SUPPLEMENTARY MATERIALS

Supplementary Materials 1 – Semi-structured interview guides

Interview Guide (Disease surveillance experts)

Introduction

Thank you for agreeing to take part in this interview. In our discussion today, I am going to ask you some questions about your experience with new Tuberculosis diagnostics.

Part 1: Participant identification

1.1 Tell me a little more about your work. What is your job title and what are your responsibilities in this role? Rephrase: What do you do?

1.2 How long have you been working in this role?

1.3 What is your previous or active role and affiliations regarding TB diagnostics and data management?

1.4 You are affiliated with [*institution*]. Do you work closely with any other organizations or institutions at the local, national, or international level?

Part 2: Background knowledge of TB diagnostics

1.1 How have TB diagnostic methods evolved since you have been working in the field of TB?

1.2 What would you say are the biggest challenges in TB diagnosis?

Follow up: Are all of these common challenges here in [*country*]?

Probe: (*To understand what are contributing factors to these challenges in the country in their view – an opportunity to break the ice by letting them share thoughts and theories about a topic they probably have thought about at length, and may give us some useful context info*)

1.3 In your recollection, when was TB DNA sequencing introduced in [*country*] and when do you think it became accessible to more clinics or patients?

1.4 How was the diffusion of access to TB DNA sequencing at various levels of the health system?

1.5 What are the applications of TB DNA sequencing in [*country*]?

Part 3: Perception of DNA sequencing to predict drug susceptibility testing (DST)

1.1 In your experience, when is DNA sequencing used to predict DST? And how accurate has it been in predicting DST?

1.2 What are advantages and disadvantages of using DNA sequencing for TB DST in the [*country*] context?

1.3 How do you feel about DNA sequencing for TB DST potentially being used more widely here, in [*country*]? Do you support such expanded use? Why or why not?

Part 4: Knowledge and understanding of molecular epidemiology and surveillance

1.1 In your experience, is DNA sequencing useful for understanding TB epidemiology?

1.2 What are some advantages and disadvantages of using DNA sequencing for epidemiologic investigations here in [*country*]?

Follow up: Have you experienced or witnessed those advantages / disadvantages? Could you tell me about it?

Part 5: Facilitators, limitations, challenges, and the way forward

1.1 Has TB DNA sequencing and DST changed your work? In what way(s)?

1.2 Has DNA sequencing made your job more difficult or easier in any way(s)? How so?

1.3 What are the facilitators for TB DNA sequencing implementation in your working environment and country?

Rephrase: What policies, attitudes, or other conditions are facilitating the use of TB DNA sequencing here in [*institution and country*]?

1.4 Are there any technical barriers or limitations to TB DNA sequencing implementation in your working environment?

1.4.1 What might be possible solutions to those previously mentioned challenges?

1.4.2 Do you think these solutions will be implemented in the near future?

<u>If yes:</u> When and who is leading that change?

<u>If no or perhaps/maybe:</u> Tell me more, why do you say that?

1.5 Are there any technical barriers or limitations to TB DNA sequencing implementation in your country?

1.1.1 What might be possible solutions to those previously mentioned challenges?

1.1.2 Do you think these solutions will be implemented in the near future?

<u>If yes:</u> When and who is leading that change?

<u>If no or perhaps/maybe:</u> Tell me more, why do you say that?

1.2 How are sequencing data management and interpretation currently handled here in [*country*]?

1.2.1 Did you personally have a good or a bad experience with data management of TB DNA sequencing?

1.2.2 Can you describe any work you have done involving the interpretation of TB DNA sequencing?

1.2.3 Are there any challenges or concerns associated with sequencing data management and interpretation at the moment, or has there been any challenges with this in the past?

1.2.4 What might be possible solutions to those previously mentioned challenges?

1.2.5 Do you think these solutions will be implemented in the near future?

<u>If yes:</u> When and who is leading that change?

<u>If no or perhaps/maybe:</u> Tell me more, why not?

1.3 In your experience, with whom are TB diagnostic data shared?

1.3.1 Do you see or foresee any issues regarding data privacy?

1.4 How is TB DNA sequencing funded here in [*country*]?

1.4.1 Do you think more funding should be put into TB DNA sequencing in [*country*]? Why or why not?

If yes: Who should invest more in TB DNA sequencing in [*country*]?

1.4.2 Do you think richer countries or international organizations should support less rich countries in TB DNA sequencing implementation? Why or why not?

1.4.3 What is your perception of the cost-effectiveness and sustainability of TB DNA sequencing for [*country*]?

1.4.4 Which organizations and countries currently support TB DNA sequencing in [*country*] as far as you know?

1.5 Do you have any other concerns, challenges, doubts or questions related to TB DNA sequencing, management, or interpretation in the country that you would like to share?

