

'We are not here to enforce; we are here for the people' Factors influencing performance of contact tracing during the COVID-19 pandemic: A qualitative study

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Abstract

Background: Provider-initiated contact tracing (CT) is an important measure to slow down the spread of infectious diseases such as COVID-19. However, carrying out effective CT depends on the collaboration between the patient and the contact tracer. To improve CT, it is important to understand which factors influence contact tracers in being able to carry out CT during large pandemics.

Methods: We performed individual semi-structured interviews with nine contact tracers working for the COVID-19 unit of the Public Health Service (PHS) Rotterdam-Rijnmond, the Netherlands, to explore their experiences with carrying out CT. Data were collected between July 2020 and December 2020. The interview protocol was structured based on the CT tasks and guided by the literature and the framework explaining adherence to clinical practice guidelines.

Results: In general, CT seemed to be carried out satisfactorily. Individual factors (interviewing techniques and skills, attitude towards the patient and attitude towards CT), factors related to the patient (cooperativeness and engagement, emotions, language and culture and (mis)information), guideline-related factors (characteristics) and factors related to the organisation (interactions with colleagues, support from management, workload and training) were found to influence the carrying out of CT.

Conclusion: To be well prepared for future pandemics, it is important to explore strategies that can be effective to support the contact tracer in performing CT, support patients in feeling comfortable to be engaged and ways to reach more consistency in policies and protocols.

Keywords

Contact-tracing, COVID-19, socio-psychological, determinants, contact tracer

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Significance for public health

Contact tracing (CT) has played a significant role in combating the recent COVID-19 pandemic. However, for effective provider-initiated CT a smooth collaboration between the contact tracer (i.e. the provider) and the patient is essential. Notwithstanding its' importance, research into factors influencing the contact tracer in effectively carrying out CT is very limited. Our study shows that individual (provider-related) factors, patient-related factors, factors related to (CT) protocols and organisational-related factors can all determine the carrying out of CT. To be well

prepared for future pandemics, theory- and evidence-based interventions targeting these factors should be developed and evaluated.

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Introduction

Contact tracing (CT), especially provider-initiated, can play an important role in slowing down the spread of infectious diseases such as TB, STI's and lately also COVID-19.¹⁻⁴ Tracing down the contacts from an infected patient and warning them for being potentially infected helps to isolate the (potentially) infected from the general public.⁵ During the first part of the COVID-19 pandemic and before vaccines were available, CT became, next to other preventive measures such as social distancing, one of the key measures taken in the fight against the virus.⁶

However, the effectiveness of CT depends on the willingness of the public to engage.^{5,7} Reports on CT participation rates during the COVID-19 pandemic show different results, with participation of patients in provider-initiated CT varying between 30% and 80%.⁸⁻¹⁰

Different studies have explored factors influencing the willingness and motivation of the public to engage in CT.^{5,11,12} But effective provider-initiated CT does not only depend on the patient: the collaboration between the contact tracer (i.e. the provider) and the patient is essential.⁶ The contact tracer must deliver clear, correct and complete information to the patient on which contacts to trace and what isolation measures to take, while the index patient in turn must provide correct and complete information regarding his/her contacts to the contact tracer. A positive, confidential atmosphere and clear communication between both parties will contribute to completeness in CT, which in turn will positively contribute to pandemic control. It is thus important to be aware of the factors influencing the contact tracer in effectively carrying out CT.

To our knowledge, scientific literature on factors influencing the carrying out of provider-initiated CT is very limited. A few studies reporting on the providers' implementation of CT for tuberculosis in Africa mention factors such as CT-related knowledge; attitudes towards conducting CT; motivation and commitment to perform the task; CT-training, monitoring and supervision received; and workload.¹²⁻¹⁴ More recently, a few studies were published on the experiences of contact tracers during COVID-19. Santella et al.⁷ showed that effectively carrying out CT seems to be influenced by work motivation, level of interaction with colleagues, (ongoing) CT training, the level of supervision, coping with stress and mental health, the engagement of the patient and the attitude towards the patient. Fulham-McQuillan et al.¹⁵ studied the psychological impact of working as contact tracer during the COVID-19 pandemic in Ireland and found relatively high levels of stress-related symptoms which will likely have a negative impact on the carrying out of CT.¹⁶

