SC 13- ECD6309 -Implement and evaluate interventions contributing to increasing TB treatment in pilot site(s), as selected within the specific contract no. 9

DL4

Interventions to increase TB treatment adherence and improved treatment outcomes among specific hard-to-reach and vulnerable population groups in Riga, Latvia.

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1 Introduction

Adherence to tuberculosis (TB) treatment is a crucial determinant of treatment outcomes. To achieve consistent adherence, good diagnostic and treatment services are necessary but not sufficient: "*patients still need to choose to take the drugs*" (Garner et al 2007: 325). Although patient-related factors and regimen complexity may partly explain poor adherence, it is widely recognised that social, economic, and systems-related factors often underlie individual-level determinants. Weak social support networks, unstable living circumstances, poverty and marginalisation lead to some demographic groups being unable to access timely and responsive care from health services. They struggle to adhere to treatment and are at greater risk of treatment failure[1].

In 2012, the European Centre for Disease Prevention and Control (ECDC) conducted a mission to the Baltic republic of Latvia, a country that has undergone drastic changes in TB notification rates over the past 20 years (ECDC 2012). Although TB rates have been recently declining again, the country still has one of the highest incidence rates within Europe. As TB incidence drops in the European Union (EU)/European Economic Area (EEA) Member States, the disease has become concentrated in vulnerable and socially excluded populations[2], and this is also evident in Latvia.

This report summarizes findings from a pilot project to support adherence to TB treatment in vulnerable individuals in Riga. The research, conducted between August 2016 and March 2017, is a ECDC project (OCS-2015-0UT-2900-MCSaAI) managed by the World Health Communication Associates and undertaken by researchers at Queen Margaret University (QMU) and at the London School of Hygiene & Tropical Medicine (LSHTM). It builds upon a previous larger programme of work led by ECDC on implementation and evaluation of interventions contributing to improving TB treatment outcomes in pilot site(s).

1.1 Background

TB notification rates in Latvia increased substantially after the collapse of the Soviet Union in the early 1990s, reaching a peak of 74 new cases per 100 000 population in 1998[3]. After 1999, TB progressively decreased until 2011, in part due to rapid economic growth in the Baltic region. In this period there were numerous reforms to the Latvian health system: following independence, the country strived to create a social health insurance type system, yet problems with decentralized planning and fragmented funding led to this being reversed. Eventually, the centralised National Health Service system was launched in 2011.[4] The decline in TB rates between 1999 and 2011 is also due to the adoption of a centralised, strictly followed programmatic approach to management of TB, backed by a good surveillance and diagnostic system in place (including for drug resistance), minimal delays in treatment initiation, and available medication.

However, the TB incidence rate increased again in 2012, likely due to the global economic crisis that hit Latvia harder than any other EU Member State. Unemployment rates increased, and a large part of the population experienced a decline in socio-economic status. At the same time, the number of HIV cases in Latvia rose sharply; by 2012, 20% of those diagnosed with TB also had HIV.

Over the past four years, the TB epidemiological situation has once again improved, with registered new TB cases declining from 38.1 per 100 000 in 2013 to 28.4 in 2016. Patients diagnosed in Riga

[1] Figueroa-Munoz and Pilar Ramon-Pardo, 2008
[2] ECDC, 2016
[3] Lucenko et al., 2014
[4] Mitenbergs et al., 2012

city and Riga region present similar trends (Table 1). Half of the registered new cases in Riga present at least one risk factor and many patients have overlapping risk factors. Among the cases registered in Riga during 2013 – 2016, 14 to 18% were co-infected with HIV, 38 to 49% were unemployed, 19 to 22% were alcohol abusers, 5 to 10% were drug users, 4 to 9% had a history of incarceration and 26 to 31% had contact with known TB cases (Table 2).

Table 1: Registered TB cases in Riga and Riga region, 2013 – 2016

	2013	**2014**	**2015**	**2016**
Riga				
New cases	242 (37.4/100 000)	201 (31.2/100 000)	204 (31.8/100 000)	176 (27.5/100 000)
Relapses	29 (4.5/100 000)	37 (5.7/100 000)	21 (3.3/100 000)	24 (3.8/100 000)
Riga region				
New cases	47 (26.2/100 000)	45 (25.1/100 000)	55 (30.3/100 000)	39 (21.4/100 000)
Relapses	7 (3.9/100 000)	3 (1.7/100 000)	3 (1.7/100 000)	5 (2.7/100 000)

Table 2: Risk factors, new TB cases, Riga, 2013 – 2016

	2013 (n=242)	**2014 (n=201)**	**2015 (n=204)**	**2016 (n=176)**
HIV	35 (15%)	36 (18%)	35 (17%)	25 (14%)
Alcohol use	47 (19%)	39 (19%)	46 (22%)	38 (22%)
Drug use	11 (5%)	13 (6%)	16 (8%)	17 (10%)
Imprisonment	19 (8%)	15 (7%)	9 (4%)	15 (9%)
Contact with TB case	69 (29%)	61 (30%)	54 (26%)	55 (31%)
Unemployment	93 (38%)	98 (49%)	79 (39%)	76 (43%)

1.2 Setting

The Centre for Tuberculosis and Lung Diseases (CTLD) is one of six clinical centres of the Riga East University Hospital and includes an in-patient department and an outpatient department. Both departments of the CTLD specialize in diagnosing and treating patients with tuberculosis and other lung diseases. The Riga Outpatient Department serves the city of Riga (population 639 630) and the wider Riga region (population 182 224). The outpatient department has a maximum capacity of 120 patients per day with an average of 90 daily patients.

TB patients are usually sent to the hospital for confirmation of diagnosis. Patients initiate TB treatment in hospital, and continue on an ambulatory basis if the patient is smear negative, tolerates treatment well and when it is possible to ensure ambulatory directly observed therapy (DOT).

1.3 The pilot intervention

In an earlier phase of this project, investigators from the LSHTM TB Centre and Queen Margaret University in Edinburgh visited the CTLD in Riga to identify needs and opportunities to support adherence to TB treatment in categories of individuals belonging to vulnerable groups and deemed likely to struggle with staying on treatment. During this visit, the investigators conducted informal and formal discussions with facility management and service providers in direct contact with patients at CTLD. This site visit and formative work presented the opportunity to understand the scope, scale and functioning of facility activities, the through flow of patients and likely recruitment timelines. A series of interviews with patients and staff allowed us to explore perceptions of the main clinic-related factors that might enable or hinder adherence in patients, and that could be addressed within a clinic-based pilot intervention. These included communication practices, improved risk screening, and intensified support and follow-up of individuals identified as being at higher risk of poor adherence.

Described more fully in the intervention proposal (Appendix 1: Intervention proposal), the pilot intervention consisted of three components:

1. Communications training to strengthen patient communication skills among all staff involved with TB patient care (conducted in early August 2016);
2. Administration of a psycho-social risk screening tool to identify those TB patients likely to struggle with regular, sustained adherence to treatment and;
3. Enhanced adherence support provided to those individuals identified by the screening tool as having one or more risk factors.

The project intervention started on the same day when patients firstly visited the outpatient department for ambulatory treatment. We included all TB patients in the project, regardless of their diagnosis site, drug susceptibility tests or previous treatment. An operational protocol was developed at CTLD to define the intervention components, specifically the use of the psycho-social risk screening tool and the nature and plausible scope of enhanced adherence support that could be provided to patients identified with one or more risk factors (

Appendix 2: Operational protocol).

Due to budget and time constraints, the evaluation of impact of the pilot intervention on treatment outcomes was not possible. Within the pilot study, a process evaluation[5] was undertaken to examine how the intervention was implemented, and what impact it had on intermediate outcomes on the causal pathway. The process evaluation had two main objectives:

1. To compare adherence and loss to follow-up in patient cohorts before and after implementation of the intervention, and at specified time points
2. To describe the context and process of intervention implementation, considering (a) the fidelity of the intervention as delivered in comparison to how it was designed and envisaged, (b) the reach of the intervention (the proportion of the target group receiving it), and (c) staff and TB patient perceptions and experiences of delivery of care during the intervention period.

2 Methodology

To address the first objective, a pre-/post-evaluation design was adopted. We compared adherence (measured by pill count and timely attendance at follow-up visits) and loss to follow-up between the cohort subject to the intervention and a historical cohort from the preceding 12 months. This was done by undertaking a retrospective and a prospective notes review in order to compare the pre-intervention baseline cohort to the cohort enrolled in the study.

For the second objective, we undertook a review of routine data sources, and adopted an iterative qualitative methodology to evaluate the intervention delivery. Routine data sources reviewed included the treatment register, patient records, as well as any records and notes documenting how and when components of the intervention were applied (psycho-social risk screening tool and enhanced adherence support). Qualitative data was collected at two different points in time (mid-way, and towards the end of the project period), and included observations and semi-structured interviews with staff and providers to understand the context and processes of TB care, and obstacles and facilitators to delivery of the intervention within this set-up[6].

During November 2016, four months after the start of the intervention, we undertook the retrospective review of patients, as well as observations and the first round of semi-structured interviews with staff and patients regarding delivery of the intervention to date.

In the final week of February 2017, approximately the start of the 8th month of the project period, we conducted the second round of staff interviews to assess if there had been any changes in the way the intervention was being delivered. The prospective review of patient adherence and loss to follow up during the project period was completed during the first week of March 2017. The chronology of activities related to the project pilot intervention and process evaluation research is shown below.

[5] See Moore et al., 2015

[6] Ethical clearance to conduct the process evaluation was obtained from the ethical review boards at LSHTM, QMU, and CTLD.

Table 3: Pilot intervention and process evaluation timeline

ACTIVITIES	June 2016	July	Aug	Sept	Oct	Nov	Dec	Jan 2017	Feb	March
Logistic & Planning	Start-up meeting at CTLD	Refinement of intervention plan; risk screening tool; operational protocols and data collection instruments proposals for ethical review;			Ethics approval received (LSHTM, QMU)	LSHTM & QMU research-ers in Riga	Interim report submitted			LSHTM & QMU researchers in Riga
Intervention			From mid-Aug: Incorporation of psycho-social screening risk tool into routine care & provision of enhanced adherence support							
			Early Aug: Communi-cations training							
Research						Round 1 data collection				Round 2 data collection

2.1 Comparison of adherence and loss to follow-up in patient cohorts pre- and post-intervention

2.1.1 Data collection methods

Quantitative data collection was carried out manually from Latvian patient records on the clinic premises. The retrospective review included all patients initiated on TB treatment in the CTLD ambulatory clinic in January, February and August – December 2015. This range was chosen in order to exactly match the months that patients were enrolled into the prospective study, thus reducing possible confounders. Exclusion criteria included: patients younger than 18 years; those not treated in the ambulatory clinic for reasons such as incarceration, drug or alcohol dependence or complex drug resistance; patients whose records were not available for review during the data collection period. Data collected from patient records and DOT cards included patient demographics, drug susceptibility profile, missed days of treatment (doses) in ambulatory clinic and microbiological results.

For the prospective record review, every new patient seen in the ambulatory clinic between August 2016 and February 2017 inclusive was enrolled into the study. Their records and DOT cards were reviewed at the start of March 2017 and data collected including; baseline demographics; drug susceptibility profile; microbiological results and conversion times where available; missed days of treatment (doses) in ambulatory clinic; additional support offered through the planned interventions.

2.1.2 Data processing, management, and analysis

All data were anonymised to exclude name and record number and stored on one computer and on an encrypted USB drive to ensure compliance with data protection standards. Data processing and management was carried out using Excel. The data sets for the pre-intervention and the intervention cohort were analysed. Missed doses were calculated using missed days of treatment documented on DOT cards and recorded for each month of therapy. Time to microbiological conversion was calculated using date of collection of first positive smear or sputum culture and date of culture conversion. For those enrolled into the intervention study in the latter months of the trial, there was insufficient time to allow culture conversion therefore smear conversion times were also recorded. Medians and percentages were calculated in order to compare the groups.

Limitations

The before and after comparison had important limitations, in particular the risk that any differences noted might be attributable to secular trends rather than in any way related to the intervention (Section 3.2, Table 6). The process was limited, at times, by availability of case notes; however the quality of record-keeping was accurate and thorough, allowing for efficient data collection. Lack of documentation regarding housing, mental health illness and registration outside of Riga meant that direct comparison was difficult to make between the groups with risk factors. In addition to the low number of participants, estimates of bacteriological clearance were hampered by incomplete and irregular monthly collection of sputa for smear and culture.

2.2 Documenting context, process, and experiences of care during the intervention period

2.2.1 Data collection methods

Qualitative data was collected at the ambulatory clinic at CTLD as well as at some affiliated institutions including: the satellite clinic where DOT is provided to patients in the city centre, the multidrug resistant (MDR) TB hospital ward, a shelter that refers individuals to CTLD for TB testing, and an HIV service non-governmental organisation (NGO) that serves as a resource centre for patients co-affected with HIV, and also provides psychological counselling services for patients who might require this, as determined by the TB team at CTLD.

Semi-structured interviews

Thirty semi-structured interviews were conducted in total. Both patients and staff were interviewed with the help of topic guides. The interviews were conducted in English and Latvian with the help of two Latvian researchers[7] who provided on-going translation.

In Round 1, interviews with 14 CTLD TB and affiliated care providers were conducted; follow-up interviews were conducted with six of these during Round 2 of data collection (Table 4). Patient interviews were conducted with a subset of the patients who initiated treatment between August and November 2016 during Round 1 of data collection (**Error! Reference source not found.**).

The 14 staff members included in the first round of interviews were selected on the basis of their involvement with TB patient care and support (medical, nursing, administrative, and auxiliary) at CTLD as well as at three relevant referring departments and affiliated institutions. The selection of staff for a follow-up interview was determined on the basis of their awareness and role in supporting the intervention. We did not conduct a follow-up interview with staff who were not directly involved, or had very limited roles in direct communication and care of patients initiated onto treatment during the intervention period.

Staff members were aware of the project and its aims as they had been briefed by CTLD staff. We provided a short introduction to the project and the researchers, and obtained consent to conduct and record the interviews. Interviews during the first round of data collection focused on staff views on the communications training, their communication practices with patients and their perceptions of the challenges encountered during initial set-up and delivery of the psycho-social risk screening tool and enhanced adherence support[8]. Round 2 concentrated on identifying changes in staff perceptions of patient communication, risk screening, and patient care and support since the first round of data collection, and in eliciting views regarding sustainability of the intervention components beyond the end of the project period[9].

Patients initiating treatment during the intervention period were approached by the TB nurse regarding their willingness to participate in the study. If interested, the nurse made appointments for the researchers to meet with, and interview these patients. After explaining the project to the patients, and providing them with an information sheet, consent was obtained for the researchers to conduct and record the interview. The topic guide for patients covered aspects of their experience with treatment initiation, care and support, communication with providers at each stage of treatment, as well as the broader familial and social context of their medicine-taking behaviour[10].