Probe: *(to understand exactly why this is a concern/challenge for them)*

Part 6: In country patient access and diagnostics involving DNA sequencing

1.1 Currently in [*country*] who do you think has access to TB DST?

1.1.1 Are there specific individuals or communities in [*country*] less able to access the best quality TB diagnostics at present?

Rephrase: Do some populations in [*country*] have access to TB DNA sequencing diagnostics that other people in the country cannot currently access?

1.1.2 Do some patients who could potentially benefit from DST in the country not have access?

1.1.3 What factors contribute to that (in)equality in access in [*country*]?

Follow up if access not equal at present: Do you see everyone having equal access in the next 5 years? Why or why not?

1.1.4 Do you have any thoughts on that?

Probe: *(e.g. feelings, any comment that would help explain that current situation and/or recommendations?)*

1.2 In your assessment, will only some individuals or communities in [*country*] benefit from the implementation of new TB DNA sequencing in [*country*]? Please explain.

1.3 Do you think that TB DNA sequencing has the potential to improve or exacerbate health disparities within the country? Why yes or why not?

Follow-up if could exacerbate: Is this something you worry about? Why or why not?

1.4 Do you have any concerns that TB DNA sequencing could exacerbate health disparities between countries? Why or why not?

1.5 In your experience, what social supports, if any, are provided to patients following TB diagnosis?

1.6 Does it ever happen that patients are offered DST in [*country*] when the corresponding treatment is not available?

Follow up if yes: Is that often the case or not very often the case as far as you know, in [*country*]?

1.6.1 Do you think it is ethical for patients to be offered drug susceptibility testing (with or without DNA sequencing) when the corresponding treatment is not available? Why or why not?

Part 7: Perceived impact and conclusion

1.1 Has TB DNA sequencing already had an impact on TB here in *[country]*? Why/how or why not?

1.2 Do you see TB DNA sequencing having a major or minor impact on TB surveillance in *[country]* in the future? Why?

1.3 What is the greatest potential impact of using TB DNA sequencing in *[country]*?

1.4 Do you consider TB DNA sequencing to be essential to TB elimination in *[country]*?

1.5 Do you consider TB DNA sequencing to be a necessary tool for TB elimination worldwide?

Conclusion

Thank you. I have learnt so much. Is there anything you would like to add? Is there anything we missed?

Interview Guide (Care providers)

Introduction

Thank you agreeing to take part in this interview. In our discussion today, I am going to ask you some questions about your experience with new Tuberculosis diagnostics.

Part 1: Participant identification

1.1 Tell me a little more about your work. What is your job title and what are your responsibilities in this role? Rephrase: What do you do?

1.2 How long have you been working in this role?

1.3 What is your previous or active role and affiliation regarding TB diagnostics and data management in your work institution?

1.4 You are affiliated with [*institution*]. Do you work closely with any other organizations or institutions at the local, national, or international level?

Part 2: Background knowledge on TB diagnostics

1.1 How have TB diagnostic methods evolved since you have been working in the field of TB?

1.2 What would you say are the biggest challenges in TB diagnosis?

Follow up: Are all of these common challenges here in *[country]*?

Probe: *(To understand what are contributing factors to these challenges in the country in their view – an opportunity to break the ice by letting them share thoughts and theories about a topic they probably have thought about at length, and may give us some useful context info)*

1.3 In your recollection, when was TB DNA sequencing introduced in *[country]* and when do you think it became accessible to more clinicians and patients?

1.4 How was the diffusion of access to TB DNA sequencing at the various levels of the health system?

1.5 What are the applications of DNA sequencing in TB in your clinical practice?

Part 3: Perception on effectiveness of DNA sequencing to predict Drug susceptibility testing (DST)

1.1 In your experience, what is the role of DNA sequencing in predicting DST? How accurate or effective is DNA sequencing in predicting DST?

1.2 What are advantages and disadvantages of using DNA sequencing for TB DST in the *[country]* context?

1.3 How do you feel about DNA sequencing for TB DST potentially being used more widely here, in [*country*]? Do you support such expanded use? Why or why not?

Part 4: Knowledge and understanding of molecular epidemiology and surveillance

1.1 In your experience, is DNA sequencing useful for understanding TB epidemiology?

1.2 What are some advantages and disadvantages of using DNA sequencing for epidemiologic investigations here in [*country*]?

Follow up: Have you experienced or witnessed those advantages / disadvantages? Could you tell me a little about how that played out?

Part 5: Facilitators, limitations, challenges, and the way forward

1.1 Has TB DNA sequencing and DST changed your work? In what way(s)?

1.2 Has prescription or interpretation of TB DNA sequencing assays made your job more difficult or easier in any way(s)? How so?