Besides empirical studies, theories can further help to identify factors that may influence the performance of contact tracers. Cabana et al.^{17,18} designed a framework to explain the implementation of and adherence to clinical practice guidelines by physicians. The framework can be

applicable to our study, as contact tracers also have to follow protocols in their work. According to the framework, factors related to the individual, the patient, the guideline and the organisation can be differentiated. Individual factors relevant in the context of CT are lack of awareness, familiarity or agreement with the guideline, lack of motivation and low self-efficacy and outcome-expectancy. Patient-specific barriers are concerns of confidentiality and stigma. Time demands or staff shortage are examples of organisational barriers. Finally, guideline characteristics such as being complex can influence adherence.

As compared to previous infectious disease outbreaks, CT during COVID-19 had to be performed in a rather unique and challenging context which was new for everyone involved. The magnitude of the COVID-19 pandemic demanded a huge upscaling of CT, for which many new contact-tracers were quickly needed. This often meant that a diverse range of people with different backgrounds (e.g. staff working in other areas of the public service, or volunteers such as students etc.), not used to this work, were briefly trained to become a contact tracer. At the same time, national COVID-19 guidelines and regulations were frequently evolving,¹⁹ and societies were polarising: people opposing the COVID-19 measures, often adhering to complacency theories, against those supporting the measures.^{20,21}

Although the above review of the literature provides some guidance on factors influencing the carrying out of CT, the number of published studies is very limited. In addition, more research on the specific context of performing CT during an international pandemic like the COVID-19 crisis is needed to be well prepared for future pandemics. A clear understanding of factors involved in effective CT can help in developing theory- and evidence-based interventions and/or trainings to further improve the carrying out of CT. The aim of our study was to identify factors related to the contact tracer, the patient, the guidelines and the organisation that may influence the performance of CT during the COVID-19 pandemic. We therefore performed in-depth individual interviews with contact tracers working for the COVID-19 unit of the Public Health Service (PHS) Rotterdam-Rijnmond, the Netherlands.

Methods

Design

A qualitative research design using a semi-structured interview protocol was used.

Participants

In total, nine employees (six female and three male) of the COVID-19 CT unit participated in this study. Their age ranged from 20 to 43 years old. Participants had different ethnic backgrounds (one Dutch, one Dutch/Iranian, two Hindustani-Surinamese, two Moroccan, one Ghanaian,

one Turkish and one Hungarian) and different positions within the unit: one medical doctor, three managers coordinating the unit (of which one person used to be contact tracer) and five contact tracers. Participants were selected based on their different roles within the unit as well as their ethnic background, to get a diverse spectrum of responses and visions.

Organisation of CT and CT policy in the Netherlands

In the Netherlands, national guidelines are used by the contact tracers working for the PHS.²² The tasks of the contact tracers depend on the phase of the pandemic in the country, but normally includes notifying the patient of his/her positive status, tracing down close contacts and informing about the regulations for isolation. Less tasks will be performed when work pressure is too high due to high numbers of infections. The most basic version of CT (the so called 'lean version') includes the notification of the positive status of the patient and offering isolation advice, the most extended version of CT additionally includes identifying and contacting close contacts. During the COVID-19 pandemic, patient follow-up was performed by a different group within the CT unit, which was outside the scope of our study.

CT is usually performed in Dutch or English. There is no official protocol for patients not speaking either one of these languages. During the COVID-19 pandemic, at the PHS in Rotterdam, this was solved by having a list available of foreign languages spoken by CT colleagues. In case of a language barrier, the contact tracer could forward a call to a contact tracer mastering the language of the patient. Additionally, the so called 'interpreter-phoneline' could be used: a phoneline by which an interpreter would join the CT call. Difficult questions from patients were transferred to more experienced contact tracers if necessary.

