

**WHO technical assistance mission report on
Development of action plan for the surveillance of the infection control implementation
process at national and facility level in Romania**

July 11 – 22, 2016

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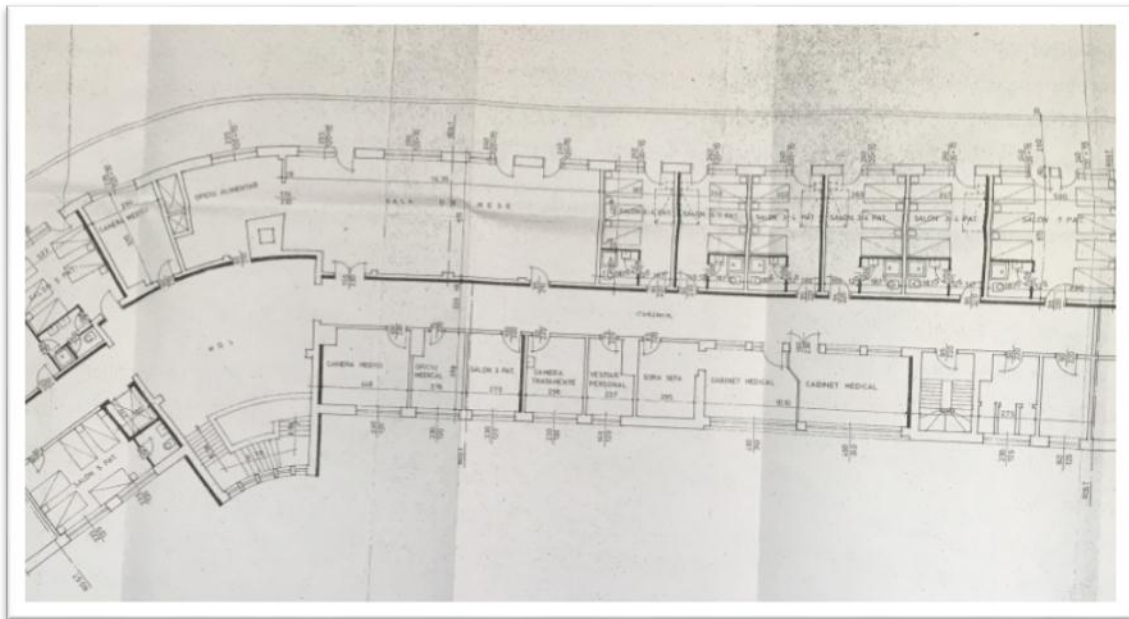
18 August 2016

My mission was organized by the WHO Country Office to assist the National Tuberculosis Control Programme (NTP) in Romania with strengthening tuberculosis (TB) infection control (IC). My terms of reference were: 1) to make a **risk assessment** and elaborate a plan to improve IC in Building 1 of the Marius Nasta Institute; 2) to visit Marius Nasta Institute and other selected health care facilities, review their IC measures and make recommendations for improvement; and 3) to review the **National Infection Control Plan** and to make recommendations for improvement. I would like to acknowledge Ms Cassandra Butu of the WHO Country Office and all colleagues of the Marius Nasta Institute and the NTP, namely Dr Cristian Popa, Dr Gilda Popescu, Dr Victor Spinu, Dr. Madalina Dragos and Dr. Mihaela Stefan for their support and effective coordination of the mission, as well as all staff of the health care facilities I visited (Annex 1), for their openness, transparency, cooperation and valuable time spent with me.

1. Marius Nasta Institute, Pavilion I TB ward

The Pavilion I (Figure 1) is located in the first floor of the Institute and its TB ward provides in-patient treatment of susceptible TB; it currently contains 29 beds squeezed in 7 patient rooms (4–7 beds in each) connected by the double loaded together with physician's offices and somnology laboratory (for in-lab study of patients suspect of having with obstructive sleep apnea). Whole room unshielded UVGI fixtures are installed in these rooms but to be considered ineffective for airborne IC. To reduce the risk of TB transmission and improve patients' and healthcare workers' comfort, the Institute administration plan the renovation of this ward during 2016–2017. At the time of my visit, the budget size for renovation and its funding source were not yet established.