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[7] We gratefully acknowledge the tremendous help of Ms Liva Krieke and Dr. Agita Lūse, who assisted with conducting and translating the interviews and observations during the first and second rounds of data collection respectively.

[8] See Appendix 3: Staff interview topic guide, round 1

[9] See Appendix 4: Staff interview topic guide, round 2

[10] See Appendix 5: Patient interview topic guide

Although we did not conduct further patient interviews, we were keen to follow up on individual stories, in particular cases of patients whose experiences of treatment had changed over the course of the intervention period. The prospective review of notes, and some additional information provided by the head ambulatory nurse on each of the ten patients originally interviewed, allowed further insights into the factors that can bring about a reversal of patterns in either a positive or a negative direction (Section 3.3, Boxes 1 -3).

Semi-structured observations

During Round 1 of data collection, brief observation sessions of approximately 20-30 minutes each were conducted in the DOT room at the CTLD ambulatory unit, as well as in the room where the TB physician first meets with the patient following confirmation of their diagnosis. During Round 2, observations were conducted for longer periods of time (approximately 1-2 hours each) at two relevant points of the patient trajectory: the patient registration desk at the CTLD clinic and the satellite clinic where DOT services are provided in the city centre.

2.2.2 Data processing, management and analysis

Qualitative interviews were recorded using a digital voice recorder. Digital recordings were then immediately transferred onto the researcher's password protected laptop and deleted from the digital voice recorder, with audio files then being transcribed onto Microsoft Word. All data involving participants were anonymised at the start of data collection. Upon return from data collection, qualitative data (interview recordings and transcripts) were uploaded to a Dropbox folder shared among the UK and Latvian researchers for analysis.

Data transcripts were reviewed by the Latvian research assistants to check their accuracy and to add in any relevant missed bits of the interview. The QMU team then read the transcripts a number of times, using a deductive approach to develop a thematic framework based on the context, process and parameters of the pilot intervention and its effects on staff communication and working practices and patient experience of care.

Limitations

Language and translation issues presented a challenge during the 1st round of data collection. While staff members spoke Latvian, with several also being proficient in English, patients recruited for this study were primarily Russian speakers. The research assistant during the first round of data collection was a native Latvian speaker with limited proficiency in Russian, and although most Russian-speaking patients had some understanding of Latvian, the majority did not speak Latvian. Six of the ten patient interviews were conducted simultaneously in Russian, Latvian and English, with the interviewer leading in English, the translator speaking in Latvian and the patient speaking in Russian. The complex process of 3- way translation likely affected the quality of the interview, and diluted the content. We dealt with this as best possible, by having a selected number of audio files reviewed by a native Russian speaker (Krutikov) on our team during the transcription of recordings.

Following Queen Margaret University's ethical guidelines, all qualitative data (raw data, transcripts and field notes) have been transferred from the researchers' laptops onto the university secure data platform for long-term storage (5 years after completion of the project). Signed consent forms are kept separately from the data for 12 months at Queen Margaret University and will thereafter be stored under the responsibility of the research team in remote storage on campus for the duration of the retention of the physical data. After the period of 5 years is complete, raw data and consent forms will be destroyed.

Table 4: Staff interviews (Rounds 1 and 2)

Interviewees (Round 1)	(Round 2)
S1: Sputum Collection Nurse	
S2: Head of CTLD Ambulatory Department	
S3: TB Physician 2, Ambulatory Department	X
S4: TB Nurse, Ambulatory Department	X
S5: TB Physician 3 (MDR TB Ward)	X
S6: TB Nurse (MDR TB Ward)	
S7: Psychologist/Social Worker (HIV NGO)	
S8: Social Worker (Homeless Shelter)	
S9: Courier	X
S10: CTLD Head Ambulatory Nurse	X
S11: TB Physician 1 (CTLD project lead)	X
S12: CTLD Social Worker	
S13: TB DOT Nurse, Satellite Clinic	
S14: Head TB Nurse (MDR TB Ward)	

Table 5: Patient interviews

Interview Number	Pseudonym	Patient profile
P1	Jevgenijs	Male, 51
P2	Sergejs	Male, approx. 50s
P3	Viktors	Male, 36
P4	Andris	Male, approx. 50s
P5	Igors	Male, approx. 30s-40s
P6	Amadi	Male, early 30s
P7	Dainis	Male, 48
P8	Ludmila	Female, approx. 40s-50s
P9	Kaspars	Male, approx. 30s-40s
P10	Natalija	Female, approx. 30s-40s

3 Findings

In the interim report, we described the trajectory of care for patients beginning ambulatory treatment at CTLD, communication practices along this trajectory, and initial experiences with setting up the intervention. Here, we provide insights from the process evaluation conducted. Firstly, we examine how the pilot intervention was implemented and taken up by staff; secondly, we present findings from the pre- and post-intervention review of patient adherence and missed doses. Further, we include sections documenting patients' pathways and experiences during the intervention period, as well as a section summarising staff views on the sustainability of the changes introduced during the project.

3.1 Implementing the pilot intervention package

In this section, we describe context, process, and factors influencing the uptake and implementation of the pilot intervention at the CTLD. We present findings from the qualitative interviews and observations on the three different elements of the intervention, namely 1) communication; 2) psycho-social risk screening, and 3) enhanced adherence support.

3.1.1 Communication

Communications training

The first component of the pilot intervention was intended to strengthen health providers' communication skills through a comprehensive patient-centred education and counselling module,

with emphasis on real-life examples and practical exercises[11]. Although well evaluated by staff members immediately following the training,[12] the staff interviews conducted in November 2016 – which specifically asked about the perceived impact of the training – indicated that some staff did not feel the training had been particularly useful or made a difference to their practices. One staff member felt that she did not gain what she expected to learn, and explained that she had developed her own strategies over time which worked fine for her.

One of the TB physicians (S3) felt the training nonetheless provided a useful opportunity for the staff members to be together in one room so that they could share their experiences with each other. In this case, taking the time to get together and communicate what was most important for each of them was valuable as the opportunity to interact did not often arise, as noted specifically by the courier who works outside the clinic.

When we asked about how the project had impacted as a whole on communication, a number of staff commented on the challenges of modifying well-established and habitual communication behaviours. For example, the head ambulatory nurse (S10) explained that although communication trainings were good in principle, changing communication styles was more difficult in practice:

> *It's a slow process because you never go and say: '*yes, I need [communication training]... because I need to improve many things in my behaviour*' … but to change, it is so difficult. I see* [that] *maybe I need to ask* [patients] *in a different way …in the next step* [case]*, I don't forget, but it's another case, another situation, another day, other feelings… it's so difficult to change.*

Communication practices

Provider communication practices not only depend on individual personalities but on an entrenched division of labour between different members of the team, which determines to some extent who communicates, what is communicated, and how communication takes place. This was noted during our observations, but also in the interviews conducted with staff who commented on the different communication styles and practices of doctors, nurses, and ancillary staff.

As identified in the observations undertaken at different points of the patient pathway, an important starting point for most patients is the **reception**; this can set the tone and atmosphere for the patient's subsequent journey through the clinic. One staff member (Courier, S9) commented that while most communication in the clinic is 'private', she could comment on the receptionist's communication which was more public. It was very 'efficient', she noted, because the attendant was responsive, always greeted patients, explaining to them how to get to places or rooms they required.

Following registration, patients routinely see the **TB physician** first. The consultation with the physician focuses on the treatment regimen, and any additional medical issues that the patient has. Patients diagnosed with drug-resistant TB also have initial contact with a doctor in the MDR-TB ward of the main hospital. The **MDR TB doctor**'s (S5) communication with patients is mainly procedural, related to her priorities to tailor dosages following diagnosis, check the tolerance and side-effects of medications through functional tests, and look into any co-morbidities. As the patient narratives show (Section 3.3), this initial phase of communication, especially for those patients hospitalised is critical, but often limited to technical information with the doctor, which may be initially daunting or

[11] Materials and exercises for the 3-day module were prepared by Dr Predrag Duric, QMU, and delivered by Dr Gordana Kritic, an external consultant.

[12] See Appendix 6: Evaluation of communications training, August 2016

poorly understood. Patients are often "…*a little bit afraid of the doctor* […] *it's something* [about the] *authority as a doctor…because the doctor is so busy and* [they] *can't ask them anything*" (S10).

Although doctors are the first to communicate with most patients, some staff suggested that patients at this early stage of treatment initiation may not be in a state that is conducive to digesting important information. Patients are often so surprised or shocked by their diagnosis that they are unable to pay sufficient attention to what the doctor is saying. The **nurse in the MDR TB ward** of the main hospital (S6) was asked by some of her patients to confirm the information provided by the doctor, or to provide them with more information. However, the nurse as well as patient interviews confirmed that communication with hospitalised patients tends to be quite minimal, as the nurse's main duty is to provide drugs and necessary injections.

There is a widespread perceived division between the 'medical' and the 'social' aspects of the patients' care: the head ambulatory nurse (S10) commented: "*Most of our doctors will say:* 'I am medical staff….I need to solve problems with medication, side effects, but I can't go into social problems". The TB physician (S11) confirmed this view:

> *I personally do not go very deep into the social problems because after the interview I ask* [S10] *how she feels about this person. For me as a doctor, I explain what the patient is to receive, for how long… the medical information. Then for me it's interesting when* [S10] *reports back to me because I don't* [have to] *ask this…I appreciate this*".

During the first consultation with the physician, a TB nurse was present and filled out a simple screening form that elicits patients' address, contacts and phone numbers, as well as basic risk factors. Following the consultation with the physician, all patients enrolled during the project period had an additional meeting with the **head ambulatory nurse** (S10), as part of the pilot intervention. These meetings took between 20 to 30 minutes on average, with some taking up to two hours, depending on the patient and his/her circumstances. In this initial meeting, or in a subsequent meeting, the head ambulatory nurse elicited more information about the social circumstances of the patient, and filled out the psycho-social risk screening form.

Based on the form, the patient might be referred to the **social worker**, based part-time at the ambulatory clinic. We initially assumed that the social worker (S12) would play a role in direct communication or counselling of patients, but it emerged that social workers' roles are in fact, limited in this setting. The CTLD social worker described herself as a "…*mediator, a neutral person…in this position, cooperation is both with the patient and the medical staff".* She conducts an interview, usually by phone, with a patient and an application is filled out in order for the patient to obtain social assistance. The numbers of patients she sees per day is very low, she says, usually between 1 to 4, and sometimes none at all. Phone calls can be challenging: she described patients as often being dissatisfied with being called and reluctant to reveal information about social contacts. At other times, she struggles to maintain conversations with patients who are audibly under the influence of alcohol.

The **DOT nurse** sees patients daily either in person or via a Skype call, and hence is a pivotal figure in terms of maintaining contact through communication. In observations of the DOT room, we found however that communication varied greatly across sites and nurses. Some patients came, took their tablets, and left quickly with minimal or no verbal exchange, while others had more interaction. One of the DOT nurses (S13) saw her role as encouraging patients but also reminding them of their responsibility:

> *In this communication with patients, it's important to remind them that they need willpower…that it's actually work* [for them] *to come here and take this medication,*

because there are also side effects and patients need to take some medication against these side effects.

The sense of limited communication between providers and patients in this setting may be due to external factors as well. Some staff suggested that patients themselves may not be used to, or comfortable with talking to health workers. The head ambulatory nurse (S10) recalled a period before the project where they had a special education nurse who provided additional information on topics like TB and diet, or medicines, or herbal remedies, but "…*we saw that patients didn't like to come* [and spend] *extra time*. *The patients don't come here and ask for more information. It's only if I see them in the corridor*". She added, thoughtfully: "*In Latvia, our mentality is that we are not so open*…"

3.1.2 Use of psycho-social risk screening tool

As described above, the CTLD staff decided that the psycho-social risk screening instrument would be administered by the head ambulatory nurse in a meeting of approximately 20 minutes with all patients following their registration and initial visit with the TB physician. Prior to the intervention, patients did not have a formalised meeting with the head nurse. When asked about the decision to have the head nurse administer the screening tool, the lead TB physician (S11) indicated that it was of critical importance who asked the questions, and how they were asked. Doctors, she argued "…*may just tick off boxes without using probes and not get to the bottom of risk-related behaviours*". Even when a patient might have no current issues or risk factors, it was important to cross-verify information, as well as ask about past history that might reveal heavy drinking or drug dependency, which are important.

When asked about how patients felt about the additional time they spent with her, the head ambulatory nurse (S10) commented that some felt their first visit to the clinic took up too much time, that they had to see too many people, often providing the same information to more than one person. In one case, she told us, a male patient said: "'*You talk too much…it's too much for me, I'm going away.* I said *'yes, of course, you* can go if you have no questions'. *I apologized that I took so much time, and I said* [to him]*: 'it's important to know this, but if you think it's not useful information, you can get additional information from the doctor'….*I gave him the doctor's name".

As a result, she explained that she used the screening instrument flexibly, not always during the first visit if it was felt to take up too much time or be too invasive. She felt that she would be more likely to get a better response once the patient has gone through the initial stages of commencing treatment.

If I see that the patient is a bit worried, I don't go through everything, e.g. 'are you an ex-prisoner'? I find a different way of asking. If the patient is aggressive, I stop and don't go into details in some cases […] *I always try to find individual possibilities to figure out how to talk … but this psychological tool* [risk screening tool] *helps me to understand or to remember to ask about something later. Depends on the case…*

For the TB doctors, the additional information gained from the head TB nurse following the meeting was perceived as very valuable:

[S10] really *has time and focus. It's quite often that patients trust her and convey important information but that information again can be very useful for doctors.* [S10] *feeds back to doctors and together it's easier to decide how to organise the treatment more efficiently* (S3)

It's very easy for me to send the patients to [S10] *who can again talk to the patients, because maybe they are not so open with me* […] *Before the project, it was just me and*

the nurse in this cabinet. But it's very good now, if I need some more help for this patient, I have one more person (S11)

A number of staff members felt that there was some overlap in the questions asked at different stages of the patient trajectory, including questions about risk factors and social contacts. However, one of the TB doctors (S3) felt that given doctors' time constraints, it was useful to have someone focusing in-depth on psycho-social factors influencing adherence.

3.1.3 Providing enhanced support

The head ambulatory nurse, based on her discussion with the patient, and on the responses elicited from the psycho-social risk screening instrument, determines what further support the patient could be offered (see Appendix 2: Operational protocol). The enhanced support provided to patients with one or more risk factors consisted of providing transport incentives to all patients who were entitled to receive these, linking the patient to a psychologist or social worker if needed, and increased frequency of contact with staff members to discuss treatment and challenges to adherence as needed. Patients who missed daily doses received a phone call, and might receive a reminder visit from the courier who will verify the address provided by the patient at the time of registration at the CTLD. A checklist mechanism was devised by CTLD lead researchers to record and monitor the patients receiving this element of the intervention.