Some contact tracers were already working for PHS before the pandemic, for example, as nurses. However, many were specifically recruited, trained and employed as temporary staff for the CT task during the COVID-19 outbreak, in order to be able to deal with the sudden extreme increase in CT workload. Most of them did not have a formal training in public health or health care. Contact tracers employed during the COVID-19 pandemic had all sorts of backgrounds. Minimum requirements were having a bachelor's degree or work experience at a bachelor's degree level, 6 months experience with customer services and digital skills. Contact tracers were directed by unit supervisors. Unit supervisors were directed by floor managers who in turn were directed by managers and medical doctors.

Procedure

Participants for our study were contacted by phone or e-mail for scheduling an appointment at a day and time of

their preference. Interviews took place between July 2020 and December 2020 and were performed by phone call due to the lockdown and COVID-19 regulations in the country at the time of data collection. The first three participants were recruited via one of the medical doctors working for the PHS. They were purposefully selected based on their function within the CT unit (management and medical doctor) and their ethnic background. The remaining participants were recruited during the daily unit start-ups via one of the unit managers that we interviewed. After the first two interviews, for which a topic list was used, the protocol was adjusted, by providing more structure and adding several more questions. Interviews lasted between 37 and 100 minutes with an average of 70 minutes.

Interviewees were informed during recruitment and again before the interview started about the aim of the study (evaluating their experiences with carrying out CT), the voluntariness of their participation, that they were not obliged to answer questions they did not feel comfortable with, and that they could refuse participation and skip questions without having to explain why. In addition, they were told that data collection would be anonymous: their names and positions within the unit would not be recorded and would not be presented as part of the results such as in relation to quotes. Participants were asked permission for recording the interview and for providing their consent by voice. One participant did not want to be recorded. This interview is summarised based on notes taken during the interview. Since this study was not a medical-scientific investigation and no experiments were done on human subjects, ethical approval was waived by the Medical Ethics Review Committee at Erasmus MC, University Medical Centre Rotterdam (MEC-2020-0877).

Interview protocol

A semi-structured interview protocol was developed guided by the tasks of the contact tracers, the literature on socio-cognitive determinants, and the framework of Cabana et al.^{17,18} that could explain the performance of these tasks. The protocol was structured thematically and included background characteristics, the COVID-19 organisation and CT unit, the CT training received, their experience with the patients and carrying out the phone calls and the procedures and policies; See Table 1 for a structured overview of the themes and examples of items and topics included.

Analyses

All interviews, except one, were recorded and fully transcribed after which they were analysed using Atlas-ti (version 9). The summary of the interview of the one participant not wishing to be recorded was included in this analysis. Coding was guided by the principals of guided theory and included open coding, axial coding and selective coding.

Table 1. Overview of themes with corresponding items included in the interview protocol.

Theme	Example items and topics
Background characteristics contact tracer	<ul style="list-style-type: none"> • Age • Educational background • (relevant) work experience • CT tasks and work experience
CT organisation	<ul style="list-style-type: none"> • Who does what, what responsibility? • Dealing with feedback / sharing best practises
CT training	<ul style="list-style-type: none"> • When and how long? • Content of the training <ul style="list-style-type: none"> ◦ Conversation techniques ◦ Cultural diversity • Evaluation of the training • What could be improved
Experience with CT phone calls	<ul style="list-style-type: none"> • General experience and impression • Accessibility of index • Barriers and facilitators • Work protocols <ul style="list-style-type: none"> ◦ Time ◦ Content ◦ Work pressure • Dealing with problems/emotions/resistance of index • How to improve CT?
(Index) patients	<ul style="list-style-type: none"> • Barriers and facilitators among specific populations • COVID and PHS-related knowledge, risk perception, (mis)trust • Change over time/pandemic • (Factors influencing) participation CT/general COVID-19 measures • Information sources

The coding on the first three transcripts was performed by two researchers. In case of different interpretations, the coding was discussed until agreement was reached. Based on these first three transcripts a final coding tree was agreed upon which was then used to finalise the coding of the remaining transcripts by one of the researchers. In case of doubts on the coding, the other researcher was consulted. Summarising the code output was also mostly done by the two researchers, reviewing each other's work and discussing differences in interpretation until consensus was reached.