Figure 1. Marius Nasta Institute, Pavilion I with the TB ward located in the central right part of the floor.



Based on Romanian regulations and international recommendations on TB IC, the available space of the TB ward can be renovated to contain only 18 TB beds, number that will provide safe and comfortable conditions both for hospitalized patients and health care workers. Given that effective treatment very rapidly reduces TB transmission risk, the highest risk of transmission is posed by the recently admitted patients with presumptive TB without rapid molecular test performed yet (ruling out drug-resistant TB) and the patients before initiation of effective TB treatment. Priority should be given to reducing the risk of TB airborne transmission from these categories of patients and only for few days of standard first line drugs (FLD) treatment after which the TB patients are not anymore infectious (if drug-susceptible TB). Such patients should be isolated in a high-security isolation unit (IU) which can be organized in the first two patient rooms for 2 beds each. Most of the patients would spend 2-4 days in this IU before to be transferred to another ward (pulmonology, susceptible TB, drug resistant TB, palliative care TB ward) or discharge after that rapid TB testing results (GeneXpert MTB/RIF and/or LPA) are available and based on them treatment initiated. Limited in time isolation in the IU should be supported by the following measures:

- Admission criteria:
 - TB suspects before microbiological TB confirmation;
 - TB patients which have not started yet *effective* treatment for any reason.
- Discharge criteria:
 - Diagnosed (confirmed) susceptible TB after receiving at least two days of standard FLD treatment;
 - Diagnosed (confirmed) M(X)DR TB patients should start second line drugs treatment and/or be transferred immediately to MDR TB ward;

- TB suspects with negative rapid molecular tests should be transferred to low risk TB ward or pulmonology, or discharged for further investigation and treatment;
- Few confirmed contagious TB patients who are not candidates for effective treatment for any reason should be transferred to palliative TB treatment and isolation ward.
- Since the probability of MDR TB among new cases is low (2.6%), standard FLD treatment should be initiated immediately after admission and diagnostic samples taken for all patients;
- Patients should be informed about their probable high contagiousness and TB transmission risk and objective need for limited in time isolation;
- Separate toilet, shower, meals, TV should be available for isolated patients;
- Due to high TB transmission risk, isolated patients should not leave the IU during whole isolation period;
- No visitors should be allowed for the patients while the stay in IU;
- Since installation and maintenance of mechanical ventilation is currently not feasible for the IUs of the Institute, all means should be applied to maximize natural ventilation if weather or season permits;
- Patients should have access to open balcony with separation installed for each IU room;
- One 30 nominal Watts upper room ultraviolet germicidal irradiation (UVGI) fixture should be professionally installed and maintained in each patient room;
- Health care workers should use properly fitted FFP2 or FFP3 respirators in the IU;
- Surgical masks should be worn by patients all the time.

If these two high risk categories would be effectively isolated in the IU, the remaining 16 beds for patients of effective therapy of the susceptible TB unit may be considered of medium to low TB transmission risk.

For safe separation of patient and personnel flows it is recommended to install separating walls with doors and signage to limit unauthorized access of other patients, staff and visitors. It is recommended to relocate the medical doctor office and somnology laboratory from this TB area to other safe location, so these rooms could be used for procedure room, additional TB patient room for 2 – 3 beds or nurse station. Available stairway in this part of the floor could be allowed for use by TB patients, so the common central stairs of the pavilion will be used by staff, visitors and pulmonology patients only.

To further reduce TB transmission risk in the susceptible TB ward the upper room UVGI fixtures could be installed in the each patient room, nurses station, procedure room (1 – 2 fixtures per room depending on room floor area) and two fixtures added to the existing corridor (on the separating walls facing to each other). The TB patient on effective therapy (other than ones staying in IU) should be allowed to walk outdoors. For maximizing natural ventilation it is important to install openable windows and keep balcony accessible for all patients.

