermore, an RLO is a standardized intervention, and allow for much flexibility on behalf of the user. Learning goals will be specified before the creation of the RLO, to make sure that the tool is in line with the learning objectives.

We rely on the theoretical (Social Worlds theory) and methodological (ASPIRE) frameworks to form a solid basis for the development of the intervention. The UGent team will document all steps that are taken in the development of the RLO, explaining how they relate to both frameworks.

The technical development of the RLO will be taken care of by experts in the field (we are currently negotiating offers with different technological companies), to ensure that the tool is easily accessible on different devices. We can also count on the experiences of the experts on the development of online learning tools, who work at the Child and Family Agency.

5.5 The TIDier Checklist of Czech Republic

Item 1. Short name:

Czech VAX-TRUST intervention: increasing awareness of the complexity of vaccine hesitancy among healthcare professionals.

Item 2. Why:

Children's vaccination is mandatory for nine diseases listed in the national vaccination program in the CR (see Table 7). The program applies across all Czech regions, including the VAX-TRUST target region of Prague.

Vaccination is fully covered by the public insurance. The Czech system is characterized by relatively high vaccination coverage rates for childhood mandatory immunisation. However, these rates are slightly but consistently decreasing over time. This decreasing tendency might be seen in all regions of the Czech Republic, but the lowest immunization rates are in our target region – Prague (Adámková, Dušek, 2019).

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In terms of provision, the childhood vaccination in Czech Republic stands out in a European perspective because of its organization. In the Czech healthcare system, there are specific physicians, operating a private (very often) one-to-one praxis, who are responsible for vaccinating children and adolescents until the age of 19. These are so called General Practitioners for Children and Adolescents (GPCA). Parents register their kid with a GPCA, this registration is mandatory. The vaccination calendar is very strict, indicating at what age kids need to be vaccinated.

Table 7 Immunisation schedule for childhood vaccination in Prague and the Czech Republic

	4 days to 6 weeks	From 9 weeks	4 months	11-13 months	13-18 months	5-6 years	10-11 years	13-14 years
MANDATORY, FREE OF CHARGE								
TBC[(a)]*	X							
DTP[(b)]		X	X	X		X	X	
HiB[(c)]		X	X	X				
HepB[(d)]		X	X	X				
Polio[(e)]		X	X	X			X	
MMR[(f)]					X	X	X	

X = compulsory
Vaccines against (a) tuberculosis, (b) diphtheria, tetanus, pertussis, (c) haemophilus influenza type b, (d) hepatitis b, (e) poliomyelitis, (f) measles, mumps, rubella, (g) human papillomavirus, (h) pneumococcus, (i) meningitis b, (j) meningitis c, (k) rotavirus
Source: Czech Vaccination Society, accessible on: *https://www.vakcinace.eu/ockovani-v-cr*

The GPCA are the key stakeholders in the childhood vaccination in the whole country, in Prague region too. They administer children's vaccination; their tasks include sending invitation letters for all mandatory vaccines to the parents and the delivery of a total of 19 preventive consultations and mandatory vaccines.

GPCA and the nurses working with them from Prague region thus represent the target group for the Czech VAX-TRUST intervention in Prague.

Our research pointed out that most hesitant parents in Prague are not necessarily opposed to vaccination itself but that they have concerns which are not appropriately addressed by health care professionals and seek to negotiate higher autonomy when it comes to vaccination schedule changes (e.g., timing and vaccine types). Hesitant parents remembered problems with overly paternalistic approach, stigmatization of hesitant parents, absence of compassion and the capacity to understand parents' concerns within the broader context of care and parenting. Their cautious attitudes are framed both by alternative lifestyle as well as by biomedical perspectives. That is why we perceive the interaction with health care professionals as a backbone for the vaccine confidence and as a backbone of our interventions (Hasmanová Marhánková & Numerato, 2022).

In our interventions, we aim at stimulating HCPs reflexivity concerning their everyday clinical practice and in particular the interaction between the GPCA and the nurses (key stakeholders) and the parents and children. We see three key pillars of our interventions:

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(1) Diversity, plurality and continuum: sensitivity towards diversity and plurality of perspectives and vaccines (X vaccination)

(2) Compassion: recognition of reasoned concerns and irrational layers of argumentation, coupled with the need to change the discourse and from statistics and concepts to stories

(3) Child-centrality: acknowledge that the interaction in surgeries is grounded around the common, yet often invisible aspect: all actors act "for the good of the child"

The key objectives of the Czech interventions will be to:

- improve knowledge about the complexity of factors underpinning vaccine hesitancy;
- foster positive attitudes dealing with vaccine hesitancy and hesitant parents and;
- incorporate a reflexive standpoint through behaviour change in everyday clinical practice.

Item 3. What (materials):

The asynchronous and in person intervention methods will be used.

Three following tools will be used:

(1) Pre-intervention and post-intervention online KAB survey to measure reflexive attitudes of HPCs and their readiness to incorporate the reflexive standpoint in their everyday clinical practice.

The KAB survey will be used to measure HCPs knowledge, attitudes and behaviour concerning the clinical practices of vaccination before and after the intervention. Reflexivity is understood here as HCPs' capacity to view their work from social-scientific perspective and through the lenses of the main conclusions deriving from WP4. That said, HCPs should be able to consider their everyday professional practice and the interactions with children and parents through the lenses of vaccine hesitant parents and be aware of the complexity of factors, in particular non-medical factors, influencing vaccine hesitancy.

More specifically, as part of the **knowledge** dimension, HCPs' awareness and degree of reflexivity related to socio-cultural aspects of vaccination and professional practice will be measured. Moreover, HCPs' capacity to reflect upon the role of social and mass media will be measured. Second, as part of the **attitude** dimension, HCPs' attitudes towards parents will be measured. More specifically, the following questions will be addressed: To what extent are HCPs' attitudes towards parents paternalistic or tolerant towards parents' hesitant perspectives? And how do they consider the importance of children in the HCP-children-parent vaccination triangle? Third, as part of the **behaviour** component, the readiness to employ a more reflexive standpoint as part of the clinical practice and following the intervention will be measured. Questions measuring HCPs willingness to bring the new knowledge in their practice will be addressed.

The post-intervention KAB survey will be delivered twice, right after the intervention for the first time and then repeatedly 2 months after the end of the intervention for the second time.

(2) In person workshop (Projection and commentary of explanatory slides, group discussions, recommendations).

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The aim is to:

- inform the HCPs about the complexity of the factors underpinning the vaccine hesitancy in the target region as well as in other VAX-TRUST regions and to
- discuss those factors in groups in order to make the HCPs aware of the complexity of the vaccine hesitancy and foster their reflexivity concerning vaccination.