Results

First, the participants' experience with carrying out CT, including the interviewing techniques they implemented, will be described. Then, the factors that may influence the carrying out of CT are presented, following the framework of Cabana et al.^{17,18}: individual, patient-related, guideline-related and organisational-related factors.

CT performance and interviewing techniques

The contact tracers in our sample generally described their experiences with talking to index patients as very positive and very personal. Based on their reports, it seemed they

applied a range of communication and interviewing techniques, in order to have a pleasant conversation and collect as much relevant information as possible. Using a positive, empathic tone and humour and being friendly, calm and reassuring, seemed to work very well according to them.

"There are people, who really think and ask, 'am I going to die now?' [. . .] I believe they just need somebody to listen to them. It is not always about answering their questions, but to just listen to what troubles them." They stated it is important to be a good listener, taking your time; the patient needs to trust you. Contact tracers mentioned it is best to not be too strict about following the interview protocol, but instead make it a real conversation, showing genuine interest.

Sometimes there are patients with language barriers or who have objectives towards CT. For these conversations, the contact tracers stated that patience, creativity and not being judgmental is very important. Repeat the question or information provided, think and move along with the patient, stress and repeat the importance of CT without being too pushy and without making people feel guilty. *"First, I try to make the man feel comfortable and not judge what he says as nonsense, even when I think it is nonsense. Move along with his feelings and say 'I understand you have a different perspective, I understand you have at least given it a lot of thought' [. . .] 'I Can*

only advise you' is what I say. You try to move along with their feelings and somehow still collect the relevant information."

"Once there was this lady, who said 'well, likely, when you hang up the phone, then the questions will pop up'. So, I agreed with this lady [. . .] who was 84 years old and had all kinds of ailments, [. . .] 'I will call you back in 30 minutes'. She very much appreciated that and indeed by then had some questions"

Individual factors

Knowledge and skills. Contact tracers indicated they could not always sufficiently handle critical or difficult questions from the patient. Often, they specifically pointed out that their colleagues were lacking skills, instead of discussing their own (lack of) skills. They stated that their colleagues sometimes struggled with assessing the situation of the patient, lacked the skills to provide good solutions for patients experiencing barriers to CT or the isolation regulations, or more generally lacked conversation and computer skills. "Well, we lately receive more of these critical questions [from the index] and it is important as contact tracer working for the municipal health service to be able to explain why it is [relevant] and why we need this information [on contacts] and what we do with the information. And you can see that this kind of knowledge is often lacking [among contact tracers]." Additionally, understanding the language and culture of the index patient and being able to handle difficult situations, such as an angry patient, is very helpful for collecting correct and complete information.

Attitude towards index patient. Contact tracers mostly showed a lot of empathy and understanding for the situation and (emotional) responses of the index, the fact that indexes misunderstand or struggle with the regulations and privacy issues, with remembering contacts or acknowledging the relevance of CT. "You [referring to the index patients] really need to understand why we ask all those questions, because otherwise, well yes, I fully understand why people are not willing to collaborate."

On the other hand, contact tracers sometimes had negative evaluations, accusing patients of lying, being stubborn or ignorant to the isolation regulations. "I've had people [on the phone] stating 'oh no, I am alone now, because I live on my own' while at the same time you really hear people at the background." They seemed to differentiate between cooperative and non-cooperative patients, with the latter being evaluated negative. "When people are cooperative, it [the CT] works out well. It is more those who are not willing to be cooperative, which I think is a bigger barrier [for effective CT] than language"

Many contact tracers felt frustrated about the fact that it was at the patient's discretion whether they participated in

CT and that public compliance with government recommended COVID-19 control measures was outside their sphere of influence.