2. Marius Nasta Institute, Pavilion II (future site for TB ward)

The Pavilion II of the Marius Nasta Institute was originally the “Pulmonology” pavilion; its renovation started about 12 years ago with MOH funds and experienced a lot of delays because of lack of funding and organizational inefficiencies. Several plans were developed by the Institute administration in the past regarding the destination of Pavilion II. According to the latest decisions, part of the ground floor will be dedicated to the lung transplant surgery and intensive care, while the rest of the building will host the Medical Department 5 (Pulmonology ward in the ground-floor and the TB ward and oncology ward respectively on the left and the right side of the first floor. At present, the newly renovated lateral wings of the building are completed. The central part of the building is still in the process of reconstruction. Open staircase between all these floors can lead to uncontrolled air flow, leading to increased risk of TB transmission. It is recommended to install separating wall with sealed doors at the entrance from the stair to the second floor, UVGI fixtures in the staircase, all TB patient rooms and the first floor corridor.

3. Marius Nasta Institute, Pavilion IV

It is located remotely from main campus, contains 2 floor inpatient building for TB and pulmonology patients and building with ground floor occupied by X-ray unit and functional diagnostics cabinet. The risk of TB transmission seems to be the highest in this pavilion among all visited facilities. One MDR TB case was registered among 45 health care workers last year, which can be estimated as TB notification of 2200 cases per 100 000, or occupational TB relative risk of 37 for health care workers. There are 3 pulmonology in-patient departments in this building. No actual separation of patient, staff and visitors flows exist. TB suspects are assessed in crowded office areas, available rapid testing is not used for all hospitalized patients, treatment not always starts on the day of admission, and therefore there is quite high chance that substantial part of patients continues transmission after admission for long period of time. There is no policy on maximizing natural ventilation and respirators use, few UVGI fixtures are not designed for safe permanent utilization in upper room mode. FFP2 respirators are available for staff but there is no clear policy on their use. Occupancy of hospital beds seems to be low (less than 30%) during the assessment visit. Based on the findings described above it seems that urgent action should be taken to reduce the nosocomial TB transmission risk in this pavilion:

- The highest priority is development of administrative plan to organize optimal and safe triage and separation of high risk TB transmitters among all patients during admission:
 - New patients assessment should be performed in separated room;
 - During the admission triage should be performed to isolate highest TB transmission risk patients in the IU;
 - IU should be organized to comply with listed above principles.
- First line drugs treatment should be initiated immediately after admission if there are no contraindications;

- All hospitalized patients should be subject for rapid molecular testing to rule out MDR TB;
- All measures to maximize natural ventilation should be taken;
- Upper room UVGI fixtures should be installed in IU and in all other high and medium risk areas – total 49 fixtures in this pavilion.
- Personal protection policy should be developed based on implemented separation and zoning of the building.

To overcome strong resistance for change among personnel it is recommended to collect and discuss data on occupational TB risk, create TB IC team (committee) for the pavilion TB IC plan development and implementation and organize TB IC education for all health care workers.

4. Marius Nasta Institute, MDR TB ward

The reparation/replacement of its mechanical ventilation system was discussed with contractor specialist and the Institute maintenance team. The system is currently partially functional including air handling unit and automation software. Ductwork repair, testing and balancing of the system are expected to be completed in September 2016, and final emergency testing (coil freezing prevention) – in November 2016. At the day of the visit since the system was not balanced, the building was ventilated naturally (by open windows), so testing of ventilation performance (flow rates and pressure differential measurement, ACH, smoke testing for air flow direction assessment) was not possible. The recommended measures to ensure effective and sustainable use of mechanical ventilation in the ward include:

- Commissioning of the system should include verification of system performance in terms of:
 - providing controlled directional air flow from low to high risk area;
 - maintaining negative pressure in the patient rooms and positive pressure in corridors, anterooms and staff area;
 - providing at least 6 ACH in high risk area;
 - providing comfort (temperature, noise, air velocity).
- As-built drawings, testing & balancing data and maintenance (preventive and catastrophic) documentation should be developed and provided to the Institute administration;
- The Institute engineer and responsible technician should be trained on monitoring and maintenance, involved in the testing and balancing of the system;
- Health care workers of the ward should be educated on mechanical ventilation operation and requirements;
- Since no air conditioning components were designed and installed, the mixed mode ventilation policy should be developed and used during hot season periods;

- Sufficient budget for the regular mechanical ventilation maintenance should be allocated and professional ventilation company contracted to ensure its stable operation;

The institute technician (engineer) should be appointed and authorized for the system performance monitoring and maintenance supervision.

A XDR TB patient from Montenegro was recently admitted in the MDR-TB Ward. The patient is placed in a single bed patient room with individual toilet; the room is naturally ventilated through two open windows (mechanical ventilation was not functional at the moment). The patient was allowed to walk outside the ward and used surgical mask all the time. All health care workers used FFP2 respirators in high risk area of the ward, separated from staff area by hermetically sealed doors. These precautions seem adequate for the risk of nosocomial DR TB transmission.

In order to reduce nosocomial DR TB transmission it is critical that only patients WITH microbiologically confirmed M/XDR TB and FOR effective treatment should be hospitalized to this ward. No “diagnostic” patients, patients with susceptible TB or patients for palliative care should be admitted to this ward.

5. Marius Nasta Institute, Children’s TB Ward

It is located in dedicated building in separated Institute territory. There are 80 TB beds and 20 pulmonology (“non TB”) beds. Remote location of this ward provides reliable separation from infectious adult TB patients. Occupancy rate in this ward was low on the visit day. There are enough space and separated rooms to provide temporary isolations for rare cases of contagious TB patients, but the separation policy is not available for review and probably not used. It should be developed and followed including isolation for all sputum smear positive children and TB suspects in the single bed room with all necessary conditions for IU described above. It is also recommended to separate hospitalized “non TB” pulmonology patients from TB patients in different buildings.

6. Marius Nasta Institute, Emergency Room and Intensive Care Unit

Both services occupy part of the Pavilion I ground floor. Waiting area, located in enclosed space at the entrance without openable windows, in the morning hours is quite crowded. Most of the visitors, including TB suspects and other respiratory patients seem do not need emergency admission but pulmonologist consultation instead. Since they may spend considerable time in this unventilated space there is high risk of transmission of TB and other airborne infections. To organize patients flow in safer and more optimal way triage of patients should be organized to separate the patients in need of emergency care from those clinically stable, those with confirmed TB and those with presumptive TB. High TB risk transmitters could be identified for

further investigation and treatment in IU. Triage algorithm for this purpose has to be developed to be followed by the physicians of all departments. Coughers and other high transmission risk patients should be offered free surgical mask and assessed separately without waiting. For environmental control upper room UVGI fixtures should be installed in the waiting area and assessment room, natural ventilation maximized by installing windows with openable area of at least 20% of floor area.

7. Marius Nasta Institute, Ambulatory TB facilities (dispensaries)

They are separated buildings (or floors with dedicated entrance), not crowded, with waiting areas in corridors. Children's TB clinic is well separated and has its own entrance, waiting area procedure room. Rapid molecular testing is available and performed for all patients on treatment. Installed here UVGI fixtures are designed for whole room UV therefore cannot be used while the space is occupied by humans. Sputum collection is done in separated rooms with open windows and unshielded UVGI fixture. DOT in some cases is not provided (patients are given TB medications for several days). It seems that workload of the staff can allow increased amount of work in terms of providing DOT and achieving higher patients compliance. Since mechanical ventilation in this settings is not feasible, installation of upper room UVGI fixtures is recommended for waiting areas, physicians' offices and DOT rooms.