Model situations of an interaction between the HCPs and hesitant parent will be presented to the participants. These model situations are inspired by our findings, coming mainly from WP4.

At the beginning of the workshop, every participant will be asked to explain what his/her behaviour in the model situation would probably be. Consecutively, the participants will form smaller groups and will be asked to share and discuss their approaches in a group/team. Then, the teams will share their findings with other groups. Finally, based on the results of the research conducted in this project, the model situation and prospective behaviour strategies will be discussed in the broader forum.

Five model situations will be discussed in one workshop.

(3) Brochures explaining the complexity of the factors underpinning the vaccine hesitancy in the target region as well as in other VAX-TRUST regions.

All participants will be given the brochure at the end of the workshop. In the brochure, the complexity of the factors underpinning the vaccine hesitancy in the target region as well as in other VAX-TRUST regions is explained.

Item 4. What (procedures):

In the **preparatory phase** the selected professional associations will be contacted (one GPCA Association, one Nurse Association), and the intervention will be accredited within the Continuous Medical Education (CME).

The professional associations will disseminate information about the intervention to their members through their dissemination channels. The intervention will be open for all HCP interested in the vaccination topic.

HCP will be asked to sign up for the intervention. To get the credits, the participants need to pass all steps of the intervention (steps 1 to 3).

In Step 1, the online KAB Survey will be made available for the participants.

In Step 2, a four-hour intervention will be prepared for participants. The intervention will have a form of an in-person workshop.

During the workshop, the complexity of the factors underpinning the vaccine hesitancy in the target region as well as in other VAX-TRUST regions will be explained and based on model situation examples discussed in groups.

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At the end of the workshop, the online KAB Survey will be made available for the participants. The aim of the survey will be double: subjective (participants are asked to provide feedback on the intervention) and evaluative (mapping the immediate ex-post awareness of HCPs of the complex factors underpinning vaccine hesitancy (VH) as well as their readiness to incorporate the reflexive standpoint in their clinical practice and interactions with parents.). The evaluative part will be identical as in Step 1.

In Step 3, two months after the workshop, the online KAB Survey will be made available for the participants. The aim of the survey will be evaluative (mapping the ex-post awareness of HCPs of the complex factors underpinning vaccine hesitancy (VH) as well as readiness to incorporate the reflexive standpoint in their clinical practice and interactions with parents). The evaluative part will be identical as in Step 1 and 2.

The data collected in the pre-and post KAB survey will form the basis for the internal evaluation.

Item 5. Who provided:

- person 1 and 2 sociology of health and illness,
- person 3 comparative health policy, comparative health system, health economics, public and social policy.

The intervention is coordinated by WP5 leadership team with extensive experience in the implementation practices and will provide the CUNI team with the necessary support to effectively implement specific intervention tools.

Item 6. How:

HOW:

The asynchronous and in person intervention methods will be used.

Step 1 (online) aims to map the pre-intervention awareness of HCPs of the complex factors underpinning vaccine hesitancy (VH) as well as readiness to incorporate the reflexive standpoint in their clinical practice and interactions with parents.

The intervention will be delivered individually.

Target group: 60 HCPs (40-50 GPCAs and 10-20 nurses).

Step 2 (in-person) will have the form of an in-person workshop in which the HCPs will be, first, familiarized with the complexity of the factors underpinning the vaccine hesitancy in the target region as well as in other VAX-TRUST regions. This will happen by means of key WP4 findings presentation. Furthermore, second, they will be asked - based on model situation examples - to discuss it in groups in order to foster their reflexivity concerning vaccination. At the end of the workshop, the awareness of HCPs of the complex factors underpinning vaccine hesitancy as well as their readiness to incorporate the reflexive standpoint in their interactions with parent safter the intervention will be mapped. At the same time, the HCPs will be asked to provide feedback on the intervention.

The intervention will be delivered in group (in person).

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Target group: 60 HCPs (40-50 GPCAs and 10-20 nurses, separately).

In the **Step 3** (online), two months after the end of the Step 2, the awareness of HCPs of the complex factors underpinning vaccine hesitancy as well readiness to incorporate the reflexive standpoint in their interactions with parents' communication after the intervention will be mapped.

The intervention will be delivered individually.

Target group: 60 HCPs (40-50 GPCAs and 10-20 nurses).

FOR WHO:

The interventions will be proposed to HCPs (GPCA and the nurses), most of the participants will be from our target region.

The logistics of intervention will be prepared in cooperation with selected HCPs professional associations. This will allow us to accredit the intervention within the Continuous Medical Education (CME).

The HCPs interested in the intervention will be asked to sign up for it. The intervention will be proposed within the CME to 40-50 GPCAs and 10-20 nurses. The intervention will be prepared separately for GPCA and separately for nurses. The participants will receive 4 CME credits/whole intervention (Steps 1, 2 and 3).

Item 7. Where:

Step 1 and 3: asynchronous method.

Step 2: In person. The intervention will take place in Prague.

Based on the agreement between Czech VAX-TRUST team and the professional associations, the interventions will take place either in one of the CUNI rooms, or in the professional associations' areas (probably ILF hotel, it is the place where the CME courses take place).

Item 8. When and how much:

Steps 1 and 2 will take place in the second half of February and March 2023.

In this period, the Step 2 will be delivered at least four times.

Duration: 30 minutes (Step 1) and 4 hours (Step 2)

Step 3 will take place in the second half of May/beginning of June 2023.

Duration: 30 minutes

Item 9. Tailoring:

In the Steps 1, 2 and 3, the interventions are planned for GPCAs and nurses. The intervention will be tailored based on the differences of those target groups; thus, a different intervention will be prepared for GPCAs and an another one will be prepared for nurses.

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Item 10. Changes and adjustments:

The logistics of the intervention will be prepared in cooperation with selected professional associations; we suppose to cooperate with two associations (one association of GPCA and one association of nurses). If the cooperation does not prove to be fruitful, we might select another association(s).

The negotiations with the professional associations will start in January 2023. Based on this, the schedule and also the format of Step 2 proposed above might be slightly changed. In this case, the new schedule will be proposed, still aiming at leaving minimally one month between the Step 2 and Step 3.

Item 11. Intervention implementation and intervention delivery:

The intervention is designed and tailored by the Czech VAX-TRUST team. The team was involved in all WPs preceding the WP5 and is also and actively involved in WP5. This ensures the adherence and fidelity to the interventions.

5.6 The TIDier Checklist of Poland

Item 1. Short name:

VAX-TRUSTed: VAX-TRUST-Educational intervention on raising awareness of the complexity of vaccine hesitancy among healthcare professionals involved in discussing childhood vaccinations with parents in the Małopolska Region of Poland.