Social assistance (travel and food coupons)

While many patients are entitled to financial assistance in the form of transport money and food vouchers from the Municipality of Riga, health and social budgets are not integrated so people who have TB and are vulnerable are sometimes missed by the system as they fall between the cracks. Patients can only receive social support if they are declared residents of Riga City. This requires having a documented address within the city, and presents a challenge for homeless patients or those who are registered in different cities yet live in Riga. A visit to the social worker is coordinated by the doctor or nurse; the main role of the social worker is to review database information on the patients' social status and verify patients' residency status by phoning them at home or by phoning the social worker at the shelter. Applying for social assistance can be a cumbersome process, and may only make a small difference for the financially least well-off patients. The DOT cabinet nurse (S13) argued that the assistance offered falls short of patients' needs:

It's too little money the social assistance given for food, there is this system of coupons and every 10 days, patients get 4 coupons and each coupon is worth 1 Euro 60. This is meant for food but this is not sufficient … It's about 19 Euro 20 per month [but the patients] *need more protein, like cottage cheese. It's not enough!*

Support for mental health and substance abuse issues

Psycho-social issues, although specified as a risk factor for poor adherence in the screening tool introduced as part of the intervention, were more difficult for staff to respond to fully. The lead TB doctor (S11) was aware of two patients who had shown mental distress and required psycho-social support. While assistance was organised for the patients to visit a psychology counsellor from the HIV NGO, she did not know if the patient had made use of this service, as they did not follow up. Unlike HIV, there was less 'enthusiasm' for TB, and no TB NGOs she was familiar with.

Further, as the second TB doctor (S3) described, visiting a psychologist or therapist is expensive and therefore potentially out of reach for vulnerable patients. This is similar for those patients requiring the services of a narcologist, who generally also require fees, apart from one substance abuse specialist who works with the municipality social services. For patients whose adherence to

treatment is at risk because of excessive alcohol consumption, assistance is limited to informing individuals about where they can go to get help, if they want it:

> *Of course I can give information on where you can go. In some cases, you need some payments* […] *If we talk about alcohol abuse, we say, you stay at the hospital, I explain…if you feel you need alcohol, don't be shy, just tell the doctor:* 'I would like to drink alcohol'. *If you treat it, you need only 2-3 months. I try to explain, if you need alcohol, I make copies of contacts* [of organisations] *that you can call* (S10).

In many cases, addressing psychological issues was mainly about finding out if there was a family member close to the patient. Yet when we asked to what extent family members accompanied patients or acted as treatment supporters, the head ambulatory nurse (S10) contrasted spousal and familial relations in Latvia with other countries, reiterating an earlier point made: "*In Latvia, we don't have these kind of strong relations….we don't see family members who help in the treatment period*".

S10 and the social worker (S12) concurred that referring someone for mental health services was a sensitive issue, not readily accepted by patients. When asked whether the social worker could provide psycho-social support for patients, a number of staff seemed surprised by the question, arguing that social workers did not have the training or skills to do so. The social worker said she would rather leave this to a doctor, as "*patients trust the doctor more*". A telling comment regarding the place of social work in health care came from the MDR-TB doctor (S5), who told us: "*In this clinic, treatment is of primary importance, and social assistance is secondary… it is more auxiliary work*".

Follow-up of patients missing daily DOT

The role of the courier (S9) is to follow-up on patients who have not shown up for their daily DOT. She receives a stack of records of people who are 'missing' from the nurse, which she tries to process one by one. Home visits, conducted using public transport where possible, can be time-consuming, tiring, and sometimes frustratingly ineffective. There are challenges in trying to locate addresses, and getting into buildings with multiple flats. If no one is in during working hours, she leaves an envelope in the door in the hope that someone will put it in a mailbox. There is no guarantee that this will happen, so she often feels disheartened, aware that her time and efforts are in vain. Other situations are challenging because of the risks to her security. She vividly described one building that she was afraid to enter: an old building in a dilapidated state, with a dark and narrow staircase, and the address found to be an upstairs apartment with broken windows, some of which covered with blinds.

Tracing 'missing' CTLD patients who are from outside of Riga city also poses a problem, as accountability for these patients should be with the health services in their place of origin. The head ambulatory nurse (S10) suggested that the roles of family doctors (GP) as DOT providers should be better enforced:

> *It's not my responsibility to call their* [family doctor or nurse] *to ask about these patients* […] *It would be better if there was a regulation to say family doctors are responsible to follow-up their patients. Now* [family doctors] *provide DOT but without extra money.*

Key Findings

- Communication patterns and practices are strongly influenced by professional roles and perceived divisions between medical and social aspects of care.
- Screening for psycho-social risk factors provides additional information about patients at risk that is shared across the team, and appreciated. However, the overlap in information elicited from patients at different steps may lead to fatigue on their part.
- Additional time spent talking to patients and understanding their circumstances is valued. Social, medical, and psychological assistance for patients with risk factors is limited because of resource constraints, including the lack of specialist skills in the team to respond to these issues.

3.2 Adherence and loss to follow-up in patient cohorts pre- and post-intervention

Of a total of 259 patients treated for TB in the Riga region in 2015, data was collected on 134 patients who were treated during the months mentioned. Following exclusion of those 35 patients for whom notes were not available, who were not treated in the ambulatory clinic and who were under 18 years of age, the retrospective cohort from the pre-study period (Jan/Feb 2015, Aug/Sep/Oct/Nov/Dec 2015) comprised 99 patients and the prospective cohort during the study period (Aug 2016 – Feb 2017) comprised 67 patients. The cohorts did not differ significantly with respect to the baseline characteristics, as shown in Table 6. There was no data available in the retrospective group regarding housing status, social isolation and mental health as this had not been documented prior to the study therefore a direct comparison between the cohorts could only be made with regards to intravenous drug use, alcohol excess, and a history of incarceration.

Of the 35 patients (35/67, 52%) identified by the psycho-social risk screening tool as having one or more risk factors for poor adherence, additional support was provided by food vouchers (8, 22.9%), travel money to attend the clinic (9, 25.7%), housing support (4, 11.4%), additional telephone calls from the clinic nurse (18, 51.4%), and courier visits (4, 11.4%). No patients were referred to an addiction specialist or a psychologist.

Due to clinical necessity, some patients in the group that were not identified by the psycho-social tool were also offered additional support. Of the 32 patients not identified as having one or more risk factors for poor adherence (32/67, 48%), the only additional support given involved additional telephone calls from the clinic nurse (3, 9.4%), courier visits (1, 3%) and referral to psychologist (1, 3%) as shown in Figure 1[13]. Figure 2 shows the number of patients that received different numbers of interventions ranging from no interventions (40/67, 60%), one (15/67, 22.4%), two (6/67, 9.0%), three (4/67, 6.0%), four (1/67, 1.5%) and five (1/67, 1.5%).

The number and proportion of doses missed were 772/20880 (3.7%) and 306/7320 (4.2%) for the retrospective and prospective cohorts respectively (p = 0.6). Most of the prospective cohort had not reached treatment completion date prior to the censure end date of the project; the proportion of doses missed by month of treatment is shown in Figure 2 (Appendix 7). The small denominator of patients still having treatment in months 6 – 8 of treatment significantly skewed the results. This is particularly evident in month 7, where 56.7 % of doses were missed in the intervention cohort (those who were identified as having one or more risk factors by the psycho-social screening tool), although only 2 patients (who missed 15 and 19 doses respectively) were actually on treatment in

[13] See Appendix 7: Quantitative results, Figures 1 – 4

that month. In the retrospective and prospective cohorts, there were few patients missing more than 5 doses per month in the non-risk factor group; suggesting that doses missed are due to a few individuals (Figure 2).

Patients with risk factors for non-adherence missed a median of only two doses more than those without risk factors in the pre-intervention cohort. The same finding was observed in the prospective cohort, in which those with risk factors were routinely offered the adherence support intervention. However, the number of patients that missed any doses was greater in the retrospective risk factor group (17, 77.3%) when compared with the prospective risk factor group (19, 54.3%), as shown in Table 7.

Figures 3 and 4 focus on monthly patterns of adherence by the two patient groups included in the prospective cohort. Excluding month 7, the greatest percentage of doses was missed in month 6 by the prospective risk factor group (10.5%). In the retrospective risk factor group the most doses were missed in month 5 (17.1%). In the prospective cohort, the greatest number of patients who missed more than five doses in one month was in the first month for the group with risk factors (12, 34.3%) and months 2 and 3 in the group without risk factors (1 and 1, 3.1%) (Figure 2).

The median time to culture conversion for the retrospective cohort was 58 days; for the prospective cohort this was 63 days (p=0.95). As culture conversion had not been achieved by many of the patients in the intervention cohort at the time of data collection, time to smear conversion was also collected. The median time to smear conversion in the prospective cohort was 31 days in the group with risk factors and 40 days in the group without (p=0.59).

Table 6: Baseline characteristics of study populations

	Pre-intervention (n=99)	Intervention (n=67)
Data collection methodology	Retrospective	Prospective
Age in years (median, range)	41 (19, 85)	40 (21, 85)
Percentage female (%)	36 (36.4)	26 (38.8)
Homeless (%)	-	6 (9)
HIV co-infection		
Yes (%)	14 (14.1)	7 (10.4)
No (%)	68 (68.7)	56 (83.6)
Not known/data not available (%)	17(17.2)	4 (6)
TB phenotype		
Baseline culture positive (%)	77 (77.8)	62 (92.5)
Baseline smear positive (%)	30 (30.3)	30 (44.8)
Pulmonary (%)	95 (96)	65 (97)
Extrapulmonary (%)	4 (4)	2 (3)
DST profile, where available (%)	99 (100)	63 (94)
Susceptible to RHEOfl[1]	78 (78.8)	44 (69.8)
MDR [2]	7 (7.1)	6 (9.5)
Mono drug-resistant [3]	11 (11.1)	11 (17.5)
Poly drug-resistant [4]	2 (2)	1 (1.6)

[1] R – Rifampicin, H - Isoniazid, Ofl - Ofloxacin, E – Ethambutol
[2] resistant to at least Rifampicin and Isoniazid
[3] resistant to one of RHOflE
[4] resistant to more than one of RHOflE but not to both Rifampicin and Isoniazid

Table 7: Adherence to treatment and time to microbiological conversion

	Pre-intervention		Intervention		P value
	No risk factors	Risk factor noted	No risk factors	Risk factor noted	
n (% of respective cohort)	77 (77.8)	22 (22.2)	32 (47.8)	35 (52.2)	
Any risk factors for impaired adherence (n, %) [1]	0 (0)		0 (0)		
Intravenous drug use	-	9 (40.9)	-	3 (8.6)	
Alcohol excess	-	16 (72.7)	-	14 (40)	
History of incarceration	-	5 (22.7)	-	8 (22.9)	
Homeless	-	-	-	6 (27.3)	
Social isolation	-	-	-	14 (63.6)	
Mental health illness	-	-	-	2 (5.7)	
Registration outside Riga	-	-	-	12 (34.3)	
Patients recorded as having missed *any* dose (n, %)	43 (55.8)	17 (77.3)	9 (28.1)	19 (54.3)	
Total doses missed (n/N, %)	438/17460 (2.5)	334/3540 (9.4)	39/3600 (1.1)	267/3720 (7.2)	0.60
Median doses missed (n)	1	3	0	2	
Time to microbiological conversion (median, days)					
Smear conversion [2]	-	-	40	31	0.59
Culture conversion [3]	59	56	62	63	0.95
Treatment outcome					
Cured	56 (72.7)	17 (77.3)	4 (12.5)	3 (8.6)	
Completed treatment	15 (19.5)	1 (4.5)	0 (0)	0 (0)	
Died	2 (2.6)	0 (0)	0 (0)	0 (0)	
Transferred out	0 (0)	0 (0)	0 (0)	1 (2.9)	
Lost to follow-up	1 (1.3)	4 (18.2)	0 (0)	1 (2.9)	
Still on treatment [4]	3 (3.9)	0 (0)	28 (87.5)	30 (85.6)	

[1] identified by intervention psychosocial tool as at risk of poor adherence

[2] of baseline smear-positives

[3] of baseline culture-positives

[4] censored at time of project end

Key findings

- The number of doses missed was low at baseline, and dominated by a small number of patients.
- The number of patients who missed any doses was greater in the retrospective risk factor group when compared with the prospective risk factor group.
- The pilot intervention had a positive effect on adherence in patients with and without risk factors although this was not statistically significant.

3.3 Experiences of TB care in the study patient cohort

By early March 2017, 67 patients had been enrolled at CTLD, and just over half of them (52.2%) were noted to have one or more risk factors for poor adherence to treatment (See above, Table 7). The most common features of vulnerability affecting patients' health seeking behaviour, including adherence to TB treatment, were excess alcohol consumption (n=14) and living outside of Riga city (n=12), closely followed by social isolation (n=14), that is limited or no recourse to family or friends who could support them whilst on treatment. Despite the fact that many of the identified risk factors for poor adherence in patients seemed directly linked to poverty and marginalisation, the MDR-TB doctor (S5) suggested that defining vulnerability was not always straightforward. As an example, she pointed out that although some women might appear to be financially stable, with adequate health insurance: "*We don't know what happens in the family. Maybe there is some violence in the family and this is the factor that impacts later on adherence*." This important observation concurs with our approach here to situate 'adherence to treatment' as part of patients' longer health-seeking trajectories rather than looking at 'non-adherence to TB drugs' as an isolated problem that is mainly contingent on individual episodic responses to treatment.

3.3.1 Fragmented pathways to care

The case stories of patients we interviewed highlighted different forms of physical and social vulnerability that compromise timely and effective health seeking, including care-seeking for TB. For a number of patients interviewed, the entry point to TB care was frequently not directly related to TB symptoms but to other illnesses or conditions that compound the burden of physical disability and distress, and generated complex pathways to care.

Jevgenijs (P1), for example, talked about being HIV+ as "*creating many problems in my life*". His pathway to care for MDR-TB was complicated because of his co-infection with HIV: he was first sent to the infectious diseases department by his HIV doctor because of a high temperature. He was kept there for a week before being checked for TB, then sent to the TB hospital, and admitted to the isolation ward[14]. Similarly, Kaspars (P9), a road worker in his 30s to 40s, recounted a story of fragmented care. He told us that he generally did not like to visit the doctor, and self-medicated in the case of illness. However, on experiencing high fever and an unusually severe pain in his side for a number of days, he called emergency services, and was taken in to hospital. He was initially told that it was not more than muscle pains and not something serious. When the pain persisted, he insisted on further investigations, the hospital doctor found inflammation of the lung membranes and suspected pneumonia. On further investigations and a 2-week stay in the infectious diseases ward, during which

[14] In Latvia, TB diagnosis is based on bacteriological examination; three consecutive sputum smears, two cultures and DST against first line drugs are performed before treatment is initiated. For all mycobacterium strains confirmed as MDR-TB, a DST for second-line anti- TB drugs is performed. (See Kuksa et al 2014)

he was put on antibiotics, he was sent to the TB hospital for further tests. He stayed in the TB hospital for 2 weeks before his diagnosis was confirmed.