Attitude towards CT. Contact tracers strongly acknowledged the importance of CT. By doing CT, you show social responsibility. It's about caring and helping your community. For this, they were willing to work a little harder. "We are not here to enforce; we are here for the people. So, many colleagues give the extra push. [. . .] Knowing that we are dealing with something severe [deadly disease] triggers everybody to put a little more effort in the job, to help the people a little further". They stated it is 'human performance', it's all about providing quality and trust, not something to be done on automatic pilot or to be digitalised. They showed strong feelings of responsibility towards performing well, they took their job very serious and sometimes felt personally assaulted when another public demonstration against the COVID-19 regulations took place. 'How can we diminish this [the rallies]? [Achieve] that no demonstrations against the regulations will take place because some people think our job is nonsense'. They also stated the work can be highly demanding and requires a flexible attitude.

Patient-related factors

Engagement of index in CT. Most index patients were described as easy to reach and very cooperative and frank. "In general, people are quite cooperative. Which is nice. I do get people [on the phone] who get startled, but if you anticipate and show understanding for their emotions, then mostly the conversation goes smoothly, friendly, and nice."

In the earlier phase of the pandemic, people could be very scared and worried about having SARS-Cov-2. Other patients were very critical or resistant towards CT and sharing contact details or information about the places where they had been. Contact tracers noticed that people can be concerned about their privacy, negative responses from people in their environment or ashamed to let other people know they got infected ("I am tested positive and now I have to let my family know I may have infected them as well"). People can also be worried about legal proceedings because they did not obey the COVID-19 regulations. The number of questions asked during CT can irritate or tire patients (especially if they are feeling ill) and make them suspicious, because they do not understand why it is necessary. Contact tracers stated it helps a lot when the patient knows what CT is and understands the relevance of performing CT. Finally, participants mentioned that patients do not always answer the phone, or they disconnect. "Yes, that happens regularly [patient not answering phone]. But well, we call anonymously. Not everybody is happy to answer anonymous phone calls. But in that case,

we send them an e-mail requesting them to contact us, which they [the patient] mostly do very quickly'.

Patient characteristics. Contact tracers mentioned several patient-related characteristics that can influence the CT process. Language barriers can slow down CT and make it very labour intensive, for both the patient and the contact tracer. Sometimes, either the contact tracer or the patient deploys an intermediary (interpreter, family member), but that is not efficient either. Language barriers can also make patients hesitant to answer the phone call in the first place. In certain communities, disclosure of illness can result in stigmatising responses or even avoidance, which negatively influences collaboration in CT. *'I notice that people are ashamed when they have it [SARS-CoV-2] . . . and that they can be afraid to be repelled or abandoned.'* Those without residence permit are worried about losing their job and income if their employer finds out they have SARS-CoV-2.

Information overload and conflicting information. A theme often mentioned and stressed by the contact tracers was the difficulty patients had dealing with all information they received regarding COVID-19. This concerns information received during the CT call but also all information available via (social) media, the government and their network. Altogether, the information is complicated, dense, often contradicting or rapidly changing which causes confusion and suspicion among patients. *'I think it is [patient's difficulty understanding COVID-19 and the measures] because people hear all kind of things, from all kinds of directions, including messages that are contradicting, which is very confusing for many people'*. Complicated, conflicting and rapidly changing information does not contribute to good performance of CT, neither to understanding and accepting the isolation measures. *'I explained the difference between being infected and being infectious, because this is confusing for many people. The [changing] quarantine measures, 3 days, then 14 days, then 10 days; it is unclear. Being symptomatic or not. It is a lot of information for them. And what we often forget, I think, is that families talk with each other, friends talk with each other. If we are sisters and we both have corona, and the public health service says A to me and B to you, and we go have a coffee together and share our experiences, well yes, this negatively influences the credibility of the public health service. They say this to me and that to you; now what is the truth?'*

Guideline-related factors

Characteristics of protocols and policies. Participants stated that the national CT protocols were mostly sufficient to carry out CT correctly. Some added it worked best when guidelines were strictly followed and implemented, while others believed it was best to be flexible. Regardless of the

protocols usually being of good support in performing CT, all contact tracers strongly complained about the ever-changing protocols and policies. *'Because currently things [regulations, policies] are changing daily, which is confusing and highly demanding for everybody. And because of this, we are making mistakes.'*