1.3 What are the facilitators for TB DNA sequencing implementation in your working environment?

Rephrase: What policies, attitudes, or other conditions are facilitating the use of TB DNA sequencing in your working environment?

1.4 Are there any technical barriers or limitations to TB DNA sequencing implementation in your working environment?

1.4.1 What might be possible solutions to those previously mentioned challenges?

1.4.2 Do you think these solutions will be implemented in the near future?

If yes: When and who is leading that change?

If no or perhaps/maybe: Tell me more: why do you say that?

1.5 How are sequencing data management and interpretation currently handled here in your work environment and in [*country*]?

1.5.1 Did you personally have a good or a bad experience with interpretation of TB DNA sequencing results?

1.5.2 Are there any challenges or concerns associated with sequencing data management and interpretation at the moment, or have there been any challenges with this in the past?

1.5.3 What might be possible solutions to those previously mentioned challenges?

1.5.4 Do you think these solutions will be implemented in the near future?

If yes: When and who is leading that change?

If no: Tell me more: why not?

1.6 In your experience, with whom are TB diagnostic data shared?

1.6.1 Do you see or foresee any issues regarding data privacy?

1.7 How is TB diagnostics funded here in [*country*]?

1.7.1 Do you think more funding should be put into TB DNA sequencing in [*country*]? Why or why not?

1.7.2 Which organizations currently support TB DNA sequencing in [*country*] as far as you know?

1.8 Do you have any other concerns, challenges, doubts or questions related to TB DNA sequencing, management, or interpretation in your workplace that you would like to share?

Probe: *(to understand exactly why this is a concern/challenge for them)*

Part 6: In country patient access and diagnostics involving DNA sequencing

1.1 Which patient populations in [*country*] currently have access to DST as part of their TB treatment?

1.1.1 Are there specific individuals or communities in [*country*] less able to access the best quality TB diagnostics at present?

Rephrase: Do some populations in [*country*] have access to TB DNA sequencing diagnostics that other people in the country cannot currently access?

1.1.2 Do some patients who could potentially benefit from DST in the country not have access?

1.1.3 What factors contribute to that (in)equality in access in [*country*]?

Follow up if access not equal at present: Do you see everyone having equal access in the next 5 years? Why or why not?

1.1.4 Do you have any thoughts on that?

Probe: *(e.g. feelings, any comment that would help explain that current situation and/or recommendations?)*

1.2 In your assessment, will only some individuals or communities in [*country*] benefit from the implementation of TB DNA sequencing in [*country*]? Please explain.

1.3 Do you think that TB DNA sequencing has the potential to improve or exacerbate health disparities within the country? Why yes or why not?

Follow-up if could exacerbate: Is this something you worry about? Why or why not?

1.4 Do you have any concerns that TB DNA sequencing could exacerbate health disparities between countries? Why or why not?

1.5 In your experience, what social supports, if any, are provided to patients following TB diagnosis?

1.6 Does it ever happen that patients are offered DST in (country) when the corresponding treatment is not available?

Follow up if yes: Is that often the case or not very often the case as far as you know, in [*country*]?

1.6.1 Do you think it is ethical for patients to be offered drug susceptibility testing (with or without DNA sequencing) when the corresponding treatment is not available? Why or why not?

Part 7: Perceived impact and conclusion

1.1 Has TB DNA sequencing already had an impact on TB here in [*country*]? Why/how or why not?

1.2 Do you see TB DNA sequencing having a major or minor impact on TB clinical management in [*country*]? Why?

1.3 What is the greatest potential impact of using TB DNA sequencing in [*country*]?

1.4 Do you consider TB DNA sequencing to be essential to TB elimination in [*country*]?

1.5 Do you consider TB DNA sequencing to be a necessary tool for TB elimination worldwide?

Conclusion

Thank you. I have learnt so much. Is there anything you would like to add? Is there anything we missed?

Interview Guide (Laboratory personnel)

Introduction

Thank you agreeing to take part in this interview. In our discussion today, I am going to ask you some questions about your experience with new Tuberculosis diagnostics.

Part 1: Participant identification and experience

1.1 Tell me a little more about your work. What is your job title and what are your responsibilities in this role? Rephrase: What do you do?

1.2 How long have you been working in this role?

1.3 What is your previous or active role and affiliations regarding TB diagnostics and data management?

1.4 You are affiliated with [*institution*]. Do you work closely with any other organizations or institutions at the local, national, or international level?

Part 2: Background knowledge and perceptions on TB diagnostics

1.1 How have TB diagnostic methods evolved since you have been working in the field of TB?

1.2 What would you say are the biggest challenges in TB diagnosis?

Follow up: Are all of these common challenges here in [*country*]?