Item 2. Why:

National context

In Poland, the vaccination system is centralised and administered according to national regulations by centralised institutions through their regional branches. Therefore, a wider national context needs to be considered when discussing the vaccination system in the region.

Each year, the Chief Sanitary Inspector of Poland publishes the immunization schedule for mandatory and recommended vaccination in the official journal of the Ministry of Health. Vaccinations against tuberculosis, hepatitis b (both administered to newborns in hospitals), rotavirus, DTP, poliomyelitis, HiB, pneumococcus and MMR are mandatory and vaccination refusal is punishable. GPs are responsible for the compulsory vaccinations of children. More specifically, they are obliged to discuss the immunisation schedule with parents of a new-born child, and if necessary, to adjust it to the child's individual needs. Vaccinations are administered by qualified nurses after medical examination by a pediatrician. The immunisation schedule foresees mandatory and state-provided free vaccinations and a set of recommended vaccinations, which are paid and have to be provided by parents.

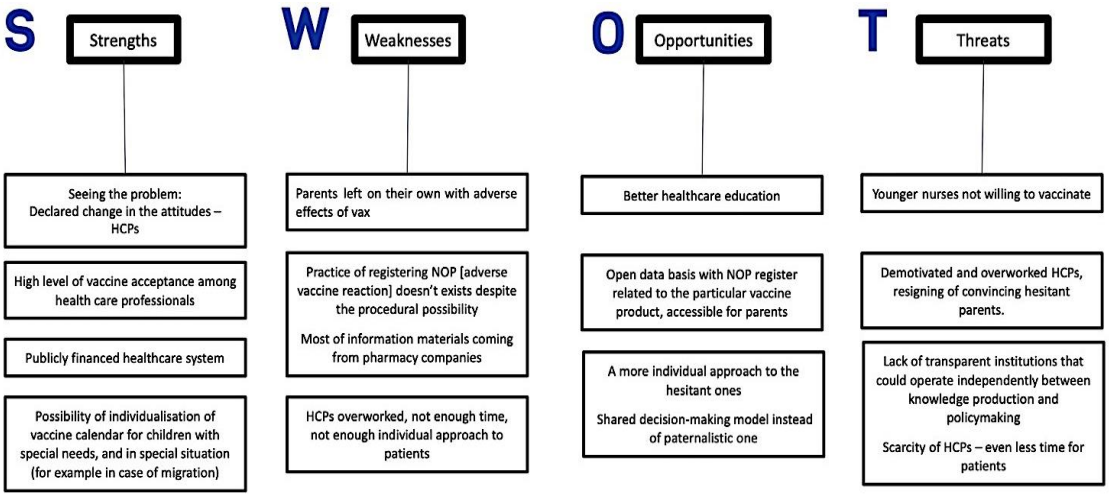
All mandatory vaccinations are under the responsibility of the pediatricians (GPs) and administered in assigned health centers - public GP offices.

Data from Poland shows that, although the vaccination coverage rates in Malopolska and Poland are still generally high, they decreased over time, with the exception of the coverage rate for the vaccine

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against the rotavirus (Table 23 D.2.2). However, despite the high rates of immunisation (all above 90%), the number of vaccine refusals has been rising in the last few years. This proves that vaccine hesitancy is a problem to be addressed, both nationally and in the target region. Recent research (CBOS, 2017; Olszewska et al., 2018) identifies decreasing knowledge on and awareness of vaccinations amongst parents, which further supports the need for education, better knowledge transmission, increase in parents' awareness and dialogue with parents.

SWOT analysis *(graph 1)* based on the research conducted in this project proves that the vaccination system in Poland has significant weaknesses. The healthcare system is underfinanced and has been suffering further and amplified problems during the Covid-19 pandemic. Vaccinations were delayed or practically stopped during the worst restrictions and increases in Covid-19 cases, as GPs worked in



online consultations mode. This was reverted back to regular consultations, but some delays may still persist. Moreover, HCPs are overworked, with many patients, short time slots assigned for patients and in general scarcity of medical personnel. OECD data shows that Poland has one of the lowest ratios of doctors and nurses per 1000 inhabitants in the whole EU. This results with HCPs not having enough time for patients and possibly losing an individual approach to patients. Those personnel and time deficits constitute the main reason why, following the recommendations from the SWOT analysis (*graph 1),* we decided to do the online health interventions in the form of a *digital learning session*, that will be more easily accessible and flexible in terms of time for the HCPs. Also, following identified barriers, the main focus of interventions will be put on younger nurses (at the beginning of their professional career). Even though the need for younger nurses to join the vaccination system is high due to lack of the personnel and the increasing average age in the profession (53 years in 2020, up from 45 in 2010, see: https://nipip.pl/srednia-wieku-pielegniarek-i-poloznych-w-polsce/) the younger nurses are the most hesitant towards work at the GP offices (as vaccination centers). Thus, this is making this group even more important to make them reflexive and cautious of patients' needs, fears and experiences, but also convince them to join the vaccination system.

Graph 1 Extract from the SWOT analysis

Theoretical background

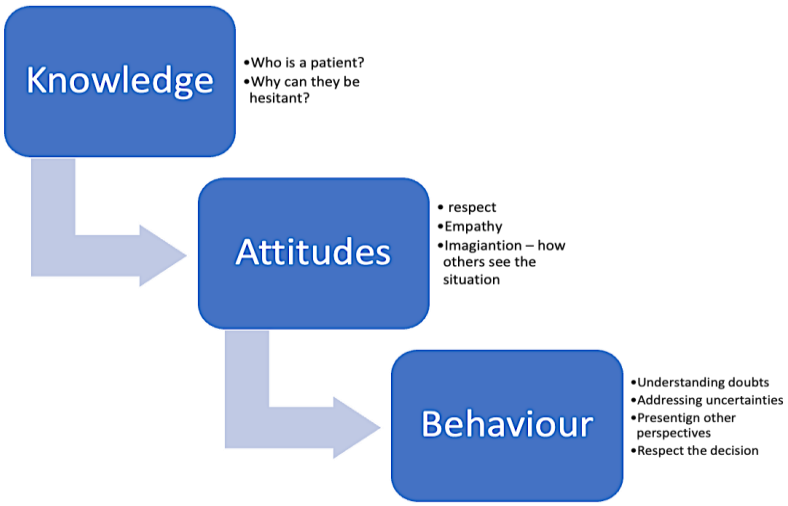
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The planned interventions in Poland will be created around the 3 crucial steps (*graph 2)*: recognition of the complexity of the vaccine hesitancy among healthcare professionals involved in discussing childhood vaccines with parents, improving dialogicality, building argumentation strategy and convincing HCPs that the lack of decision is also a decision.