For Ludmila (P8), being diabetic complicated her treatment-seeking. She was sick for 3 weeks before going to the hospital where she was told that her diabetes had weakened her immune system. When shadows were found on her x-ray, she was informed that she had TB. She knew what TB was as she recalled the mantoux tests that were used for TB screening in school during Soviet times, but was shocked to hear of her diagnosis, and expressed uncertainty about how to manage the dual burden of disease:

> *You never think that it will affect you… They told me the treatment would be slower because of my diabetes.* [There is] *conflicting information – with TB you need to eat well, but not for diabetes. One* [disease] *needs sun, the other not.*

Similarly, Sergejs (P2), who had a pre-existing cardiac problem, was referred to the hospital to get an x-ray and a CT scan during a routine health check. Like Ludmila, he was extremely surprised when told by the attending neurologist that he had TB, as he had no prior experience of TB.

Both Andris (P4) and Dainis (P7) are from outside Riga which complicated access to treatment. They both suffered accidents which led them to seek acute care, and it was only through a circuitous route that they were diagnosed with TB. Andris had a family history of TB, so he was familiar with the disease, but nonetheless experienced discontinuities in his pathway to care. When he broke a bone in his upper shoulder, he first went to a doctor in Riga, but was advised to seek help from a doctor in his home city, Bauska. The doctor in Bauska suggested he go for another x-ray in Riga, and it was at this point that they noticed something "*wrong with his lungs on the x-ray*". He was then admitted to the hospital and discharged after a week, but remained unsure about whether he had TB or not, although he understood that he must take his pills.

Dainis is a 48-year old stair cleaner who has a history of alcohol abuse. He suffered a bad fall a number of years ago and broke his ribs which led to him not being able to work. He did not have access to a general doctor because he was not declared in Riga City, and only obtained the declaration when he spent some time in a shelter. He did not have family nearby but luckily was taken in by someone who invited him to stay with him when he experienced his fall. He lamented the high costs of health care, commenting on the paradox that TB was the only disease where the state "*gives you money for the cure*". Like Andris, Dainis was no stranger to TB – he had experienced TB 20 years earlier, and suspected he might have a recurrence of the disease when he began to lose weight, had a high fever and weakness in early 2016. In contrast to Andris, however, Dainis' pathway to care was more prompt: he called the ambulance and was taken to the hospital where tests were done and he was referred to the TB hospital. After spending four months in the isolation ward, and then 1.5 months in a normal room, he left the hospital, and is now receiving treatment in ambulatory care.

Finally, Amadi (P6) left his home country in 2010 and came to Latvia as a refugee via a long and difficult route with 'transit' time spent in a number of countries. In one of the countries, he was imprisoned for inciting social protests, and says he became ill, possibly with TB, during this period of incarceration. Upon his release, he travelled to Southern Europe with the help of an asylum seekers' support organisation and arrived in Latvia in 2015. At arrival, he underwent a medical examination and was found to have TB. He was hospitalised for a few weeks, then discharged, but returned to see the doctor again after feeling unwell, and went back to the hospital, this time for two months.

3.3.2 Care in hospital

All patients with confirmed diagnosis receive TB treatment in hospital for a minimum of 2 weeks while they are smear-positive. If they are found to have drug-resistant TB, they are kept in an isolation ward for a period of time, dependent on smear or culture conversion, their tolerance to medications, and social factors, including their financial, housing, and general support circumstances. For a number of patients interviewed, the experience of initiating treatment during hospitalisation was frequently described as a period of shock, stress, and uncertainty. Dainis (P7), for example describes his initial transfer to the hospital as a "*big mess*". He moved from the 4th floor, where patients are diagnosed for the first time, to the 7th floor when they realised he had drug-resistant TB. He was found to be resistant to one particular drug and was then moved to the 6th floor, which was familiar to him from his past TB history. In contrast to the first time he had TB, there was no long conversation at this point; he says he was simply given documents to sign.

Kaspars (P9) also describes the experience of being moved between the two hospitals (infectious diseases and TB) as unsettling and confusing. When he was finally admitted to the TB hospital, he remembers the doctor telling him that the diagnosis was a big "*mystery*" because although TB was suspected at the outset, they later were unsure, and kept switching the information. This lack of certainty around the TB diagnosis was distressing; he says "*I didn't sleep for 3 days*".

Communication of the confirmed diagnosis was minimal and abrupt, and did not respect his rights to confidentiality. He describes the TB hospital as being like a "*factory*" where "*nobody takes care, nobody pays attention. Nobody. One patient, then the next, the next*…" Kaspars recalled the moment when the doctor came in to confirm the diagnosis:

> *I was in the hospital room with the other patients. The doctor came in and said "*Yes, we have found that you have TB. We will start treatment*". That was it (…) The other patients didn't say anything but they overheard the conversation. I didn't like that… I could report this to a newspaper!*

For patients like Kaspars and Viktors (P3), the experience of being on the hospital ward was sobering because they found themselves in the company of people they felt were socially inferior to them. Kaspars noted the number of homeless people in the hospital, commenting that this might be the reason the doctors there did not seem to connect with their patients. Viktors (P3) poignantly describes his own attempt to distance himself from those who share his condition in the hospital:

> *I ended up on my own in the ward. I was shocked. I try to surround myself with good people but I had ended up with bums and addicts. On the street I would avoid these people. I am not against them, they have chosen their own way of life and that is how they are. Of course I am uncomfortable about them. I haven't drunk alcohol in 4 years, haven't been out in 1 year. My one bad habit is smoking. I try to keep away from these people as much as possible. Now I am amongst them. I was shocked. I spent one week re-evaluating my whole life.*

Ludmila (P8), on the other hand, felt that patients should be grateful for the care received during this period, recognizing that working conditions in hospitals were poor: "*I have nothing bad to say about the doctors and the workers. They treated me so well. They have such a low salary and work in such a place, we can only thank them*."

3.3.3 Ambulatory care

Following a period of hospitalisation, patients are discharged when confirmed smear-negative, and then registered for ambulatory treatment using daily DOT. The process of treatment initiation as

described by a number of patients is similar: a patient will spend between 20 minutes and an hour with the doctor first, and then go to see the head nurse. Patients recognised the division of labour between the consultation with the doctor, which focused on symptoms, clinical course of illness, and treatment, while the meeting with the head nurse concentrated on assessing patients' specific circumstances that might require addressing before initiating them on to treatment, and emphasising adherence to treatment.

Overall, the experience of the initial consultations with the doctor and nurse were experienced as positive and helpful, often contrasted with the confusion and distress experienced during the time of diagnosis. Natalija (P10), for example, described the clinic staff as very pleasant and friendly. She was encouraged by the head ambulatory nurse not to be afraid, and was given ample information and the opportunity to ask any questions regarding her treatment while at the ambulatory clinic.

Kaspars (P9) similarly experienced the doctor as kind and polite, and reassuring. When he had first come to the clinic with his girlfriend, he was positively surprised that the doctor invited the girlfriend into the room, explaining to her that it was necessary to cheer him up all the time, and to take care of him. He commented that in comparison to the hospital, "…*everything here* [at CTLD] *is humane… it's civilized*".

Box 1: Kaspars (P9)

Kaspars started treatment in mid-October 2016. When we interviewed him in November 2016, he expressed anger and frustration with the experience of hospitalisation and delays in establishing a diagnosis. The head ambulatory nurse recalled her first meeting with him as tense; he appeared to be paranoid, and have some "*mental problems*"; she described his mistrust of doctors, negative attitude and nervous mannerisms. However, after gaining trust and support not only for himself but his girlfriend who was also being treated for TB, he came regularly, asked questions, and appreciated the care he received. At the time of our second visit in March 2017, he had not missed any doses to date. Kaspars' case illustrates the influence of previous experience with the health system on treatment readiness. Here, a change in his treatment literacy and responsiveness can be linked to his experience of care at CTLD as being "*humane*" and reassuring after his time at the hospital which he described as a "*factory*".

While part of the enhanced adherence support offered as part of the study included recourse to other professionals who could address some of the issues affecting patients' capacity to stay on treatment, there were few patients that avail themselves of these services. Dainis (P7), for example, recalled being asked by the head nurse about his living conditions, alcohol use and eating habits, and being told to drink a lot of water because "…*all these drugs are like poison*". Because of previous problems with not having the Riga city declaration, she advised him to see the social worker, however, to date he had not made use of this service. Andris (P4) recalled being asked questions and being offered information in the form of leaflets and brochures. He was also offered services of a psychologist and a social worker in case he needed these. He declined as he says "*nothing has changed in my life*".

Ludmila (P8), too, was made aware of the possibility to get a social worker or psychologist but said that she had good family support and that it was not necessary. She noted the openness of the nurse in providing specific information about the treatment and giving her the chance to ask questions if she needed to:

"The nurse also explained to me why and what for I take the tablets. She explained it all on the first day. If I have any questions, I can always ask them. I can call or come. And where I take my tablets, I can also ask her."

Once patients started on treatment, they were expected to come in daily for DOT. There is evidence from the interviews that the contact with staff after the initial 'induction' to treatment became more sporadic, and for some patients, quite minimal. Most patients saw one of two nurses who share the tasks of DOT supervision, and would also see the doctor on occasion. When asked about their interaction with staff during daily visits, patients like Jevgenijs (P1) and Sergejs (P2) said they were not familiar with the staff and did not know their surnames, and generally avoided contact with other patients. Jevgenijs would prefer being given 4 months of tablets to take at home. Ludmila (P8), too, did not like to have to take her medicines in the presence of the nurse, but said she understood why it was necessary. The one time that she was unable to come because of problems with the car, she found the nurse caring, because "*she understands that these things happen in life so she didn't judge me".*

Box 2: Ludmila (P8)

When we interviewed Ludmila in November 2016, she was positive about her experience at CTLD and optimistic about staying on treatment. In March 2017, we heard that although she had steady regular adherence patterns for the first four months of treatment, she had stopped coming in December. In addition to being diabetic, she had a history of alcohol abuse as well as problems with her husband. She was not declared in Riga, and although she received travel money from the project, did not receive any additional social support. In December, after a fight with her husband, she started drinking again and moved to another city. By this time, she had completed all her doses, and although she was 'lost' to the system, she was listed as cured. Attempts were made to contact her through her son to confirm her health status but he said he no longer had contact with her: it was "too difficult to help her". In this case, numerous social vulnerability factors conflate to make adherence to treatment challenging, and beyond the scope of clinic-based interventions.

Viktors (P3) and Andris (P4) had mixed views on their care. Viktors, on the one hand, highly praised the head TB nurse, commenting on her competence and loyalty; on the other hand, he was critical of other staff, who he said were too caught up in their professional guidelines – "…*they only say what they are supposed to*" – rather than adapting to specific patient circumstances. Andris (P4) was generally satisfied with the care received, but commented that the attitude of the nurse providing DOT was "*like in the army*" and that she treated her room as her space with her rules.

3.3.4 Being and staying on treatment

Most patients found the initial stage of treatment difficult. Some expressed reluctance to have DOT, yet grudgingly accepted that daily treatment involved a necessary, but tiresome re-ordering of their everyday lives. Sergejs (P2) said, for example, that going for DOT had become an everyday occurrence – he wakes up and his first thoughts are to come to the clinic. His family was supportive. There were generally no problems in accessing the clinic, although a number of patients did mention struggling with extreme fatigue: some expressed apathy and resignation. Viktors (P3) took naps, not because he was tired, he says, but because he was at home with nothing to do. He resented having to come to the clinic every day:

Every morning, having to get up and come here, irrespective of the weather….. I don't want to do it. It's a big demand on my time. Then I see that people can take tablets on skype. It takes no time. But for me, to even get here, to get up, have a shower and come here takes so long… I understand that taking tablets is in my interest but I don't see why I have to come here all the time. It would be even better if I could take the tablets on skype and get paid to do so!

Igors (P5) said that he knew little about the diagnosis and treatment, but did not want to know more. He was aware that he could find information on the internet if he wanted, but did not search for information, as he "*didn't care*". In contrast, Viktors (P3) proactively sought for information on the internet, especially for side effects of the pills.

Those who missed doses were sometimes visited by the nurse at home, as in the case of Jevgenijs (P1). Sergejs stayed at home for 5 days due to illness, and was found to have problems with his liver when he returned to the clinic, so had to interrupt his treatment for some time. Patients were anxious about the consequences of non-adherence. Dainis (P7), for example, who had a drinking problem, was aware that alcohol consumption might affect his treatment negatively, and was worried that he might have to go back into isolation if he missed doses. Viktors (P3) and Kaspars (P9) expressed anxiety around not being able to work, and worried that their employers would not hold jobs for them over the long period of treatment.

Amadi (P6) faced unique challenges as a result of his status in the country. A query about the challenges of staying on treatment elicited a web of underlying factors that compromised his health:

If you need to take a tablet, you need to eat food, but there isn't any food […] *I need to talk to the doctor because* [taking] *the tablets is difficult without food* […] *But it is difficult for us, we have no money. The government does not care about us. And I have no family, nobody to come and help. So I applied already* [to go to] *England because this organisation, they gave me the documents to go out. They left it with the camp, but I cannot earn. Because I have only 1,139 Euro but if I need to work, how? Maybe it is about 200, 300, it is not enough. It's a difficult life for me with my health...*

Box 3: Amadi (P6)

When we spoke to Amadi in November 2016, he was living in a refugee camp outside of Riga municipality and was not working. He did not speak Latvian or Russian. He had been on TB treatment since September, and had good adherence patterns, although the head ambulatory nurse noted nutritional deficiencies and digestive problems linked to side effects of treatment. He met with the nurse a number of times, mainly to ask for support on immigration issues. He received some travel money from the project, but did not receive social support, as he was not declared in Riga City. After November, his appearance became more erratic; finally he stopped coming to the clinic. Upon inquiry, the CTLD staff was informed by one of the nurses at the refugee camp that he had left the country before Christmas; he was then classified as lost to follow up. Amadi, although an unusual case in terms of his refugee status, illustrates how a set of challenging circumstances – political, social, and individual health-related vulnerability – interact to discourage effective and sustained treatment-seeking and adherence.