Not only the CT protocols changed often (e.g. moving from extended CT to the lean version) but also the definition of what a close contact is, the number of days a patient had to isolate etc. Other critics mentioned were the protocols being too general, lacking instructions for exceptional or difficult cases and not being tailored to specific (cultural) groups or needs: *'I noticed that my cultural background helps me in formulating questions that are not part of the standard protocol. For example, we do ask 'have you been anywhere with more than that many [number depends on the than applicable regulation] people and at less than 1.5-meter distance?' But that's such a general question that most people's answer is 'no'. But if you continue 'have you been visiting the mosque? Did you have tea afterwards?' [. . .] then suddenly a whole lot of other information comes out.'*

Finally, the so called 'lean version' of the protocol (most brief version of CT) provides too little useful information and places too much responsibility on the index patient to notify contacts him/herself. Providing too much information during CT was mentioned as too demanding and confusing for the patient.

Organisational factors

Attitude towards colleagues, management and organisation. The collegial interactions were mostly described as positive. There is always room to talk about 'difficult cases' (i.e., having had a particularly difficult phone call), and management advises regular breaks. Colleagues and management were accessible, and management was open to feedback, questions and suggestions from the contact tracers. *'Previously, we always had a 9am gathering and a 3pm gathering, during which the managers and doctors were also open to feedback. And when they noticed it [an issue raised] was a common problem [. . .] then they really adjusted [the protocol] and incorporated it in the guidelines or they clearly stated how to handle in certain situations.'*

Contact tracers also stated that their colleagues are really motivated to work hard and prepared to put a lot of effort and pay a lot of attention to the index patients. On the other hand, it was mentioned that some colleagues were lacking skills, experience or patience, which negatively influences the CT quality, and sometimes staff members were given too much responsibility. *'The [positive] intention is clear; sometimes it is lack of knowledge or experience, which makes me think 'this is a little clumsy''*.

Contact tracers criticised how staffing matters were handled, such as selection of employees (i.e., too little diversity regarding language, culture, education and experience), (high) staff turn-over and emotional support. Contact tracers stated that reflection and feedback is important, but due to high work pressure it is not always possible. Also, during (difficult) CT conversations, in the end, you must handle matters on your own.

Other organisational matters that were mentioned to negatively influence CT were too long delays in calling the patient after (s)he got tested for SARS-CoV-2 (which negatively influences the patient's perceived relevance of CT and therefore his/her willingness to join CT), the restricted hours that CT was performed (9 am–5 pm, office hours) and incomplete patient files. Finally, the national scandal with patient records that were sold by municipal public health service employees²³ was mentioned to have very negatively influenced the patients' trust in their privacy protection.

Work pressure. In general, contact tracers experienced moderate time pressure. The amount of time pressure seemed to depend on the number of new COVID-19 cases: the more new infections, the more CT work. *'Just now, with the raising infections and the changing procedures, the protocol being shortened such that more people can be called [. . .] the pressure is high, the pressure on how much time you can take for the people.'* But contact tracers in our study mentioned that most of the time they did not experience high work pressure. *'They do give us the space to really have a conversation with the people [. . .] it is no mass production, so to say, [. . .] the quality is very important, the quality of the conversations.'*

Attitude towards training. Contact tracers had different opinions regarding the CT-training received, and whether it was sufficient. This is likely explained by the training content and procedure changing over time: *'Currently, you have phase 1, and during phase 1 you learn how to make a patient file, and then in phase 2 you really are going to call with the patient, so currently it is very neatly structured, and we have guidelines. But when I started, I was really thrown into the deep end.'*

Some contact tracers stated the training was sufficient, clear and (very) good. However, others were quite critical and stated it was not sufficient for everybody: the training was evaluated as too short, too quick and too general. According to them, contact tracers are not well-prepared for difficult and exceptional cases, and conversation techniques and cultural or language barriers are receiving too little attention. This lack of training, according to them, negatively influences the quality of CT and causes mistakes, which other colleagues then need to solve. *'That's because they [new Contact tracers] quickly need to be prepared and ready to go, because everything needs to be*

ready to call the patients [. . .]. But the quality is sometimes really negatively influenced by that.'