Graph 2 Three crucial steps for the digital learning session



Graph 3 Learning Model for digital learning session



To fulfil that task we will focus on the Knowledge Attitudes Behaviour model *(graph 3)* aiming at providing HCPs with tools for knowing and understanding vaccine experiences of parents and concerning their potential *baggage of experience,* promoting changes in HCPs attitudes and behavior by showing the need for mutual respect, empathy, and understanding of potential doubts.

Item 3. What (materials):

The educational package in the form of a digital learning session includes: two video podcasts with key information on vaccine hesitancy based on the VAX-TRUST project results; reading materials on vaccine hesitancy with questions and answers, and an interactive game-quiz to increase the awareness and understanding of vaccine hesitancy. Detailed information on the intervention will be made available on the intervention website, hosted by the Jagiellonian University (www.uj.edu.pl).

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The plan for the digital learning session is:

- Online registration (20 minutes);
- Pre-test (30 minutes);
- Podcasts (40 minutes);
- Online game-quiz (1 hour);
- Reading materials on vaccine hesitancy in general and in the region with question and answer sections (3 hours);
- Post-test (30 minutes).

Item 4. What (procedures):

The intervention is planned as a digital learning session to increase awareness of the complexity of vaccine hesitancy among healthcare professionals involved in discussing childhood vaccines with parents, in the Małopolska Region of Poland.

The target population is 100 nurses from the Malopolska region. The recruitment process will mainly focus on institutional connections to help targeting and reaching the population: 1) nursing colleges will be approached, with the aim of informing and recruiting their MA students (resident students) of the interventions; 2) nurses' professional bodies (Malopolska Chamber of Nurses and Midwives, regional branches of the Chamber) will be contacted to reach practicing nurses; 3) healthcare facilities, including those included in the ethnographic observations, will be contacted. The other part of the recruitment process will use previous relations and established contacts to individually contact practicing nurses and invite them to take part in the health intervention.

The main part of the online intervention will encompass: 1) increasing knowledge on vaccine coverage and vaccine hesitancy in Poland and the world in the form of two podcasts and additional reading materials; 2) an interactive serious digital game[2] aimed at stimulating and encouraging a reflexive insight into why patients may be hesitant. The game will use real-life examples of why patients hesitate towards vaccines and stimulate the user to empathically understand the rationales behind it and address the doubts. The online game will take the form of a quiz, with correct answers rewarded and explanations of what behavior is more favorable and why. The game will engage the participants and is supposed to make HCPs more reflexive, by using examples from their everyday work and insights from the VAX-TRUST project results. 3) Another podcast recapitulating on some of the key ways of addressing vaccine hesitancy.

All healthcare professionals participating in the intervention will be given a KAB (Knowledge, Attitude, Behaviour) questionnaire before the intervention, and after it is finished as pre-tests and post-tests. Participants will be asked to fill in the questionnaire online, within the same digital learning session. The results of the above questionnaires will be presented in a report and passed to the evaluator.

[2] There is rich scientific literature on serious games as useful tools for education and intervention, see for example: https://www.frontiersin.org/articles/10.3389/fcomp.2021.686348/full

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If institutional support is provided for the intervention (eg. recruitment via MA studies for practicing nurses), an introductory and encouraging lecture might be provided on site, depending on the willingness and interest of the institution. The intervention, however, will be held online.

Item 5. Who provided:

The health interventions will be provided by 3 specialists in communication, 4 sociologists, and 1 social psychologist. All the trainers have experience in training and facilitation and necessary qualifications and will provide a detailed scenario for the interventions, prepare the intervention and provide podcasts, where their expertise as trainers will be used. Same team of specialists in communication, 4 sociologists, and 1 social psychologist will be involved in creating a scenario for an online-quiz as well as pre and post-tests. All the team members will have a background and previous experiance in communicational sciences.

Item 6. How:

The intervention is delivered online as a digital learning session. It is delivered individually, with possible institutional support (university, healthcare facility).

The intervention assumes the interactive asynchronous involvement of the participants by active participation in the game, listening and watching the podcasts, reading additional materials provided with the intervention, as well as completing the pre- and post-intervention test. 100 nurses will be involved in the intervention.

Item 7. Where:

The intervention (digital learning session) will be delivered online, through a website hosted by the Jagiellonian University servers (http://www.uj.edu.pl). For the purpose of the interactive game, we will use software that will help in the design of the game, programming and providing a server to host it. However, all the materials will be uploaded to the website hosted by the Jagiellonian University (www.uj.edu.pl). Planned podcasts will be recorded by the Jagiellonian University team researchers using a professional video camera. Editing and all necessary works on the raw video material will be subcontracted to an external company specializing in directing and creating podcasts.

Item 8. When and how much:

The intervention will be delivered online on an individual basis, starting from February 2023 until April/May 2023. Each participant will conclude the intervention in their chosen time.

Each session will consist of:

- Online registration (20 minutes);
- Pre-test (30 minutes);
- Podcasts (40 minutes);
- Online game-quiz (1 hour);
- Reading materials on vaccine hesitancy in general and in the region with a question-and-answer sections (3 hours);
- post-test (30 minutes).

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Additional costs will include commissioning video podcasts to a specialist firm; paying for professional recording studio time; paying for graphic services; subscription to an online game creation tool. Planning and organizing interventions, as well as recruiting participants within the Malopolska region will include further travel and possible accommodation costs.

Item 9. Tailoring:

If trained individuals are recruited through an institution (e.g., university or other educational institution, where participants study or attend additional courses; or healthcare facility that participants work at), an introductory short lecture might be added to encourage participants or introduce them to the topic of the intervention and the project as a whole. With individual recruitment, such information will only be briefly delivered online.

Item 10. Changes and adjustments:

As the intervention will be prepared as an online educational package, no modifications to the package are foreseen. However, if necessary or required by partners (e.g. university offering MA nursing studies), the intervention might be delivered partly within a group (podcasts streamed on site and interactive quiz game played individually).

The modifications might also be in time of delivery, in case formal requirements or delays occur.

The main risks involve server breakdowns. Mitigating those risks will include postponing the time of the intervention.

The intervention might in some cases be conducted as part of the students' classes and will then be mandatory. However, as the intervention is asynchronous, the risk of students' absence (and failure to meet the declared number of participants) is eliminated.

There is a risk that some of the HCPs will have technical difficulties in joining and completing the digital learning session. To mitigate that risk, the JU team will provide IT support for participants to join and fulfill the digital learning session.

Item 11. Intervention implementation and intervention delivery:

As interventions will take the form of a ready online educational package (digital learning session), we foresee that the interventions are delivered as planned. Some deviations might result from connection or server problems. However, the tool will have to take that possibility into account.