3.4 Sustainability of the intervention

During the second round of staff interviews, we asked about the sustainability of the intervention components, specifically about the additional time spent by the head ambulatory nurse with patients,

and the use of the psycho-social screening tool. When asked what made the difference, the lead physician (S11) reflected: "*I think more time with the patient. It depends on the person of course. But normally the person likes it if you talk with them and explain more* […] *I think patients like communication with the nurse, sometimes more than* [the doctors]". Regarding the screening instrument introduced as part of the pilot intervention, S11 felt it should be combined with the existing client card that is filled out by a nurse during the patient's initial consultation with the physician. However, not everyone could administer the extended screening tool:

> [S10] *knows how to probe for information…she also knows all the practical stuff, can give practical help and can replace any nurse. If someone else did it, it would not be so good*" (S11)

> [S10] has a special talent for *attracting people and gaining trust* […] *many people benefit from that information. Not only* [S10] *who knows better but when she finds out more details on the patient, she can also pass this on to me* (S9).

When asked about her views on the sustainability of the intervention, S10 felt it was feasible for her to talk to patients for the extra half hour, although she was not convinced that the screening instrument was required. For other nurses, it would be "*extra work*"; for her, it was relatively easy to find the time required. An additional advantage was that she had her own office which offered patients privacy, whilst other nurses tended to share a room with the doctor.

However, other staff members were more ambivalent about eliciting psycho-social risk factors in the absence of resources and personnel to provide adequate social support, for example: "*It would be advisable to have a staff member who could interview people about their psycho-social risk factors, but what resources are there to carry on supporting these patients when the project is over*?" (S3). Questions about who could carry on providing additional time and support to patients raised more general issues about human resource constraints. S10 noted that she had a vacancy open since two years for a nurse; they were unable to attract someone since salaries were small and working in TB is not popular. For the research team, it was notable to observe that a number of staff including nurses had been working at CTLD for 20 years or more; two nurses interviewed were over 70 years of age.[15]

In addition to basic health workforce gaps, there is a lack of in-house specialists to respond to specific needs of vulnerable patients at risk of poor adherence. S3 talked about the difficulties in the care and follow-up of drug users. As a TB doctor, she felt she did not have the necessary knowledge or skills to manage patients with drug addiction issues; the clinic would benefit from hiring a part-time narcologist (de-addiction specialist) if finances were not a problem, she noted. Within the broader context of health care financing challenges in Latvia, and the decline in TB rates more specifically, the MDR-TB doctor (S5) indicated that budget cuts and a shift in priorities had affected support for TB patients drastically:

> *And then we* [the government] *cut some things…we cut from the most available places. Obviously, we could not cut from the drugs, or disinfectants, or electricity which are stable amounts of money. Previously there were two social workers, some work on group support, some occupational activities among the patients, everything was there but not anymore. This was until 2008 during the crisis…*

> [Now] *if we demand that we need more social workers, the response would be that there is enough. There is one staff for the amount of beds and that is enough. I think the problem is*

[15] Latvia has a very low proportion of nurses compared to EU averages and other countries in the region. There are severe shortages of nurses, physician assistants and midwives, which means that physicians generally assume some proportion of nurses' duties, influencing the quality of care for patients (Mitenbergs et al 2012).

that the understanding of social work is very narrow. And we see only the pension, the document work, passport, immigration registration and so on and that's it. But to go a little wider to understand what we have to do, I think this is the problem of [lacking] *awareness.*

The reality of limited resources for providing enhanced support was most poignantly expressed, perhaps, by the courier (S9). When asked what would enable her to carry out her job more effectively, she shrugged, saying walking shoes were a priority. On further reflection, she added that access to a tablet with a database to keep track of the patients she needed to see each day might be a good thing.

4 Discussion and Conclusions

4.1 Impact of pilot intervention on adherence and loss to follow up

In this pilot study of an adherence intervention, the principal outcomes of interest were qualitative. The short study duration did not permit meaningful evaluation of treatment outcomes and the study was not powered to detect a difference in time to bacteriological conversion. Conclusions can thus not be drawn about whether the intervention would or would not have an impact upon quantitative outcomes in a longer, adequately powered study.

A strength of the study was the meticulous recording of doses administered which enabled accurate estimates of adherence. The total number of doses missed was very low and was similar in the intervention and pre-intervention groups (3.7%, 4.2%). However, the median number of doses missed by an individual and the total number of patients that had missed at least one dose of treatment was lower for the group with and without risk factors in the intervention group when compared with the pre-intervention counterparts.

Overall, the intervention had a positive effect on adherence in patients with and without risk factors, though the number of doses being missed was generally low at baseline, but dominated by a small number of patients.

4.2 Implementation of the pilot intervention

The communications training, while appreciated on paper, did not seem to have made a difference in practice, although, staff commented positively on the opportunity to come together as a group to talk through the issues they faced.

- Finding the space to bring a team together regularly to communicate may enhance collaboration and strategies to respond to specific patients' needs or challenging issues.

Communication practices and styles are strongly governed by the perceived division between medical and social aspects of care. They vary across staff, and at different phases of the patient trajectory. As noted in the interim report, the period of initial hospitalisation and transfer to ambulatory care appeared to be one of stress and uncertainty for a number of patients; the care and communication provided during hospitalisation contrasted with the communication received post-diagnosis. Patient and staff interviews suggested that patients may not be receptive to information 'saturation' at the point when they are still coming to terms with the diagnosis.

- Closer attention to what is communicated to the patient (and how) at different stages of diagnosis and treatment initiation may help to strengthen the effectiveness of communication in supporting treatment adherence.

The intervention was implemented according to protocol, with the head ambulatory nurse taking responsibility for the additional patient meeting, the psycho-social risk screening, and coordinating follow-up efforts where needed.

- Taking into account that the number of TB cases is decreasing, the CTLD team envisages the head ambulatory nurse continuing to work closely with all TB patients.

Screening for psycho-social risk factors provided additional important information about patients at risk that is shared across the team, however, the instrument was seen to require specific 'probing' skills which implied that it was of limited use if used as a tool to gain 'quick' information about risk factors. Patients experienced the first visit at the clinic as generally positive but there was note of the amount of time spent on these initial visits with some patients commenting on being asked the same questions a number of times by different people.

- The team agree that the instrument needs to be integrated better into current practice; they foresee combining the 'added value' elements of the screening tool with other documentation that already exists for patient management.

While both staff and patients commented favourably on the empathy, care, and information provided, the extent to which enhanced support can be sustained is limited by financial constraints as well as the lack of integration between health and social services. Although the project was able to cover travel costs for all patients for their treatment visits, the reality of providing support for patients whose adherence patterns are compromised by social and economic deprivation is far more challenging, and would require structural interventions that go beyond the space of the clinic setting. Nonetheless, the project demonstrated that small adjustments can be made within clinic routines and communication practices to support treatment adherence of vulnerable TB patients at critical points along their trajectory of care: these appear to be the difficult moment of diagnosis, transition into ambulatory care, and the 'normalisation' of taking daily treatment. Integrating the medical and social aspects of TB care and adherence support not only within the clinic – but more broadly within the Latvian health system – would encourage what both staff and patients felt was a strong motivator for patient's faith in the system and in themselves – humane care.

> *If we can solve the social network problems, we can solve the medical issues. In some cases, it's a systematic problem, it's the restriction of only having 20 minutes, it's a limitation of the system…* (S10, Head Ambulatory Nurse, CTLD)

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Appendix 1: Intervention proposal

Research protocol

Title: Interventions to increase TB treatment adherence and improved treatment outcomes among specific hard-to-reach and vulnerable population groups in Riga, Latvia.

Abstract

Adherence to TB treatment is a key determinant of successful treatment outcome (treatment completion or cure). For certain patient groups adherence to treatment is a particular challenge. As part of a larger programme of work led by the European Centre for Disease Control (ECDC) this project will provide preliminary evidence for the impact of a tailored adherence support intervention upon interim treatment outcomes, and through process evaluation will report the challenges and facilitators encountered in delivery of the intervention. The intervention comprises risk stratification of all patients initiating TB treatment at Centre of TB and Lung Diseases Ambulatory Department in Riga, Latvia during the study period and delivery of a package of adherence support measures to those identified as at increased risk of non-adherence. Interim treatment outcomes to be measured will include number of doses missed and time to smear and culture conversion.

Study description

This mixed methods intervention study will use a before/after design to evaluate the implementation of an adherence support package for patients initiating TB treatment in Riga, Latvia.

Study questions

With regard to the implementation of a strategy to (a) risk-stratify patients initiating TB treatment in Riga according to likely future treatment adherence and (b) develop communications training on patient education and counselling for clinic staff and (c) deliver targeted adherence support measures:

1. What are the challenges and facilitators to implementation of the strategy?
2. What is the impact of the strategy upon proximate surrogates of treatment outcome – doses missed, microbiological response?

Rationale, previous studies on the subject

It is recognised that adherence to TB treatment is a crucial determinant of treatment outcome, and that some demographic groups particularly struggle to adhere and are thus at greater risk of treatment failure. As TB incidence drops in the EU/EEA member states, the disease has become concentrated in populations at the lower end of the socio-economic scale and especially among vulnerable and socially excluded populations including those who are homeless, have high-risk or problematic drug and/or alcohol use, are in prison, or for other reasons are socially and politically marginalized in their access to the health system as well as broader social structures of care and support.

The project is part of a research contract from ECDC, and builds upon previous work within an ECDC-led programme of work on TB adherence in vulnerable population groups, culminating in the recent publication 'Guidance on tuberculosis control in vulnerable and hard-to-reach populations' (Stockholm: ECDC; 2016). This publication summarises the results of systematic review of adherence support tools,

with specific recommendations for targeted screening, enhanced case management, and improved health communication and treatment literacy.

A preliminary scoping exercise was undertaken by our research team and resulted in a research proposal (outlined in this protocol) and identified the Centre of TB and Lung Diseases Ambulatory Department in Riga as a suitable site for a pilot study.

Project site and background

Under the auspices of the Riga East University Hospital, the Centre of Tuberculosis and Lung Diseases (CTLD) has provided care for patients with tuberculosis and lung diseases in the country since 1971. It is the principal tertiary-level clinic in the area of diagnostics and treatment of lung diseases. The CTLD includes an in-patient department as well as the Riga out-patient department. Approximately 5,500 patients are examined and 40,000 out-patients are admitted each year. Patients are referred to the CTLD by pulmonologists or general practitioners; resident patients do not have to pay for examination or treatment referral.

All patients attending the ambulatory department have initiated TB treatment in hospital and transferred to receive daily directly observed therapy at the Centre of TB and Lung Diseases. There is a scrupulous record kept of all attendances for observed therapy (and thus all missed doses are recorded) and sputum samples are taken on a regular basis to ascertain time to smear and culture conversion during treatment.

Aims and objectives

We aim to provide preliminary evidence to assess the feasibility and likely impact of an adherence support intervention though achievement of the following objectives:

1. **introduce a package of measures** designed to
    a. identify individuals likely to have difficulty in the future with TB treatment adherence, and;
    b. develop and implement a comprehensive training module in patient-centred education and communication skills for clinic staff, and
    c. provide directed, appropriate support strategies to mitigate future treatment adherence difficulties in individuals identified as being at high future risk of poor adherence.

2. **evaluate the process of implementation** of this intervention through
    a. description of the challenges and facilitators in delivering the package as intended (fidelity, reach);
    b. assessment of the impact of the intervention through evaluation of interim adherence indicators.

Design and methods

This protocol outlines the intervention package and evaluation plan. The proposed pilot intervention comprises three main components:

1. Application of a psycho-social adherence risk screening instrument for all individuals initiating TB treatment, to identify the subgroup(s) most likely to encounter future difficulty with adherence [activities 2, 3];
2. Development and implementation of a comprehensive patient-centred education and counselling module, with delivery of general and intervention-specific communication training for staff, to enhance interaction, dialogue and knowledge transfer for all patients (not restricted to those with perceived adherence risk) [activity 4];
3. Directed, enhanced support for subjects assessed by the risk screening instrument to be at highest risk of poor adherence, through increased personal contact with a staff nurse, pro-active side-effect screening, and facilitation of links to supportive services if and where required (e.g. social support, housing, psychological counselling, etc). A particular focus will be on the period of step-down from intensive to continuation phase treatment [activity 5].

The process evaluation will consist of two elements:

1. Description of the process of intervention implementation, considering (a) the fidelity of the intervention as delivered in comparison to how it was designed and envisaged, (b) the reach of the intervention (the proportion of the target group receiving it), and (c) the barriers to facilitating implementation of the intervention and how these can be addressed and; (d) the pre-existing factors that facilitated implementation [activities 6, 7];

2. Comparison of adherence and loss to follow-up in patient cohorts before and after implementation of the intervention, and at specified time points, stratified by treatment regimen (MDR, non-MDR) and (within after cohort) by whether pre-identified as high adherence risk or not [activity 8].

Quantitative outcomes of interest, interim adherence indicators, which are readily available in the routinely collected data on every patient, are:

1. number of doses missed and;
2. time to smear and culture conversion.

Study design

This is an operational evaluation of the implementation of an intervention to enhance TB treatment adherence. The process evaluation uses qualitative methods to document feasibility, acceptability, and reach of the intervention; a pre- and post-assessment of crude indices of adherence (doses missed) and microbiological indices (surrogates of future treatment success) will provide limited quantitative assessment of any changes in intermediate outcomes.

Study population

Subject selection:

All patients initiating TB treatment at TB treatment at the Centre of TB and Lung Diseases Ambulatory Department in Riga, Latvia between August 1st 2016 and March 31st 2017 will be included.

Sample size and statistical power:

This is an opportunistic sampling frame, constrained by the finances made available within the research contract and the project duration. All patients will be included but a formal sample size assessment is not relevant. For qualitative methods, the sample for *staff interviews* includes all staff involved with TB patient care and support (medical, nursing, administrative, and auxiliary) at CTLD as well as the relevant referring departments and institutions. *Structured observations* and *patient interviews* will be conducted with a purposively selected set of patients who initiated treatment during the study period. The purposive sample (approximately 10 patients) will aim to cover the scope of patient experience with treatment, and specifically the range of relevant social risk factors for poor adherence. The qualitative methods will generate data that form the primary outcomes of interest; quantitative assessments have been requested by the sponsor (ECDC) but it is acknowledged that this is a pilot study with no expectation of measurable impact upon outcome.

Qualitative data collection:

Staff interviews: All staff involved with TB patient care and support (medical, nursing, administrative, and auxiliary) at CTLD as well as the relevant referring departments and institutions will be interviewed with the help of a semi-structured topic guide [Appendix 1] focusing on staff interactions and communication practices with patients and their perceptions of the challenges encountered during initial set-up and in sustaining the two intervention components (social risk screening and enhanced adherence support). The interviews will be recorded and transcribed.