Discussion

Provider-initiated CT can be an effective strategy in controlling the spread of infectious diseases, if performed successfully and with a public that is willing to engage.^{5,7} In this study, we evaluated the carrying out of CT and its' determinants during the COVID-19 pandemic, by interviewing contact tracers working for the PHS. Results suggest that CT was mostly performed satisfactorily. Factors that seemed to influence the carrying out of CT were individual factors (interviewing techniques and skills, attitude towards the patient, attitude towards CT) and factors related to the patient (cooperativeness and engagement, emotions, language and culture, (mis)information), the guidelines (characteristics) and the organisation (interactions with colleagues, support from management, workload, training).

Contact tracers gave the impression to use effective interviewing techniques for carrying out CT and for engaging the index patients. They, for example, showed empathy, moved along with resistance from the index and were very patient. These are methods also used in motivational interviewing (MI); an interviewing technique that showed to be effective for stimulating a range of health-related behaviours.²⁴ The use of MI during CT is recommended by the Centre for Disease Control (CDC), as described in the paper of Hohman and colleagues.²⁵ They explain the importance of having the appropriate skills for sensitive communication during CT: patients may experience several other issues (e.g. financial and relational) and have strong emotions such as anxiety or anger, which was indeed mentioned by the contact tracers we spoke to. It is thus important to have the appropriate MI skills for addressing such problems during the CT process. We therefore support the recommendation of the CDC to use MI during CT.

Regardless of mostly showing good interviewing techniques, some contact tracers doubted the skills of their colleagues especially when it comes to cultural-sensitive communication. In addition, the CT training seemed to be lacking sufficient attention for dealing with complicated cases and/or cultural norms and values. The significant value of strong cultural-sensitive communication skills when carrying out CT has been acknowledged by several scholars^{5,26} as well as the WHO.²⁷ It may be useful to review the CT trainings that are currently provided with communication and cultural experts, and specifically focus on the implementation of training methods, such as culturally responsive teaching,²⁸ for developing those skills. Although we must be careful drawing conclusion based on subjective experiences described by the contact tracers, it has been shown that sufficient training plays an important

role in carrying out CT.^{5,7,12} For a more objective evaluation of the skills applied by the contact tracers, observational analyses are recommended.

Most contact tracers in our study had a very positive attitude towards their work. They were personally engaged, showed strong feelings of responsibility and were very motivated to contribute to combating the COVID-19 pandemic and to being a good support for the indexes. Commitment and motivation likely have a positive influence on effectively carrying out CT, especially combined with high self-efficacy.^{7,12,18,29} At the same time, however, they can make one vulnerable for burnout.^{30,31} Especially in times of high work-pressure (e.g. when the infection rates are high), with limited time for support from colleagues, feelings of commitment and responsibility can result in stress-related complains.³² Indeed, a study by Fulham-McQuillan et al.¹⁵ exploring the psychological impact of CT during COVID-19 on contact tracers, showed that more than half of the contact tracers experienced burnout-related exhaustion. It is important to monitor the mental health of contact tracers, not just for their own well-being, but also because poor mental health will negatively influence the quality of the (CT) work.³⁰ Implementing measures at the organisational level (such as stimulating interaction and exchange with experienced colleagues), combined with offering training to develop and apply individual (emotionally-focussed) coping skills may effectively support the contact tracers mental health.^{30,33}

The ever-changing protocols and policies were one of the strongest and most often mentioned complains of the contact tracers. Repeatedly changing policies without being transparent are not only undermining the credibility of the government by the public,³⁴ but our results showed it also caused strong irritation, frustration and confusion for the contact tracers. Rapidly changing policies and protocols require a high level of adaptation skills from the contact tracer. In addition, it negatively influences CT because indexes and contacts are becoming more sceptical and suspicious towards the policies and will therefore be more hesitant to join CT. As shown by the framework explaining guideline adherence in the health care sector,¹⁸ a negative attitude towards the guidelines by both the health care professional as well as the patient will not stimulate a good carrying out of the (CT) protocols. To motivate the correct implementation of protocols, and to support job satisfaction, more consistency in the protocols is recommended.