5.7 The TIDier Checklist of United Kingdom

Item 1. Short name:

Vaccine hesitancy in the UK: A University of Nottingham Reusable Learning Object.

Item 2. Why:

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Theory: Our theoretical starting point (drawing upon existing social science literature and the VAX-TRUST Grant Agreement) is that rather than trying to 'educate' healthcare professionals involved in discussing childhood vaccines with parents about the complexity of vaccine hesitancy, or improve 'communication', a more useful approach is to facilitate reflection, with a focus on the concepts of risk and trust.

Method: The common objective of the VAX-TRUST programme intervention is to 'increase awareness of the complexity of vaccine hesitancy among healthcare professionals involved in discussing childhood vaccines with parents'. Our objective is in line with this and will focus on the target region and the UK. To achieve this objective, we will develop an intervention which is designed to raise awareness of the complexity of vaccine hesitancy among healthcare professionals involved in discussing childhood vaccines with parents. The intervention involves the development of a reusable learning object (RLO).

Aim: Overall, the aim is to improve awareness by healthcare professionals of the complex social/sociological underpinnings of vaccine hesitancy. By providing a dedicated opportunity for reflection on this topic, we hope that healthcare professionals will feel more equipped for engaging in conversations about vaccines.

The target population for this RLO is described elsewhere in this document under item 6. Key findings from WP4, presented in D4.4, include the sometimes-inhibitory distribution of the 'discussion' of vaccination with parents across multiple healthcare professionals outside the actual vaccination appointment itself. Since vaccine hesitancy is relatively low in the UK (see WP2) and very hesitant parents tend not to attend vaccination appointments (D4.4), our intervention focuses on the moments of discussion prior to the appointment that include health visitors, GPs, and GP nurses.

The strategy for recruiting participants (healthcare professionals) is described briefly under item 7. We anticipate that peer to peer sharing will be important given the challenges we faced during WP4 in recruiting healthcare professional participants within the geographic limits of the East Midlands target region and as 'outsiders' to the healthcare professions (see D4.4 for further discussion of this). We may also use a press release, disseminated by the University of Nottingham and drafted by the UNOTT team. Further specifics on the recruitment of participants will be confirmed following our development meeting with the HELM team who have broad expertise in the evaluation of tools such as the one we are proposing.

Item 3. What (materials):

Format: The educational package will be an asynchronous RLO and it's a digital learning session methodology. This format was chosen in order to maximise reach with busy healthcare professionals who, in the target region, have limited time and energy to participate (see D4.4) in activities outside of their immediate work commitments. It was also chosen because, as explained in D4.5, the UK is a 'noisy' and 'crowded' environment for interventions. Any new interventions therefore must be easy to access and relatively quick to use in order to successfully penetrate this environment. This format also means that the RLO may be able to travel beyond the target region and become integrated in the training curricula of significant institutions such as the NHS or the Royal College of Nursing, without significant resource demand. It was also chosen to maximise the benefit to the VAX-TRUST consortium/funder of existing expertise at the University of Nottingham in this format.

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The target group is healthcare professions who deliver or discuss childhood vaccination. This is not one type of healthcare professional but includes practice nurses, general practitioners, and health visitors. In order to apply the tool to a target group and evaluate its success at meeting our objectives, our first task is to recruit 50-100 healthcare professionals from the identified groups (GPs, GP nurses, and health visitors) to access this RLO. Our second task is to identify whether and how users found the resource useful. The measures that we will use to fulfil this second task cannot be specified in advance as we are yet to develop the tool, but the measures will be developed in collaboration with the staff member responsible for evaluation in the UNOTT team and colleagues from HELM.

Because the RLO will live online and will be free to access, we anticipate that access will be encouraged via word of mouth (peer to peer sharing). This will include our own networks, but also those associated with the HELM team. However, this will not occur if the RLO is not designed to appeal to the target audience. This is why we are working with others who have direct expertise in designing tools such as these in the context of healthcare-related education to design our RLO. In WP4, UNOTT worked with the University of Nottingham to design a press release, which led to multiple media interviews and had some positive impact on the recruitment of HCPs for interviews. We anticipate that this will be one prong of our strategy for WP5.

We cannot predict at this point which institutions will link to this RLO: This depends on the resource that is produced. We have not sought agreement for this, nor would this be appropriate before the resource has been developed. We anticipate that involving others in the planning for the RLO will mean we can encourage collaborators to share the resource with their personal and professional networks.

Location: The package will be accessible via a URL, and will be held in an online repository with other health interventions on the same platform by the University of Nottingham. The RLO will be freely available online via creative commons license. Detailed information on existing resources is at https://www.nottingham.ac.uk/helmopen/ Their resources, on a range of health-related topics are used by approximately 6 million people in 70 countries.

Material and tools: The RLO will include 4 elements:

a) New information, based on our VAX-TRUST findings and existing published and grey literature. Based on findings from WP4 and previous work packages, and our reading of the wider literature, the intervention will focus conceptually on trust and risk. This will be designed as a series of narrated slides that users can navigate in their own time forwards and backwards, with control over the speed of the narration and whether and when they return to material. There will be interactive elements, including elaboration of specific concepts, as well as links to relevant external material such as example media sources;

b) Short reflective tasks, designed to encourage the integration of this awareness into healthcare practice, and to stimulate learning and reflection;

c) Built-in open and closed questions, designed to allow the UNOTT team to measure any change that healthcare professionals perceive in their self-rated ability, confidence, and comfort with discussing childhood immunisation before and after their engagement with the intervention;

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d) A form to collect contact details, so that volunteers can be contacted later for follow-up interviews.

Item 4. What (procedures):

Production: The intervention production will follow the ASPIRE method (Aims, Storyboard, Produce, Integration, Release, Evaluation), a well-known model for RLO development (see D5.2: p. 14; p. 24 and Blake et al., 2022).

- Aims: The RLO needs to have a clear focus, with a defined topic area or learning goal and specified target group. The aim is developed by the UNOTT team drawing upon the mission of VAX-TRUST and adapting this to the UK context. The aim of this RLO is described above, to raise awareness of the complexity of parental vaccine hesitancy among healthcare professionals whose role it is to discuss childhood vaccination.
- Storyboard: This phase involves stakeholders beyond the UNOTT team, who are invited to provide expert input into the creative ideas for content and design of the resource. The UNOTT team have identified and invited experts who have previously provided advice or support to the UNOTT team during WPs 2-4.
- Produce: In this phase the ideas from the storyboard phase are translated into media components by the expert HELM team.
- Integration: In this phase the media components are integrated into the HTML5 platform used by HELM.
- Release: In this phase the tool is made available to learners using a specific platform (e.g. a virtual learning environment or website). In the UNOTT case, this platform will be the HELM repository of RLOs. The link to the tool will be shared with relevant groups or embedded in relevant course material in order to reach the target audience.
- Evaluation: This stage, carried out by the UNOTT staff member responsible for evaluation, will involve the assessment of the efficacy of the RLO in achieving the objective specified above.