Semi-structured observation: The researcher will spend between 15 and 30 minutes of time at each relevant point of staff-patient communication[16] along the trajectory of TB care at CTLD Riga, using a semi-structured observation guide [Appendix 2] to document communication style, informational content, and other aspects of the patient-provider interaction. These would normally include at least the following points - reception, initial meeting with clinician, meeting with TB nurse, DOT consultation – but depending on the particular patient trajectory, might include other points of patient contact including the hospital, and outreach (home-based visits). The observations will be recorded through note-taking.

Patient interviews: Interviews with patients will be conducted using a semi-structured interview guide [Appendix 3] that covers aspects of their experience with treatment initiation, care and support, communication with providers at each stage of treatment, as well as the broader familial and social context of their medicine-taking behaviour. The interviews will be recorded and transcribed.

Quantitative data collection:

Data will be collected on all patients initiated on treatment in 2015 and on all patients initiated on treatment during the study period (August 2016 to March 2017). For all patients the following data will be abstracted into a data collection instrument designed in ODK: data of treatment initiation, number of doses missed in week 1, week 2… until end of treatment, date of smear conversion, date of culture conversion. Data will also be collected on important co-morbidities as documented in the case file including HIV and diabetes.

[16] The time spent in observation is proportionate to the average time spent in consultation at the specific stage, but also on practical considerations, including the need for the researcher to be minimally disruptive or obtrusive in their role as observer.

Definitions

Smear conversion is defined as the midpoint date between the first negative smear and the last positive smear, culture conversion is defined as the midpoint date between the first negative culture and last positive culture.

Data management and statistical analysis

Qualitative data recordings (staff and patient interviews) will be transcribed and translated; observation notes will be extracted from the forms. All data will be anonymised through the use of culturally appropriate pseudonyms, and through removal of any personal or familial references not immediately relevant to the interview content. A thematic framework for analytical comparison of the qualitative data between the two time points will be developed, focusing on the context, mechanisms, and processes of change in communication and care practices (staff interviews) and how they are experienced by patients (patient interviews and observation notes). Additionally, we seek to develop short narrative case studies where possible, for up to 5 patients, where comprehensive information on their experience of treatment can be triangulated from different sources including interviews, observations, patient records, and quantitative data collected over the course of study.

Quantitative data will be collected into a password protected database and anonymised with linkage to a key stored in a separate password protected file. Time to smear and culture conversion will be compared between the 2015 and study period cohort using Wilcoxon log rank statistic, as well as proportion achieving smear and culture conversion at 2 and 6 months, and any discernible changes in adherence will be assessed through comparison of proportions of doses missed.

Project activities and timeline

This pilot project will run for 10 months, though patient data collection will be limited to 8 months of this period.

The specific activities (see Gantt chart for timeline) are as follows:

1. **A start-up meeting at CTLD** to introduce the project to all staff. Ideally this should fit within the regular timetable of CTLD meetings and be an opportunity to present the rationale, outline plan and implications of the project, and invite comment. Key CTLD personnel who will run the project will have been identified previously and will lead the meeting and presentations.

2. **Development of psycho-social adherence risk questionnaire** in collaboration with local providers at CTLD, based upon historical data from Riga and known risk factors from the literature. This tool was based on existing TB adherence risk assessment tools but will need to be adapted to the Latvian context, and streamlined to facilitate incorporation into routine clinical practice. It should be suitable to be administered by clinic physicians, nurses or social workers and should avoid the use of potentially pejorative language. It will capture information on demographic, psycho-social and biomedical information and assimilate this into a score, for which a pre-determined threshold will indicate levels of anticipated vulnerability and need for additional adherence support. Development includes pilot testing of the tool in 10 TB patients initiating treatment and refinement in the light of observations made and insights gained, and training of clinic personnel in use of the finalised questionnaire.

3. **Incorporation into routine care of adherence risk questionnaire** applied to all patients initiating TB treatment during project months 2 to 9. The tool should be correctly completed for every patient and the result of the assessment evaluated with each high-risk patient being assigned to receive intensified adherence support.

4. **Communication training for patient CTLD clinic staff in direct contact with patients**; this should include reception and other clerical staff with patient contact. A training schedule consisting of a total of 12 hours face-to-face small-group training will be developed and delivered over the first two months of the project according to staff availability and organisational capacity to incorporate this in-service training into the working week. The schedule comprises both general communication skills development as well as a specific component related to communicating health information to vulnerable groups.

5. **Delivery of intensified adherence support** to patients identified as at high risk of adherence difficulty, during months 2 to 9. This package will comprise increased frequency of enquiry about potential medication side-effects, personal contact and immediate follow-up after the missing of a single day of medication. A checklist mechanism will be established for recording the adherence support delivered; this will provide source data for process evaluation metrics of reach and fidelity for this element of the intervention package. Particular emphasis will be placed upon key points during the treatment course when adherence is most vulnerable, perceived to be soon after treatment initiation, whilst riding out early self-limiting side-effects, and around the time of step-down to continuation phase therapy when patients often feel "too well" to believe they need to continue treatment.

6. **Development of narrative description of process of intervention implementation and maintenance**, through qualitative research methods. This activity forms part of the evaluation thread and will focus on understanding the key obstacles and facilitators to delivery of the package. At month 5 (midway through the project) and month 10 (end of project), interviews will be conducted with all staff members involved in patient reception, care, and follow-up. During the initial round of data collection, semi-structured observation will be used to document staff communication and care practices at each stage of patients' trajectories within the clinic. Further, patient interviews will be conducted midway and towards the end of the project to understand their perceptions of the information, care, support, and communication received during the course of treatment.

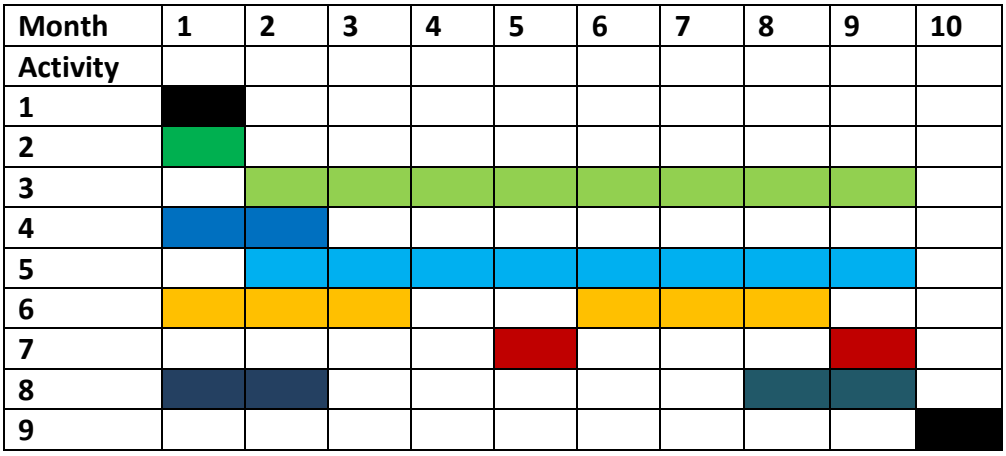
7. **Evaluation of intervention delivery** will entail review of routine data sources including clinic lists, TB treatment register as well as project instruments, in particular the adherence risk assessment tools and records of intensified adherence support delivery. Outcome measures of interest are described in M&E section below. An interim review at month five is proposed in order to capture any major shortcomings or difficulties that may be remediable for the second half of the project lifespan. Such modifications may increase the utility of the project.

8. **Evaluation of intervention impact upon intermediate outcomes** will involve comparing adherence (measured by pill count and timely attendance at the follow-up visits) and loss to follow-up between the cohort subject to the intervention and a historical cohort from the preceding 12 months. This before and after comparison has several important limitations, in particular the risk

that any difference may be attributable to secular trends rather than in any way related to the intervention, and the likelihood that data quality and completeness from the retrospective cohort will differ from that collected during the project period. Nevertheless, the pre/post evaluation design is the only option available given the budgetary and temporal constraints on the project. Loss to follow-up will be defined according to both international and local operational definitions, and the proportion of patients determined to have adhered well to treatment (defined as receiving >80% of scheduled doses) at 4, 8, 12, 16, 20 and 24 weeks and timely attendance at follow-up visits will be compared between the two cohorts. Later time points may be considered for MDR-TB patients for whom treatment will be prolonged beyond the duration of the project. Subgroup analyses will consider whether high-risk subjects receiving intensified adherence support achieved adherence rates comparable to patients regarded as low risk and will explore factors associated with good adherence amongst these subjects. These data will be collected from the routine records and analysed at the end of the project. For the historical data collection we plan to collect data on a sample of 200 patients starting treatment over the previous 12 months based on selecting every 5th patient registered until target sample size is reached. Data collection for intermediate outcomes for the intervention cohort will be conducted in a similar way. Smear and culture-conversion rates at 2 and 6 months will be compared between cohorts.

9. An **end of project feedback meeting** will be held at CTLD to which all staff and patients will be invited in order that the results of the project can be shared with participants and stakeholders. This specific meeting will complement discussions with CTLD staff during the latter stages of the project aimed at understanding which (if any) elements of the project intervention should be carried forward into routine practice, and developing a plan to ensure sustainability.

Duration of the study (timeline)



Project management

The intervention development and implementation, including communication skills training will be led by collaborators from Queen Margaret University, Edinburgh led by Karina Kielmann. Quantitative data collection and analysis will be led by David Moore at LSHTM. Collaborators in Riga, particularly Dr Vija Riekstina and Head Nurse Evita Biraua, will also be closely involved in intervention development and

implementation and will facilitate collection of qualitative and quantitative data. The project is a research contract initiated by ECDC and managed through a framework agreement with WHCA (World Health Communication Associates) which has established subcontracts with LSHTM, QMU and Latvian partners.

Monitoring and evaluation

Monitoring and evaluation will be used to ensure the project is on track to complete the nine defined activities on time and to ensure that the intervention delivery is adequately recorded and, if deemed necessary, adjustments are made to project execution to maximise the utility of the intervention and the assessments of the intervention. As process evaluation is an integral component of the project the M&E element described here also includes some of the outcome measures of interest.

Progress against the timetable indicated in the Gantt chart will be evaluated at 3, 5, 8 and 10 months. Reasons for any identified delays will be sought and corrective action taken to restore the project to the planned timings. The following measurements and pertinent outcomes of interest specific to the process evaluation will be determined during month 10:

1 Assessment of reach and fidelity of adherence risk questionnaire

   a. proportion of TB patients initiating therapy for whom an assessment is documented
   b. proportion of patients initiating treatment for whom assessment has been fully (and correctly) completed

2 Assessment of reach and fidelity of adherence risk mitigation support package

   a. proportion of TB patients with scores indicating need for intensified adherence support for whom any such support was provided
   b. proportion of TB patients with scores indicating need for intensified adherence support for whom full support package was provided
   c. proportion of TB patients without scores indicating need for intensified adherence support for whom any such support was provided
   d. proportion of TB patients without scores indicating need for intensified adherence support for whom full support package was provided

3. Description of the context, mechanisms, and processes of behaviour change for both staff and patients through:

   a. a basic conceptual model highlighting barriers and facilitators for documented change (or lack of change) in communication, care and support practices and their impact on treatment adherence
   b. case studies of up to five patients documenting their experience with treatment and care over the study period

Additional background

The European Centres for Disease Control (ECDC) issued a Request for Proposals (RFP) to “design a methodology and an implementation plan for interventions that will contribute to increased TB treatment adherence and improved treatment outcomes among specific hard-to-reach and vulnerable population groups in the EU/EEA”. World Health Communication Associates (WHCA), with support from

the LSHTM TB Centre, responded to this RFP under the framework contract ECDC/2014/013 "Communication support to ECDC" - LOT 3: "Provision of health communication experts for short term assignments" - ID 4795 with a successful bid and subsequently contracted the LSHTM TB Centre to undertake several of the packages of work involved. This protocol represents the second of two phases of this contracted work.

Personnel required

The project budget has provision for an additional member of staff in Riga dedicated to intervention implementation, a part time research assistant from LSHTM for quantitative data collection, a part-time research fellow from QMU, Edinburgh for qualitative data collection and a contracted research fellow to develop and deliver the communication skills training.

Ethical considerations

This project is operational research evaluating a pilot intervention to enhance TB treatment adherence. Informed consent will be sought from participants in the following qualitative elements of the evaluation: staff interviews, patient interviews, and observations of patient-provider interactions. Abstraction of data from patient records for the analysis of pooled adherence outcome data will entail removing patient identifiers and assigning a code to each record; patient consent will not be sought for this. There are no significant risks anticipated in the execution of this project. Participants in the qualitative work will be free to withdraw at any stage.

Budget

The total budget assigned by ECDC and divided, following agreement between the collaborating partners, according to activity development is €59.836.

Investigators (alphabetical order)

- Evita Biraua, Head Nurse, TB treatment at Centre of TB and Lung Diseases Ambulatory Department in Riga, Latvia
- Predrag Duric, Lecturer, Queen Margaret University, Edinburgh
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- Maria Krutikov, Research Assistant, LSHTM TB Centre
- David Moore, Professor of Infectious Diseases and Tropical Medicine, LSHTM TB Centre
- Vija Riekstina, TB Physician, TB treatment at Centre of TB and Lung Diseases Ambulatory Department in Riga, Latvia
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Appendix 2: Operational protocol

"Methodology and implementation plan for interventions that will contribute to increased TB treatment adherence and improved treatment outcomes among specific hard-to-reach and vulnerable population groups in the EU/EEA"

Centre for Tuberculosis and Lung Disease (CTLD) Riga, Latvia

Current Treatment model

In Latvia, TB and MDR-TB patients are hospitalized until they become non- infectious. Smear-negative TB patients do not require hospitalization, smear- negative MDR-TB patients are hospitalized during treatment initiation to get them settled into treatment, educate them, and address issues that could affect treatment in the outpatient setting. If the patient refuses hospitalization, home treatment can be organized if sufficient infection control measures can be implemented. During outpatient treatment, DOT is provided at a place suitable for the patient, e.g. at the family doctor. The tuberculosis (TB) patients face many psychological, social and economic problems that complicate treatment and care, especially MDR-TB cases.

Social assistance

All outpatients registered as inhabitants of Riga city are eligible for daily transport vouchers and food coupons. A social worker employed by the TB hospital in Riga gives information about other social support available from the local government that might be useful to the patient.

Examples of the socio-economic support currently provided are:

- temporary housing for the homeless;
- availability of free meals;
- provision of firewood for heating during the winter;
- free medical support for drugs to treat side effects;
- seeking collaboration with HIV NGOs to provide HIV-related treatment;
- seeking collaboration with alcohol and drug addiction specialists.