Contact tracers described the behaviour of the indexes during CT as mostly cooperative. However, COVID-19 related emotions, such as worry about privacy or being hesitant to disclose one's COVID-19 infection to close contacts, were some of the patient-related factors mentioned to hamper CT. Privacy issues as an obstacle for CT is an often-reported determinant, which especially received

attention during the COVID-19 pandemic.^{3,35} Together with the more general tendency of increased distrust in governments that arose in many countries during the ongoing COVID-19 pandemic,³⁶ future research should explore effective ways to restore the public's confidence in governmental- and privacy-related matters. Worries about being stigmatised or even being avoided when disclosing your illness has been regularly reported as a determinant negatively influencing disclosure and engagement with CT.^{5,37} The literature provides several methods that can be effective in coping with stigma by those being stigmatised such as psycho-educational and supportive-interventions.³⁸ In addition, several methods can be used to reduce stigmatising behaviour for example initiating contact between perpetrator and victim or using social marketing.^{38,39} To be prepared for the future, it would be worthwhile to explore which of these methods can be translated into practical strategies for use during future pandemics such as COVID-19.

Complicated, conflicting and rapidly changing information on COVID-19 and the preventive measures in the (social) media was another factor impeding CT that came out strongly during the interviews. For most people, the enormous amount of information, including misinformation, available on social media, traditional media, via regular press conferences and one's social network, is confusing. The fact that governmental measures are rapidly and continuously changing causes further scepticisms and suspicion among the public,⁴⁰ including indexes. Distrusting governmental policies can negatively influence the public's motivation to adhere to the recommended preventive behaviours such as engaging in CT.^{34,41} Although we are aware that rapidly changing information and policies is partly inevitable in times of crisis, we recommend communicating a clear, simple and consistent message as much as possible, in order to motivate the participation in CT and adherence to the isolation measures among index patients. Further research is needed to find out how people can be supported in filtering evidence-based and correct information from misinformation and conspiracy theories, for example, by guiding them to trusted sources of information.

Limitations and conclusion

Several limitations of our study are relevant to mention. Firstly, a relatively small number of contact tracers participated in this study. This was partly caused by the fact that data were collected in the middle of the COVID-19 pandemic and thus most contact tracers were too busy to join. Those who did participate, may have been more motivated and positive about CT. On the other hand, however, we recruited a diverse sample of contact tracers, both regarding cultural background as well as regarding their role within the CT unit, which helped in capturing a broader

perspective on the challenges and factors influencing CT. Furthermore, we also interviewed a large group of index-patients and community key figures,⁴² and the themes that emerged from these interviews are consistent with the results presented here. Another limitation is that data were collected during the early phase of the pandemic in which CT was still developing and vaccinations were not yet available. Therefore, results are not fully representative for all CT situations. However, the results will provide important input for pandemic preparedness for future pandemics, especially considering the limited scientific literature available on this topic.

To conclude, our study shows that overall CT was carried out successfully, especially considering the unusual and high demanding context in which contact tracers had to work. However, it also shows that more research is needed to be well prepared for future pandemics. Key topics that need more attention in research and intervention development are the actual performance of contact tracers as well as the training received, effectively supporting the emotional well-being of contact tracers, enabling more consistency in policies and protocols, building confidence and trust among the public, reducing (the impact of) emotions such as related to stigma and disclosure, and supporting the public in dealing with (mis)information. We recommend that Motivational Interviewing, culturally sensitive communication and emotional-focussed coping are included in the training programs for contact tracers.

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Availability of data and materials

Interview protocols are available from the corresponding author upon request. Due to privacy matters and promises made to the participants we prefer no sharing of original interview data.

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Ethics approval and consent to participate

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Patient consent for publication

Information about possible publication of anonymised study results was communicated to and consented by participants.

Informed consent

The manuscript does not contain any individual person's data in any form.

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