8. Marius Nasta Institute, Bronchology Unit

During the working hours (mostly before noon) it has a high patient load, but lacks of natural ventilation, absence of upper room UVGI and no policy on respirator use take place here. Patients with confirmed TB come for procedures in the end of the working hours, but patients with presumptive TB seem to be among other diagnostic respiratory patients during the morning busy hours. Given this crowding and mixing, this unit also poses high TB transmission risk: therefore it is recommended the installation of upper room UVGI fixtures, strict use of respirators by all staff and future mechanical ventilation installation to create negative pressure with 12 ACH.

9. Marius Nasta Institute bacteriology laboratory

After reorganization and renovation it has rational layout, controlled access for staff only and occupies sufficient space to perform high volume of sputum smear microscopy, solid and liquid media cultures and DST, molecular rapid testing on GeneXpert and Hein line probe assay. Rational and safe sample and personnel flow organized according to technological laboratory needs. Entire laboratory has no mechanical ventilation. Class II type A2 biological safety cabinets (BSC) used for sputum processing, cultures manipulations, DST and other aerosol generating procedures recirculate air into the rooms. There is no BSC certification and

maintenance program in the laboratory. No clear respiratory protection policy developed for staff. No cases of active TB were notified among laboratory staff since reorganization. To comply to Tuberculosis Laboratory Biosafety Manual (WHO, 2013) it is recommended for this laboratory:

- Develop personal respiratory protection policy for the laboratory staff, including mandatory proper use of FFP2 or FFP3 respirators in all high risk area;
- Develop BSC maintenance program, including their annual professional certification supported by adequate allocated budget;
- Install mechanical ventilation in high risk area including rooms for sputum processing, smear preparation, sputum concentration, culture and DST procedures – to maintain negative pressure and 12 ACH inside.

10. Victor Babes Hospital

Victor Babes Hospital is for the diagnosis and treatment of infectious diseases (including HIV/AIDS and TB) and serves selected sectors of Bucharest city. The TB ward in this hospital occupies half of the upper floor of the Pulmonology Pavilion. Currently hospital laboratory performs sputum smear microscopy, GeneXpert MTB\RIF, liquid culture and DST. Because of lack of MTB\RIF cartridges this molecular testing is used only for patients with “high risk of MDR TB”. Only first line TB drugs are available for treatment. The TB ward has naturally ventilated (by opening windows) 3–6 bed patient rooms with toilets; few wall-mounted UV-air cleaners are installed in corridor and staff rooms. Staff use surgical masks; respirators are also available but there is no clear policy for personnel to use them (who, where, when). Given the probability of MDR TB (1/40 new TB patients), there is a substantial risk of MDR TB transmission in the ward because there is no rapid molecular testing for all patients and no effective treatment available for such patients. The most appropriate IC intervention in Victor Babes Hospital is administrative and mainly on referring all patients with confirmed TB by GeneXpert to Marius Nasta Institute hospital. Which means that all PLHIV with presumptive TB should be tested with GeneXpert as soon as they are admitted in Victor babes Hospital.

11. Pulmonology Hospital Sf. Stefan

This specialized hospital is located in downtown Bucharest and has two building – administrative and the hospital one. Recently renovated (in 2015) two floor hospital building has one entrance for patients and staff. There are two departments for both TB on non TB pulmonology patients. There are double and single load corridors and patient rooms for 2 – 4 – 6 patients. Windows are openable. TB patients stay in separate rooms, but share the same toilet, corridor and entrance with patients suffering exacerbated COPD, asthma, often receiving steroids. There are few unshielded UVGI fixtures installed in corridors. Staff use surgical masks randomly, but FFP2 respirators are available. Sputum smear microscopy, liquid and solid cultures and first line DST on VersaTrek are available for diagnostics. On special request