Before: Once they access the RLO, participants will respond to a short questionnaire in which they will self-rate their ability, confidence, and comfort with discussing childhood immunisation with cautious parents. This will use closed-response questions, as well as the chance to provide a short open-response reflection on their awareness of reasons for vaccine hesitancy. This questionnaire will also collect some similarly brief information about the participant's healthcare role (nurse, doctor, etc). In designing the questionnaire we will take account 2 aspects 1) Ease of use: We will seek advice from collaborators in maximizing this 2) Ease of evaluation: Once we have a draft prepared, we will seek advice from WP6 in ensuring that the wording of the questions will be appropriate to maximise opportunities for evaluation.

During: Participants will navigate through the RLO in their own time. This could take around half an hour, depending on how much they rewind, slow down the narration, or follow-up the concept explanations. Key messages will be based on external sources and findings from WP2, WP3, and WP4 including for example relevant contextual factors from WP2, examples of media discourse from WP3, and paraphrased or re-constructed examples from WP4.

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After: At the end of the RLO, participants will respond to a short questionnaire that again asks them to self-rate their ability, confidence, and comfort with discussing childhood immunisation with cautious parents, and describe their awareness of the reasons for hesitancy *having completed the learning object*. This is designed to quantitatively measure participants' immediate reflection on the utility of the learning object. Data will be analysed by the local evaluator, comparing change between the pre- and post-questionnaires. This questionnaire will also invite participants to share contact information for future participation in a qualitative interview.

Beyond: Those participants who provide their contact details will be contacted by email to arrange a 1:1 follow up interview with the local evaluator. We will discuss with local colleagues whether this email address should be provided at the start or end of the session. We anticipate approximately 10 interviews will be carried out about 30 days after the RLO use. These will be online using Teams. This interview may incorporate techniques from cognitive interviewing, to assess the extent to which participants utilise information from the learning object when reflecting on examples. The aim of the interview is to assess the extent to which healthcare professionals perceive that the RLO has impacted on vaccine encounters in the workplace.

Item 5. Who provided:

Who: The RLO development, and all content, will be led by the UNOTT team (currently 3 staff; a sociologist, geographer, and ethicist). It is likely that one additional member of research staff will also be employed in 2023 to work on WP5. It is also likely that a further member of staff will be employed in 2023 to work on WP6 ('the local evaluator'). The latter will work with us to ensure that the built-in questions described above are appropriately phrased, and to ensure that these data can be evaluated.

With: The RLO will be produced in collaboration with HELM, The Health E-Learning and Media team which is based in the School of Health Sciences at the University of Nottingham. Their experience, expertise, approach and reach, is described here (https://www.nottingham.ac.uk/helm/home.aspx).

This team includes academics with expertise in public health. They will also use technical experts, in order to ensure that the RLO works well, looks profession, and avoids glitches. As listed above, the process used will be in line with the ASPIRE methodology. This includes a process of storyboarding. This involves holding a workshop to share ideas on content and format. We will invite the NSAB to this workshop, as well as healthcare professional contacts (approximately 5) and other contacts we have developed.

Item 6. How:

The intervention is online and is a digital learning session. We anticipate that this will be used by individuals rather than groups. As described in section 3 above, it will include 4 aspects. We anticipate that participants will be healthcare professionals currently working in delivering or advising on childhood vaccination. We hope to attract between 50-100 individuals; however, this number could be substantially higher.

A future secondary audience for the tool are resident students. For example, the RLO could be used by qualified healthcare professionals as a way of assisting in the training of healthcare students based in higher education. Some of these students would be postgraduates, with previous experience of

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working in practice; others would already be on the front line as part of their work-based placements. If utilised in this way, the RLO could be used by individuals but in a group context (for example in a lecture theatre). The RLO will be designed to ensure that the 'type' of participant is included, as they may be useful for the evaluation.

Item 7. Where:

The RLO will be accessible from any computer or mobile phone using an internet browser. Once this RLO is launched, we will use our existing networks to advertise its online location to a range of existing websites where existing information on hesitancy is currently located (these are listed in D4.5 and include the Royal College of Nursing.

Item 8. When and how much:

In planning the interventions across the consortium, the original intention was that each would last 6 hours. However, in light of results from work packages 1-4, UNOTT has had to adapt this expectation to ensure that the intervention is fit for purpose and complies with the overall objective. As noted above, we anticipate that the UNOTT RLO will take up to 30 minutes to work through at normal speed with no rewinds, and participants will also spend further time on the 2 or 3 reflective tasks integrated into the educational package. As explained in item 4 above, participants who provide their contact details will be invited to a qualitative interview with the evaluator. We anticipate that these will be relatively short (around 30 minutes), in order to balance the need to collect good data whilst not overly time-burdening busy participants that have already participated in the object. This step would require ethical approval from the University of Nottingham.

Item 9. Tailoring:

All participants will receive the same intervention. However, they may click through the resource at different speeds; some participants may choose to engage in the recommended reflective tasks or follow links to other grey and published resources; others may not. They may also choose to come back to the resource at a later date. Based on the evidence of WP4 in the East Midlands there are several professionals involved in the *discussion* of vaccination (the focus of the intervention). Therefore, the RLO will be designed to be valuable to healthcare professionals involved at each stage of discussion (in order: midwives, health visitors, GPs, and finally GP nurses).

Item 10. Changes and adjustments:

Using the ASPIRE methodology (and see Blake et al., 2022), the HELM team will work with us to ensure that the RLO is trialed before release and modified if appropriate. The HELM team have contacts with healthcare professionals who have not been part of the storyboarding process, but can be used to generate critical feedback and to allow final changes to be made. Maintenance by the expert HELM team will mean that any technical challenges will be addressed quickly. Given VAX-TRUST timescales and delays in previous work packages, it is unlikely that academic content will be modified once the RLO is launched.

A risk of this intervention plan (like all similar initiatives) is that it will only be used by a small number of participants. However, we hope that working with an experienced team (HELM), and designing a short package of material, may help to mitigate some of this risk. Another risk is that lots of

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participants view, use and appreciate the RLO, but choose not to input the sections requiring data. Again, this is a risk with any resource of this type and is not unique to the topic of hesitancy. We cannot remove this risk, but will work with HELM to see whether automatic data (for example number of website hits) can be captured. This would not allow us to measure awareness raising, but would at least provide some useful indication of reach.