Probe: (*To understand what are contributing factors to these challenges in the country in their view – an opportunity to break the ice by letting them share thoughts and theories about a topic they probably have thought about at length, and may give us some useful context info*)

1.3 In your recollection, when was TB DNA sequencing introduced in [*country*] and when do you think it became accessible to more clinics or patients?

1.4 How was the expansion of the TB DNA sequencing sector in your work environment?

Part 3: Perception on effectiveness of DNA sequencing to predict Drug susceptibility testing (DST)

1.1 In your experience, when is DNA sequencing used to predict DST? And how accurate has it been in predicting DST?

1.2 What are advantages and disadvantages of using DNA sequencing for TB DST in the [*country*] context?

1.3 How do you feel about DNA sequencing for TB DST potentially being used more widely here, in [country]? Do you support such expanded use? Why or why not?

Part 4: Knowledge and understanding of molecular epidemiology and surveillance

1.1 In your experience, is DNA sequencing useful for understanding TB epidemiology?

1.2 What are some advantages and disadvantages of using DNA sequencing for epidemiologic investigations here in [*country*]?

Follow up: Have you experienced or witnessed those advantages / disadvantages? Could you tell me a little about how that played out?

Part 5: Facilitators, limitations, challenges, and the way forward

1.1 Has TB DNA sequencing and DST changed your work? In what way(s)?

1.2 Has DNA sequencing made your job more difficult or easier in any way(s)? How so?

1.3 What are the facilitators for TB DNA sequencing implementation in your working environment?

Rephrase: What policies, attitudes, or other conditions are facilitating the use of TB DNA sequencing here in [*institution*]?

1.4 Are there any technical barriers or limitations to TB DNA sequencing implementation in your working environment?

1.4.1 What might be possible solutions to those previously mentioned challenges?

1.4.2 Do you think these solutions will be implemented in the near future?

If yes: When and who is leading that change?

If no or perhaps/maybe: Tell me more, why do you say that?

1.5 How are sequencing data management and interpretation currently handled?

1.5.1 Did you personally have a good or a bad experience with TB DNA sequencing?

1.5.2 Are there any challenges or concerns associated with sequencing data management and interpretation at the moment, or have there been any challenges with this in the past?

1.5.3 What might be possible solutions to those previously mentioned challenges?

1.5.4 Do you think these solutions will be implemented in the near future?

If yes: When and who is leading that change?

If no or perhaps/maybe: Tell me more, why not?

1.6 In your experience, with whom are TB diagnostic data shared?

1.6.1 Do you see or foresee any issues regarding data privacy?

1.7 How is TB DNA sequencing funded here in [*country*]?

1.7.1 Do you think more funding should be put into TB DNA sequencing in [*country*]? Why or why not?

If yes: Who should invest more in TB DNA sequencing in [*country*]?

1.7.2 Which organizations and countries currently support TB DNA sequencing in [*country*] as far as you know?

1.9 Do you have any other concerns, challenges, doubts or questions related to TB DNA sequencing, management, or interpretation in your workplace that you would like to share?

Probe: *(to understand exactly why this is a concern/challenge for them)*

Part 6: In country patient access and diagnostics involving DNA sequencing

1.1 Currently in [*country*] who do you think has access to TB DST?

1.1.1 Are there specific individuals or communities in [*country*] less able to access the best quality TB diagnostics at present?

Rephrase: Do some populations in [*country*] have access to TB DNA sequencing diagnostics that other people in the country cannot currently access?

1.1.2 Do some patients who could potentially benefit from DST in the country not have access?

1.1.3 What factors contribute to that (in)equality in access in [*country*]?
Follow up if access not equal at present: Do you see everyone having equal access in the next 5 years? Why or why not?

1.1.4 Do you have any thoughts on that?

Probe: *(e.g. feelings, any comment that would help explain that current situation and/or recommendations?)*

1.2 In your assessment, will only some individuals or communities in [*country*] benefit from the implementation of new TB DNA sequencing in [*country*]? Please explain.

1.3 Do you think that TB DNA sequencing has the potential to improve or exacerbate health disparities within the country? Why yes or why not?
Follow-up if could exacerbate: Is this something you worry about? Why or why not?

1.4 Do you have any concerns that TB DNA sequencing could exacerbate health disparities between countries? Why or why not?

Part 7: Perceived impact and conclusion

1.1 Has TB DNA sequencing already had an impact on TB here in [*country*]? Why/how or why not?

1.2 Do you see TB DNA sequencing having a major or minor impact on TB clinical management in [*country*]? Why?

1.3 What is the greatest potential impact of using TB DNA sequencing in [*country*]?

1.4 Do you consider TB DNA sequencing to be essential to TB elimination in [*country*]?

1.5 Do you consider TB DNA sequencing to be a necessary tool for TB elimination worldwide?

Conclusion

Thank you. I have learnt so much. Is there anything you would like to add? Is there anything we missed?