GeneXpert MTB/RIF tests are performed in M. Nasta Institute to confirm TB in HIV positive TB suspects and to check for Rifampicin resistance selected patients. In many cases TB suspects are referred for hospitalization without any laboratory tests performed. During the visit bed occupancy was not high – about 50 – 60%. Two categories of TB patients stay in the separate, but no isolated rooms: ‘Homeless’ and ‘Chronic’. Patients with DST confirmed MDR TB stay in the hospital without real isolation and second line drugs treatment. Based on these findings the TB transmission risk in this hospital can be estimated as high, because there is no effective triage, and isolation of TB suspects and drug resistant patients, no routine rapid testing performed for TB suspects and patients, substantial delay of effective treatment initiation, no effective isolation of contagious TB patients from non TB and immunocompromised pulmonology patients. Installed whole room UVGI fixtures are not effective in continuous aerosol generation settings because they cannot be used constantly and while patients and staff present in rooms. To reduce TB transmission risk in this hospital the following measures are recommended:

- Provide education for all health care workers on airborne infection control;
- Organize isolation unit (2 – 4 rooms) compliant with above listed requirements;
- Make available rapid molecular testing for all TB suspects and patients admitted (preferably before admission);
- Develop and implement triage algorithm to identify and isolate for limited period of time high risk TB transmitters until TB confirmed and Rifampicin resistance verified and effective treatment initiated;
- Ensure that all hospitalized TB patients receive effective chemotherapy based on molecular testing and DST;
- Organize isolated from TB ward pulmonology unit to avoid any contact indoors of these patients with contagious TB patients;
- Install upper room UVGI in patient rooms, corridors, waiting areas (total 30 per hospital building);
- Develop policy on respirators use (to be mandatory for all health care workers in designated high risk areas).

12. Leamna de Jos Pulmonology Hospital, MDR TB ward

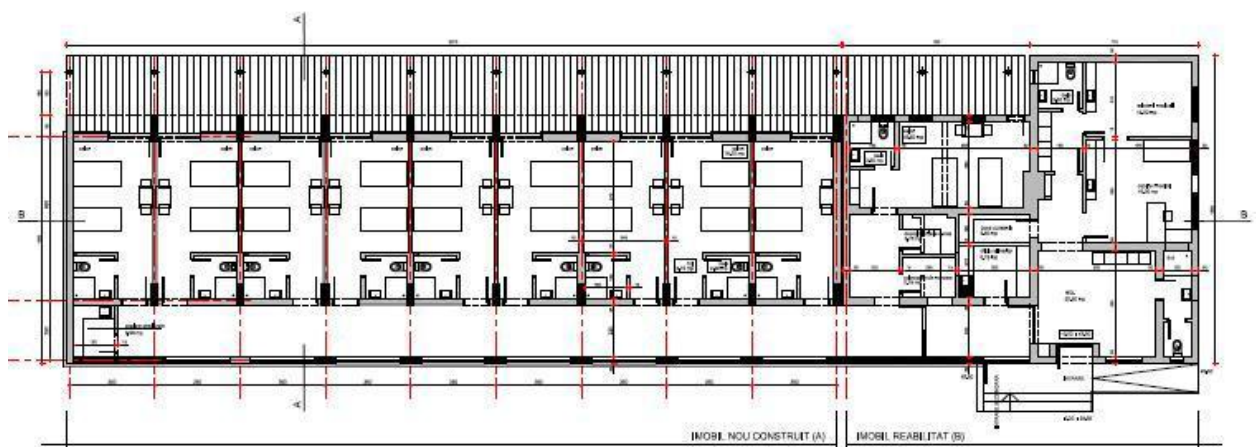
The hospital is located in the town of Leamna de Jos, Dolj county, where the highest notification rate of TB in Romania has been reported since the last decade. It is a building under renovation, which is funded by the Global Fund. The renovation is intended to create a single floor building with naturally-ventilated single room for MDR TB patients.

Figure 1. Facade of the MDR TB ward in the Leamna de Jos Pulmonology Hospital (design drawing)



The 495 sq. m building will have a single loaded corridor and 10 double bed patient room with large openable windows and access to open shaded porch. Each patient room of 19 sq. m will have 2 beds, toilet with shower and sink, and one 30W upper room UVGI fixture. There will be isolated staff room, reception/procedure room and storage rooms. The design of the building allows providing comfort and isolation for hospitalized patients.