A further risk is that the resource is opened, but users choose not to click through the material (a risk of 'non-adherence'). Again, we can't avoid this risk entirely but will mitigate this by: working with experts (HELM) with previous experience of developing successful RLOs; working with collaborators who include healthcare professionals to ensure that the resource is tailored to their need; developing a resource that is quick to use, so that busy professionals are less likely to stop mid-way through the resource.

Item 11. Intervention implementation and intervention delivery:

An advantage of using an RLO means that we avoid issues of whether training providers use the same words each time, whether they experience fatigue, or questions of how and by whom they are trained. In other words, using an RLO means that the learning materials will be standardised across different professionals.

The UNOTT team will document, regularly and in detail, all stages of the ASPIRE methodology. We will therefore ensure that we will document the steps that are taken to ensure the overall objective (item 2 above) is adhered to throughout the process.

The technical expertise of the HELM team will be relied upon to standardise the user experience of the reusable learning object across participants' different computer setups (for example, laptops with smaller screens and touchpad mice compared to desktops with larger screens and optical mice, or mobile phone usage).

The extent to which the reusable learning object achieves its objectives and succeeds in being relevant across different professional participants will be evaluated using the pre- and post-questionnaires built into the object, and feedback during the qualitative interview follow-up.

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References

Adámková, V. a Dušek, L. (2019). Tisková zpráva - Očkování 27.3.2019. [Press Release – Vaccination 27 March 2019]. In Poslanecká sněmovna Parlamentu České republiky [online]. Praha: Parlament České republiky, Poslanecká sněmovna. Available at: https://www.psp.cz/sqw/text/orig2.sqw?idd=162307&pdf=1

Attwell K., Dube E., Gagneur A., Omer S. B., & Suggs L. S. (2019). Thomson A. Vaccine acceptance: Science, policy, and practice in a 'post-fact' world. *Vaccin*e. 29;37(5): 677-682. doi: 10.1016/j.vaccine.2018.12.014.

Barton S. M., Calhoun A. W., Bohnert C. A., Multerer S. M., Statler V. A., Bryant K. A., Arnold D. M., Felton H. M., Purcell P. M., Kinney M. D., Parrish-Sprowl J. M., & Marshall G. S. (2022). Standardised Vaccine-Hesitant Patients in the Assessment of the Effectiveness of Vaccine Communication Training. *J. Paediatrics.*, 241: 203-211.e1. doi: 10.1016/j.jpeds.2021.10.033.

Berenson, A. B., Hirth, J. M., Chang, M., Kuo, Y. F., Richard, P., & Jones, D. L. (2021). A brief educational intervention can improve nursing students' knowledge of the human papillomavirus vaccine and readiness to counsel. *Human vaccines & immunotherapeutics*, 17(7): 1952–1960. https://doi.org/10.1080/21645515.2020.1852871

Berenson, A. B., Hirth, J. M., Fuchs, E. L., Chang, M., & Rupp, R. E. (2020). An educational intervention to improve attitudes regarding HPV vaccination and comfort with counseling among US medical students. *Human vaccines & immunotherapeutics*, 16(5): 1139–1144. https://doi.org/10.1080/21645515.2019.1692558

Bishop, J. M., Real, F. J., McDonald, S. L., Klein, M., DeBlasio, D., Khan, J. A., Kreps, G. L., & Rosen, B. L. (2021). Evaluation of HPV Vaccine: Same Way, Same Day TM: A Pilot Study. *Journal of health communication*, 26(12): 839–845. https://doi.org/10.1080/10810730.2021.2021459

Blake H., Fecowycz A., Starbuck H., & Jones W. (2022). COVID-19 Vaccine Education (CoVE) for Health and Care Workers to Facilitate Global Promotion of the COVID-19 Vaccines. *Int J Environ Res Public Health*, 19(2): 653. doi: 10.3390/ijerph19020653.

Blake, H., Fecowycz, A., Starbuck, H. & Jones, W. (2022) COVID-19 Vaccine Education (CoVE) for Health and Care Workers to Facilitate Global Promotion of the COVID-19 Vaccines. *International Journal of Environmental Research and Public Health*, 19(2), 653.

Brown, J. (2010). *The world café: Shaping our futures through conversations that matter*. ReadHowYouWant. com.

Cardano, M. (2020). *Defending qualitative research: design, analysis, and textualisation*. London, Routledge.

CBOS, 2017, Polacy o obowiązku szczepienia dzieci, Komunikat z badan 100/2017, https://www.cbos.pl/SPISKOM.POL/2017/K_100_17.PDF

Chang, C.-Y., Hwang, G.-J., & Gau, M.-L. (2021), Promoting students' learning achievement and self-efficacy: A mobile chatbot approach for nursing training (1) 1. https://doi.org/10.1111/bjet.13158

Conselho Nacional de Saúde. (2018) *Gerações mais saudáveis. Políticas públicas de promoção da saúde das crianças e jovens em Portugal.* Retrieved from http://www.cns.min-saude.pt/wpcontent/uploads/2018/12/GERACOES-MAIS-SAUDAVEIS

De Vito, E., Parente, P., De Waure, C., Poscia, A., & Ricciardi, W. (2017). *A review of evidence on equitable delivery, access, and utilization of immunization services for migrants and refugees in the WHO European Region*. World Health Organization. Regional Office for Europe.

Direção Geral de Saúde. (2020) *Boletim nº3 Programa Nacional de Vacinação.* Retrieved from

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 965280.

Dybsand, L. L., Hall, K. J., Ulven, J. C., & Carson, P. J. (2020). Improving Provider Confidence in Addressing the Vaccine-Hesitant Parent: A Pilot Project of 2 Contrasting Communication Strategies. *Clinical Pediatrics*, 59(1): 87-91. https://doi.org/10.1177/0009922819884572.

Fouché, C., & Light, G. (2011). An Invitation to Dialogue: 'The World Café'In Social Work Research. *Qualitative social work*, *10*(1), 28-48.

Gagneur, A., Bergeron, J., Gosselin, V., Farrands, A., & Baron, G. (2019). A complementary approach to the vaccination promotion continuum: An immunization-specific motivational-interview training for nurses. Vaccine, 37(20), 2748-2756.

Gagneur, A., Gosselin, V., Bergeron, J., Farrands, A., & Baron, G. (2019). Development of motivational interviewing skills in immunization (MISI): a questionnaire to assess MI learning, knowledge and skills for vaccination promotion. *Human vaccines & immunotherapeutics, 15*(10), 2446-2452.

Harvey, N., & Holmes, C. A. (2012). Nominal group technique: an effective method for obtaining group consensus. *International journal of nursing practice*, *18*(2), 188-194.