Intervention component 1: Psycho-Social Risk Assessment Tool

When/how it will it be used:

All patients who begin ambulatory treatment will be assessed using the psycho- social risk assessment tool. It will be used by the diagnosing nurse at the time of collecting patient registration information.

Risk Categories

The tool will enable us to identify the following risk categories:

- living situation (by gathering information on living place and additional home address or alternate contact information);
- social network (by gathering contact details of relatives or friends; patients will also be asked to diagram their social network);
- alcohol, drug abuse;
- mental health;
- communication assessment (based on staff judgment of patient body language and communication style);
- income;
- imprisonment history;
- health literacy (of disease).

Which groups to concentrate on:

Patients who exhibit at least one of the above risk factors will be considered "at risk" and will be included in the follow up plan. At this stage, it is estimated that the distribution between the overall population of patients who begin treatment with those that will be identified as at risk may be approximately 50/50%. All patients will be monitored for adherence. In the event of logistical (e.g. time constraints) limitations to follow-up, at risk patients who exhibit non-adherence patterns will be prioritized.

Follow up plan for at risk patients:

The intervention will consist of providing "enhanced support" for at risk patients. Enhanced support will consist of strengthening current services as detailed above as well as including additional specialist supportive providers (i.e. addiction specialist, psychologist). Patients who are deemed to require support from the addiction specialist or psychologist will be offered the opportunity to either go to the specialist's office for additional support or to meet with the specialist in the ambulatory clinic. This is dependent on each patient (based on their preference or ambulatory staff's judgement of what would be more successful in ensuring the patient maintains the appointment. Additionally, if feasible (for the specialist – given time and financial availability), there is the possibility for dedicating a weekly time slot where the specialist can hold a walk-in service based at the ambulatory clinic.

Based on patient needs assessment, we will provide an **additional person** who will:

1. more clearly and repeatedly give information about TB (disease, treatment process e.t.c.);
2. more deeply find out risk factors to non-adherence;
3. consult and support patients;
4. extra home visits;

5. social-economic support for non-declared patients in Riga's city and district; (transport vouchers and food coupons);
6. to use questionnaire alcohol use disorders identification test (AUDIT);
7. to decide the necessity of involving our team psychologist for psycho- emotional support.

Patients included in this intervention will also be offered one 20-minute meeting to assess how best to offer enhanced support. This meeting will be conducted by the diagnosing nurse when the patient begins ambulatory treatment. Following this 20-minute meeting, the nurse will review each patient's files daily to monitor adherence.

Patients who exhibit non-adherence will be reassessed by the ambulatory nurse by analysing the risk-assessment form to identify whether alternate risk factors were missed during the initial risk-assessment. The ambulatory nurse will be responsible for following-up on patients who are non-adherent by telephoning and home visits if and when possible. The ambulatory nurse will bring medication during home visits and will dedicate time to discuss the patient's situation if they are found. Extra time will be dedicated to attempting to locate the patient on a daily basis during non- adherence.

The staff courier who is currently responsible conducting patient home visits will also be requested to attend training sessions and there may be possibility for the courier to schedule times to accompany the patient to extra services (e.g. addiction specialist, psychologist, NGO support services). Note the courier uses public transportation and is not equipped with a driver/car.

Specific support offered

This will be offered to each patient identified as having one or more risk factor at the initial meeting.

Initial meeting format:

Every new patient will have an additional twenty minute meeting with the head nurse. During this meeting a printed questionnaire will be completed and will be filed in each patients notes'. Decisions regarding further appointments and additional support required will be made at this initial meeting and ongoing assessment performed if the patient misses medication doses.

Support offered will be according to risk factor identified:

Living situation

Definition	Those at high risk defined as those with no fixed abode
Assessment	Questions regarding living situation in initial assessment, this can be changed retrospectively if situation changes during course of treatment
Current Practice	If no fixed abode – refer to social worker (onsite, part time) for help with acquiring place in a shelter
Intervention	Ensure contact details for at least one next of kin for every patient

Social network

Definition	Patients assessed as having limited social network and little support
Assessment	Gathering contact details of relatives or friends; patients will also be asked to diagram their social network
Current Practice	This information is obtained during DOT interactions and doctor visits but no designated questions. Nurse responsible for patient will contact them approx. 2-3 days after missed medication dose to establish cause and social isolation can become apparent at this point
Intervention	- Head nurse will react to missed medication doses on the next day by phoning patient (excluding weekends) - Head nurse / outreach worker will perform home visit, if unable to contact by telephone. This will be decided in each circumstance by the head nurse and she will be recording the decision making process.

Alcohol

Definition	Alcohol use is preventing the patient from attending for DOT
Assessment	Alcohol intake assessed at initial visit using direct questioning. This can be changed retrospectively if patient misses medication doses due to alcoholism. AUDIT assessment can be carried out if there is uncertainty.
Current Practice	Can be referred to narcologist
Intervention	- Head nurse will visit home to administer DOT if patient has missed dose due to drunkeness - Head nurse will make second appointment with patient to discuss what support would be appropriate. Support available is : Referral to narcologist (doctor trained in managing substance abuse) at another institution (paid for from budget, one visit cost 5 euros)

Drug abuse

Definition	Illicit drug use and missed medication dose during treatment
Assessment	At initial meeting, assessment from questionnaire and throughout treatment
Current Practice	Referral to narcologist for Methadone programme (free) which can be

	administered alongside DOT, occasional referral to NGO (ie. Narcotics anonymous) specialising in drug abuse
Intervention	- Head nurse will visit home to administer DOT (within limits of personal safety) - Head nurse will make second appointment with patient to discuss what support would be appropriate and offer referral to narcologist or NGO - Referral to psychologist via NGO - Social worker / outreach worker can accompany patient to appointment with narcologist

Mental health

Definition	Those with existing psychiatric diagnosis and those who appear low in mood
Assessment	During initial meeting using direct questioning and assessment of communication and body language
Current Practice	Inpatient psychiatric TB ward
Intervention	Referral to psychologist 30-40 euros / session (first session from budget)

Communication

Definition	Those less willing to communicate or interact, introvert
Assessment	At initial meeting, assessment of communication and body language
Current Practice	No intervention
Intervention	- Head nurse will arrange an extra 20 minute appointment, 1 week after initial visit; she will review number of missed doses and decide if more appointments are required (can offer one visit per week if ongoing non- compliance)

Income (Financial barriers)

Definition	Usually those registered outside Riga who are not entitled to benefits
Assessment	At initial meeting, and during ongoing assessment by nurse during DOT
Current Practice	No Intervention
Intervention	- Social support from budget – daily transport to DOT, food coupons (13.50 euros) after 30 days of no missed doses - If further support is required, this can be assessed on a case by case basis

Imprisonment history

Definition	Those patients who have been in prison at any point in their lives
Assessment	During initial meeting using direct questioning
Current Practice	No intervention
Intervention	Head nurse will arrange an extra 20 minute appointment 1 week after initial visit; she will review number of missed doses and decide if more appointments needed (can offer one visit per week if ongoing non- compliance)

Health literacy (of disease)

Definition	Applies to all new patients attending the clinic
Assessment	N/A
Current Practice	Diagnosis and disease discussed at initial joint meeting with doctor and nurse, occasionally written information is also given
Intervention	Additional time allocated for explanation of disease at meeting with head nurse - Written information in the form of booklets given to every patient - A further meeting can be arranged if the patient would like this

Follow up for patients not identified as having one or more of the above risk factors:

- Initial joint meeting and discussion of diagnosis with doctor and nurse;
- Monthly meetings with doctor however this can occur more frequently if requested;
- Daily DOT meetings with nurse.

Appendix 3: Staff interview topic guide, round 1

Semi-Structured Topic Guide for Interviews: Staff – 1st Round

Thank you for agreeing to be interviewed. We are conducting this interview with you as a staff member of CTLD in order to better understand service delivery for TB patients belonging to vulnerable groups, and how the intervention that is being carried out in this clinic is affecting your work with patients. The questions we will ask you today are focused on the care you provide for TB patients, with particular emphasis on your experiences with communication and interactions with patients, and some thoughts you may have about how this might influence patient treatment adherence. As already mentioned in the information sheet and consent form you have been provided, the interview will take approximately one hour. Please do feel free to ask any questions now or during the interview itself.

Section 1: Profile of participant and role in TB service delivery

- Brief profile of participant (background, training, history of involvement at CTLD)
- His/her current role in TB care

Section 2: Understanding patient trajectories to care

- [*dependent on who is being interviewed*]: Please describe your involvement with TB patients in terms of the communication and activities you fulfil at different stages of their care-seeking process (e.g. at reception, patient registration, risk assessment, follow-up clinical, DOT and patient counselling visits)
- What are the main challenges you face in fulfilling your role (e.g. when it comes to screening, diagnosis, treatment follow-up, patient social and environmental conditions)?
- What strategies do you use to respond to these challenges (probe on patient follow-up methods, frequency of follow-up attempts, referral to other staff or external support services)

Section 3: Communication practices and patterns

- Returning to a patient's trajectory through the clinic as described, can you tell me more about your communication with the patient at different stages of care? (probe on when communication is required, by whom, length of time, what is the content of communication to patients during each stage? What is its purpose?)
- What sorts of issues or challenges, if any, arise at any/each of these stages? (probe on communication challenges such as language barriers, patient health literacy, patient behavioural cues, content that may be "lost in translation" during staff/patient communication). How do you handle these situations?
- At what stage(s) do you think it is most important to reach out to patients who might be at risk for non-adherence? Why?

- Did the training you received in August make a difference to how you communicate with patients likely to struggle with adherence? If yes, in what ways?
- What are some strategies you have used, or seen others use to ensure the patient shows clear understanding of the importance of continuing uninterrupted treatment? (probe on style, method and content of communication, perceived importance of communication, what makes it effective, what do you think would be most effective in helping them with adherence issues?)
- Can you provide some examples of instances where you felt a patient was more receptive to the information you were providing them? Less receptive? Why do you think this is? (probe on perceptions on patients' communication toward staff)
- Can you think of any examples where someone has had to adjust their communication style or language according to patient circumstances? (probe with whether or how often they have to repeat themselves or use other strategies to communicate such as translation/back translation, third-party). Describe how you handled this.
- Please recount any experiences you may have had, if any, with patients who you feel expressed disinterest/disengagement in their treatment or with the medical advice they are given (probe on body language, communication strategies as above). Describe how you handled this.
- What do you recommend as ways of communicating with this person to help improve their adherence?

Section 4: Experiences with intervention components (risk screening tool and enhanced support) [to be asked only of staff using risk screening tool and providing enhanced support]

- Tell me about your experiences with the screening tool. What are you finding most useful in using this tool? Least? (probe on thoughts on how helpful the tool is for identifying "at risk" patients, potential benefits/disadvantages)
- What did you find most challenging in using this tool? Least? (probe on practical aspects such as extra time/paperwork)
- Can you think of any examples where using the tool helped or hindered your interaction assessment of the patients' status? (probe on patient perceptions/reactions to the tool, perceptions of whether they feel its use makes a difference in the services being provide, patient/staff rapport, and/or patient treatment adherence)
- Tell me about your experience providing enhanced support for at risk patients? Please give me a recent example and how the patient was followed up, what were the concrete issues addressed?
- How feasible is it to provide enhanced support to patients who need it? (probe on practical aspects, feasibility, views on sustainability)
- How do you feel patients are responding to the enhanced support package (probe on patient attitudes, motivation). Any challenges?
- Can you think of any issues that patients receiving enhanced support raise most frequently with you? Do you notice any differences between these and your other patients? (probe on differences in dialogue, health literacy, treatment support, other social and economic issues)

- Have you noticed any differences in the ways patients and staff interact with each other since this intervention started? (probe on changes to content, frequency or style of communication between staff and patients such as verbal or body language, patients' attitudes or behaviour towards treatment

Appendix 4: Staff interview topic guide, round 2

Semi-Structured Topic Guide for Interviews: Staff – 2nd Round

Thank you for agreeing to be interviewed for the second time. We are conducting this 2nd interview in order to better understand the changes in service delivery for TB patients belonging to vulnerable groups that have or have not occurred as a result of the intervention in this clinic. The questions we will ask you today are focused on any changes in the care you provide for TB patients, with particular emphasis on your experiences with communication and interactions with patients, and some thoughts you may have regarding whether this intervention can be maintained or modified to support improved patient treatment adherence. As already mentioned in the information sheet and consent form you have been provided, the interview will take approximately one hour. Please do feel free to ask any questions now or during the interview itself.

Section 1: Profile and responsibilities

- Since we spoke to you a number of months ago, has your position in this clinic changed?
- Have any of your responsibilities vis-à-vis patients changed?
- Are there other changes affecting how TB care is delivered in this hospital/OPD?
- How about the numbers of vulnerable patients you have been seeing – any changes since we last spoke?

Section 2: Understanding patient trajectories to care

- [*dependent on staff member interviewed]* Are there any changes in the way you fulfil your specific role in TB care in this clinic since we last spoke?
- What are the main challenges you face with effective delivery of TB services? (e.g. when it comes to screening, diagnosis, treatment follow-up, patient social and environmental conditions)
- What strategies do you use to respond to these challenges? (probe on patient follow-up methods, frequency of follow-up attempts, referral to other staff or external support services)

Section 3: Communication practices and patterns

- To what extent did the intervention in this clinic change your ways of communicating with patients?
- If change reported – can you provide an example?
- Have you noticed any change in the way you communicate with other staff?
- If change reported – can you provide an example?
- What sorts of issues or challenges, if any, arise at any/each of these stages? (probe on communication challenges such as language barriers, patient health literacy, patient behavioural cues, content that may be "lost in translation" during staff/patient communication). How do you handle these situations?
- What are some strategies you have used, or seen others use to ensure the patient shows clear understanding of the importance of continuing uninterrupted treatment? (probe on style, method and content of communication, perceived importance of communication, what makes it effective, what do you think would be most effective in helping them with adherence issues?)

- Can you provide some examples of instances where you felt a patient was more receptive to the information you were providing them? Less receptive? Why do you think this is? (probe on perceptions on patients' communication toward staff)
- Can you think of any examples where you have had to adjust your communication style or language according to patient circumstances? (probe with whether or how often they have to repeat themselves or use other strategies to communicate such as translation/back translation, third-party). Describe how you handled this.
- Please recount any experiences you may have had, if any, with patients who you feel expressed disinterest/disengagement in their treatment or with the medical advice they are given (probe on body language, communication strategies as above) Describe how you handled this. What do you think would be the best way to communicate with this person to help improve their adherence?