Hasmanová Marhánková, J. & Numerato, D. (2022). Czech team ethnography on vaccine hesitancy. Pp. 34-69 In Cardano et al. (Eds.) *D4.4 Country-specific synthesis of the qualitative studies including ethnography and in-depth interviews with parents and healthcare professionals*. VAX-TRUST.

Hiatt, J. M. (2006). ADKAR: A model for change in business, government and our community. Fort Collins, Colorado, USA: Prosci Research.

https://www.dgs.pt/documentos-e-publicacoes/boletim-n-3-do-programa-nacional-devacinacao-abril-2020-pdf.asp

Hulsman, R. L., Ros, W. J. G., Winnubst, J. A. M., & Bensing, J. M. (1999). Teaching clinically experienced physicians communication skills. A review of evaluation studies. *Medical education, 33*(9), 655-668.

Jacobson R. M. (2014). Making the C.A.S.E. for the Human Papillomavirus Vaccine: How to Talk to Parents and Adolescents. *Minn Med*., 97(2): 38-42.

Jacobson R. M., & Finney Rutten L. R. (2019). Parents' Hesitance about HPV: Using the CASE Approach to Address their Concerns. *Minn Med*, 102(1): 24-27.

Jacobson R. M., Van Etta L., & Bahta L. (2013). The C.A.S.E. Approach: Guidance for Talking to Vaccine-Hesitant Parents. *Minn Med*, 96(4):49-50.

King, A. J. (2017). Using comics to communicate about health: an introduction to the symposium on visual narratives and graphic medicine. *Health communication*, *32*(5), 523-524.

King, N. (1998). *Template analysis*. In G. Symon & C. Cassell (Eds.), *Qualitative methods and analysis in organisational research: A practical guide*. London, Sage Publications Ltd, 118-134.

Koski, K., Lehto, J. T., & Hakkarainen, K. (2018). Simulated Encounters With Vaccine-Hesitant Parents: Arts-Based Video Scenario and a Writing Exercise. *Journal of medical education and curricular development*, 5: 2382120518790257. https://doi.org/10.1177/2382120518790257

Lane, C., & Rollnick, S. (2007). The use of simulated patients and role-play in communication skills training: a review of the literature to August 2005. *Patient education and counseling*, 67(1-2): 13–20. https://doi-org/10.1016/j.pec.2007.02.011

Langiano, E., Ferrara, M., & De Vito, E. (2017). Training on vaccination for health care professionals. *Igiene e Sanita Pubblica*, *73*(5): 497-505.

Mendonça, J. & Hilário, P. (*in prep*). When 'parents know best': Natural intensive parenting and vaccine-hesitancy.

Mitchell, G., Leonard, L., Carter, G., Santin, O., & Brown Wilson, C. (2021). Evaluation of a 'serious game' on nursing student knowledge and uptake of influenza vaccination. *PloS one*, 16(1): e0245389. https://doi.org/10.1371/journal.pone.0245389

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 965280.

Olszewska, M., Smykla, B., Gdańska, M., Kiełbasa, G., Ficinski, M., Szymońska, I., ... & Kwinta, P. (2018). The analysis of parental attitude towards active immunoprophylaxis and its influence on the implementation of an immunization schedule among children in Poland. *Children's Health Care*, 47(3), 289-307.

Opel D. J., Robinson J. D., Spielvogle H., Spina C., Garrett K., Dempsey A. F., Perreira C., Dickinson M., Zhou C., Pahud B., Taylor J. A., & O'Leary S. T. (2020). 'Presumptively Initiating Vaccines and Optimising Talk with Motivational Interviewing' (PIVOT with MI) trial: a protocol for a cluster randomised controlled trial of a clinician vaccine communication intervention. *BMJ Open*, 10(8):e039299.doi: 10.1136/bmjopen-2020-039299.

Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elmagarmid, A. (2016). Rayyan-a web and mobile app for systematic reviews. *Systematic reviews*, 5(1): 210. https://doi.org/10.1186/s13643-016-0384-4

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., McGuinness, L. A., & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* (Clinical research ed.), 372, n71. https://doi.org/10.1136/bmj.n71

Pampena, E., Vanucci, R., Johnson, L. B., Bind, M. A., Tamayo, I., Welch, K., Lind, E., Wagner, R., & Villa, A. (2020). Educational Interventions on Human Papillomavirus for Oral Health Providers. *Journal of cancer education: the official journal of the American Association for Cancer Educatio*n, 35(4): 689–695. https://doi.org/10.1007/s13187-019-01512-7

Real, F. J., DeBlasio, D., Beck, A. F., Ollberding, N. J., Davis, D., Cruse, B., Samaan, Z., McLinden, D., & Klein, M. D. (2017). A Virtual Reality Curriculum for Pediatric Residents Decreases Rates of Influenza Vaccine Refusal. *Academic pediatrics*, 17(4): 431–435. https://doi.org/10.1016/j.acap.2017.01.010

Real, F. J., Rosen, B. L., Bishop, J. M., McDonald, S., DeBlasio, D., Kreps, G. L., Klein, M., & Kahn, J. A. (2021). Usability Evaluation of the Novel Smartphone Application, HPV Vaccine: Same Way, Same Day, Among Pediatric Residents. *Academic pediatrics*, 21(4): 742–749. https://doi.org/10.1016/j.acap.2020.11.023

Santana, M. J., Manalili, K., Jolley, R. J., Zelinsky, S., Quan, H., & Lu, M. (2018). How to practice person-centred care: A conceptual framework. *Health Expectations*, 21(2), 429-440.

Shukla, A., Nyambose, J., Vanucci, R., Johnson, L. B., Welch, K., Lind, E., & Villa, A. (2019). Evaluating the Effectiveness of Human Papillomavirus Educational Intervention among Oral Health Professionals. *Journal of cancer education: the official journal of the American Association for Cancer Education*, 34(5): 890–896. https://doi.org/10.1007/s13187-018-1391-z

Singer, A. (2010). *Making the CASE for Vaccines: Communicating about Vaccine Safety*. Virtual Immunization Communication Network (VICNetwork). URL: http://www.vicnetwork.org/2010/09/22/ making-the-case-for-vaccine/. Last accessed January 31, 2021.

Steier, F., Brown, J., & Mesquita da Silva, F. (2015). *The World Café in action research settings*. In Bradbury, J. (eds.). *The SAGE handbook of action research*, 3, 211-219.

WHO (2019). *Ten threats to global health in 2019*. WHO.

Wolynn T., & Hermann C. (2021). Shots heard round the world: better communication holds the key to increasing vaccine acceptance. *Nat Immunol*, 22(9): 1068-1070. doi: 10.1038/s41590-021-00998-y.

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