Section 4: Experiences with intervention components (risk screening tool and enhanced support) *for staff using risk screening tool and providing enhanced support*

- Tell me about your experiences with the screening tool. What did you find most useful in using this tool? Least? (probe on thoughts on how helpful the tool is for identifying "at risk" patients, potential benefits/disadvantages)
- What did you find most challenging in using this tool? Least? (probe on practical aspects such as extra time/paperwork)
- Overall, did the tool help or hinder your ability to identify and provide targeted support to vulnerable patients? If so, how?
- Tell me about your experiences providing the enhanced support package for at risk patients – what are examples of enhanced support (probe on practical aspects, feasibility, views on sustainability)
- How do you feel patients are responding to the enhanced support package (probe on patient attitudes, motivation) Any challenges?
- How feasible is it to provide enhanced support over a longer period, is this a sustainable intervention?
- What would you do differently in terms of supporting vulnerable patients on treatment having the experience of the training as well as use of the tool to identify those patients who need more support?
- What aspects of the intervention have proved most challenging to implement, and why?

Appendix 5: Patient interview topic guide

General Topic Guide for Interviews with TB Patients

Thank you for coming together and agreeing to be interviewed. Towards understanding what kinds of issues you face in accessing health care, and particularly care for TB, we are conducting interviews and some observations in this facility. The questions we will ask you today are focused on the care you receive here, with particular emphasis on your experiences with communication and interactions with clinic staff. We value your reflections on your own experience and your thoughts on what, if anything, is needed to improve your care here. As already mentioned in the information sheet and consent form, the interview will take approximately 1 hour of your time. Please do feel free to ask any questions now or during the interview itself.

Section 1: Background and profile of informant

A) Patient profile

- Please tell me a little bit about yourself and your situation?
- Do you have any family here? Can you tell me a bit about them?
- How is your health at the moment? What kinds of health issues have you faced in the past? How about your family?
- What has been your experience of seeking health care in this city? What, if anything, have you found positive during with this experience? What, if anything, have you found negative? (probe on access, transport, ease of finding services)

B) Pathways to TB treatment and care

- Tell me about when you first started feeling symptoms that led you to seek care? OR
- When were you first screened for TB? Can you recall the experience? (tell me more about it, what were the circumstances?)
- What happened next? How were you diagnosed?
- Did you talk to family or friends about this diagnosis?
- Tell me about when you started coming to this clinic for your treatment (probe for original impressions, ease of access, general feelings at the time)
- Is there a typical time of day you prefer to visit the clinic? How long does it take you to travel here? How long are you normally in the clinic? (probe on how much time out of the day is required to receive treatment)

Section 2: Treatment adherence issues

A) TB knowledge

- How knowledgeable about TB do you feel you were before your diagnosis?
- Going back to when you were diagnosed, tell me more about how you were informed. (probe on who did this, in which facility, how long did they take to explain the diagnosis and treatment?)
- What is your understanding of how the treatment works now? Can you think of anything more that you would have liked to know or would have been helpful to have been explained to you when you were diagnosed?
- How have you felt on this treatment? How easy/difficult is it for you to take these medicines regularly? What makes it easy/difficult? (probe on social/environmental challenges)

B) Staff communication and interactions during care

- Tell me more about your daily visits for treatment. How many staff members would you say you come in contact with each time? For how long with each?
- Do you ever feel you need more/less time with clinic staff?
- How do you feel you are treated when you come in (probe on whether it is a personable or welcoming experience? (probe on patient/staff rapport if any)
- Can you give me any examples of a situation that would make it difficult for you to visit the clinic for your treatment (traffic, work, illness)? What would you do in this case? (probe on whether they inform the clinic or if clinic contacts them first)
- In what ways does the clinic support your treatment currently? What are they doing to help you stay on treatment? Can you think of anything that could be done differently to help you stay on treatment?
- What are your perceptions of the ways staff interact with you or other patients? Do you feel there is strong communication? Do you feel sufficiently supported? (probe on communication content, language issues, staff communication style, is it sufficient, easy to reach out to staff members if necessary)
- Can you recall any instances where you felt that the clinic staff was unavailable to you? How important do you think it is to be in regular contact with your treatment team?

Appendix 6: Evaluation of communications training, August 2016

Summary Report, Training in Riga, August 3-5, 2016

Training Evaluation Form

Patient-Centred Communication in TB Care

12 participants filled-in forms

						Comments
1. The learning objectives of the training were achieved.						
Strongly agree	4 X	4 X	3 X	1 X	Disagree strongly	
2. Presentations and group exercises were generally well-prepared and organised						
Strongly agree	5 X	4 X	3 X		Disagree strongly	
3. Adequate help was available when needed						
Strongly agree	9 X	2 X	1 X		Disagree strongly	
4. The training work was						
Far too easy	2 X	4 X	5 X	1 X	Far too difficult	
5. The amount of training work required was						
Far too little	3 X	1 X	8 X		Far too much	
6. The pace of the training was						
Far too slow	1 X	5 X	6 X		Far too fast	
Excellent					Non-existent	

7. Overall, the course was

Very interesting	4	3	3	2		Extremely boring
	X	X	X	X		

Please let us have your thoughts on the following issues:

1) **The most useful sessions**: Which of the training sessions did you find most useful or interesting and why?

- Role playing game and active listening
- Patients and stigmas. You must start with yourself to overcome these assumptions
- The practicing sessions
- Communication strategy
- Vulnerable groups and TB
- Communication strategies and role playing game
- Practicing exercises, because by analysing actions of other colleagues you can see the imperfections in your own work
- Sharing experiences with others, getting to talk about vulnerable groups, that makes us think about the way we talk, what we speak and what we do.
- Communication strategies
- Working with colleagues, understanding each other

2) Any suggestions that can improve the training:

- Use practical examples about the use of communication strategies; experiences
- More time to explain the situations
- Make lectures and sessions more appropriate for the situation and location we work in
- More practical tips on how to improve communication
- I am completely satisfied about the training.

- I liked it, but the 1st day was a bit boring
- More practical examples
- More experiences from other countries/doctors
- Learn languages so the lectures could be presented in the original language
- More information about experience from other countries
- The lecturer needs to acknowledge the current situation and only then make the presentation, for us to really learn new things, otherwise everything is already known by us

3) Any other comments:

- Thank you!
- Very good translation!
- Liked the group work and the discussions together

Appendix 7: Quantitative results, Figures 1 – 4

Figure 1: Interventions delivered to patients with and without non-adherence risk factors during intervention study period

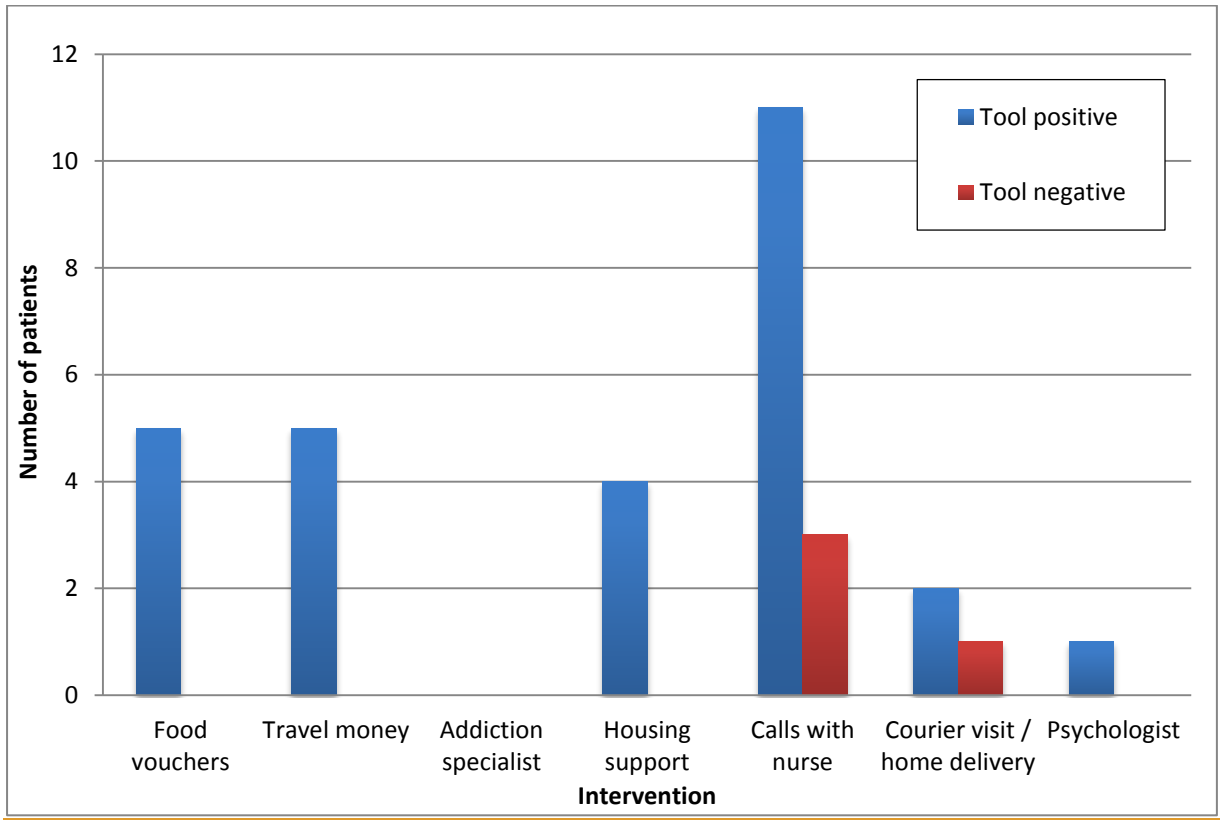

Figure 2: Number of interventions received per patient

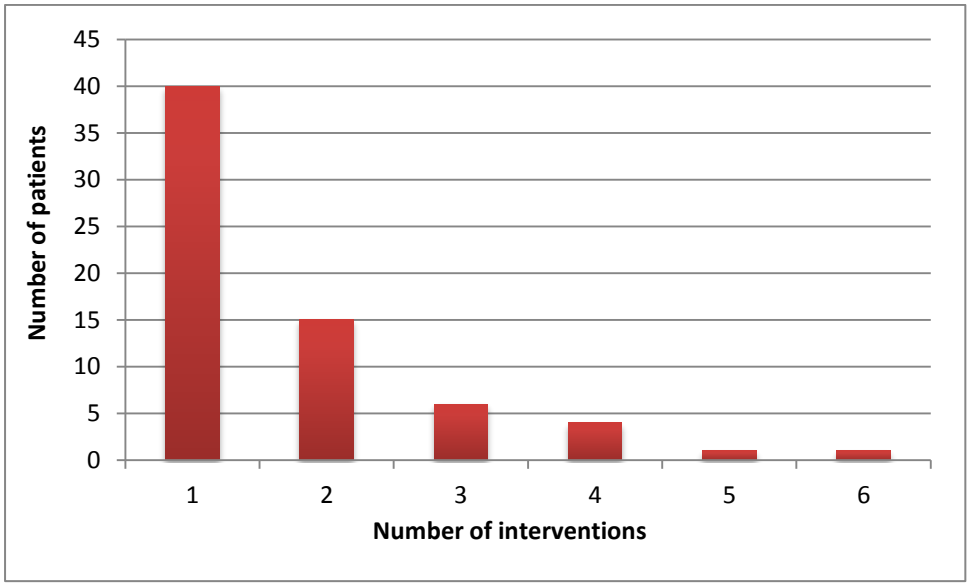

Figure 3: Percentage of doses missed by month of treatment in ambulatory clinic by group shown against number of patients who missed ≥ 5 doses each month by group

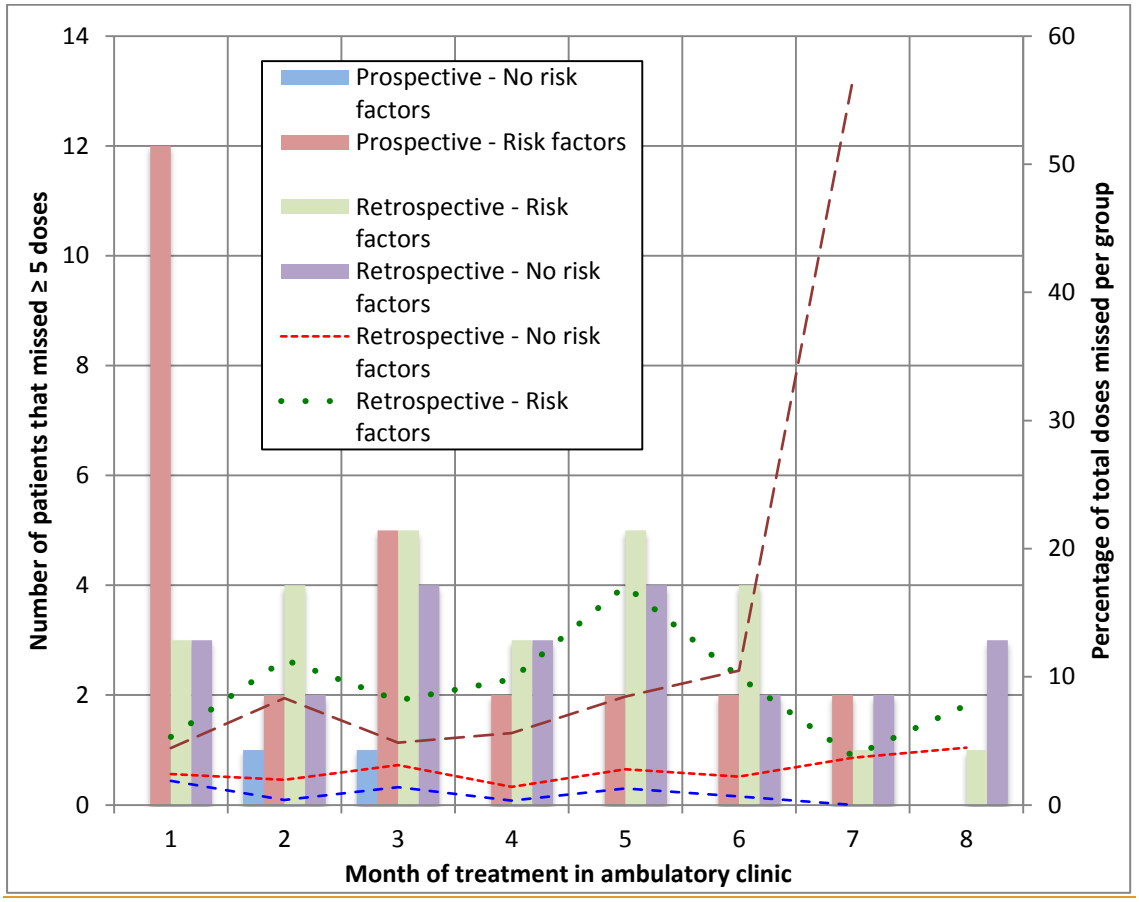

Figure 4: Number of doses missed per month by each patient during intervention study period in non-adherence risk factor group