Figure 2. Floor plan of the MDR TB ward in the Leamna de Jos Pulmonology Hospital.



Microbiology laboratory TB laboratory in Craiova (30 km) performs for this hospital SS microscopy, rapid testing (GeneXpert MTB/RIF and LPA), solid and liquid cultures and first line

DST. TB laboratory in Leamna hospital performs sputum smear microscopy, solid cultures and first line DST. Samples for second line DST are sent to Marius Nasta Institute laboratory.

In order to further reduce TB transmission risk in the building it was recommended:

- Consider including into design passive exhaust ventilation stacks for each toilet to maintain some natural ventilation and negative pressure in patient rooms during colder season and for odor control;
- Administrative TB IC policy should be developed and followed regarding:
 - criteria for admission (only cases with confirmed MDR TB) and discharge;
 - effective (based on available drug resistance pattern) treatment initiation immediately after admission;
 - use of diagnostic algorithm including rapid testing and second line drugs DST for all patients;
 - separation of patients with (pre)XDR TB in dedicated rooms;
 - avoiding congregation of patients indoors;
 - development and implementation of personal respiratory protection policy for patients and staff.
- It is important not to mix in this ward patient on effective chemotherapy and on palliative treatment

Location of future upper room UVGI was discussed (one per each patient room, in other areas – at least one per each 20sqm of floor area, total 19 fixtures).

In case of the second line and the fifth group TB drugs shortage in the country the MDR TB ward can be converted to isolation facility for contagious patients without effective treatment, but this scenario should be avoided by every means, since without effective treatment it is impossible to control drug resistant TB epidemic. Therefore it is critical for NTP and MoH to ensure adequate TB drugs supply after GFATM and Norwegian support will come to the end in 2017.

13. Infection control at family medicine practice

TB control in Romania is currently in the process of shifting priorities from over-hospitalization to providing more ambulatory care, which is, if properly organized, less costly, more patient-centered and able to reduce TB transmission. All TB patients discharged from TB ward are not contagious anymore, since they already have received effective treatment for several days or weeks. It means they do not pose any risk of TB transmission and can be safely managed by general practitioners in outpatient settings – either in a clinic or at home. Most important measure is to prevent their interruption of chemotherapy as prescribed by the TB specialist. Patients and all household residents should be educated on the basic principles of airborne TB transmission, its prevention and critical importance of treatment compliance. Any treatment interruption should be documented and reported to the responsible TB specialist.

Undiagnosed and untreated TB patients, unlike the TB patients on effective treatment, can pose substantial risk of TB transmission. Therefore all patients with such symptoms as cough more than 3 weeks, prolonged fever, weight loss, night sweats should be offered free surgical mask and fast-track, free-of-charge medical assessment including physical examination, sputum smear microscopy, rapid molecular testing for TB and drug resistance and chest X-ray. All patients with positive findings should be immediately referred to a TB specialist for further investigation and treatment initiation. To reduce TB transmission risk in crowded waiting areas of family practice clinics such low cost and effective environmental controls can be used as intensive natural ventilation and upper room UVGI.

14. General comments and recommendations

All findings of my mission were discussed in Ministry of Health with Dr. Amalia Serban, Head of the Public Health Directorate. Urgent need to reduce unnecessary hospitalization of TB patients to reduce nosocomial TB transmission and to provide directly observed treatment and follow up for ambulatory patients to reduce transmission in community settings in line with WHO/Euro “Review of the national tuberculosis programme in Romania, 10–21 March 2014” were emphasized.

To implement the recommended interventions aimed to reduce TB transmission risk in health care facilities it is important to make the following legislative actions:

1. Include TB into the officially recognized nosocomial infections list;
2. Prompt and effective TB treatment is one of most important measures to stop TB transmission. That is why it is urgent to make all WHO recommended TB drugs available for effective drug resistant TB treatment, there is a urgent need to update the official list of TB drugs, by including into it capreomicin, levofloxacin, linezolid, clofazimine, PAS, imipenem/cilastatine and delamanid; sufficient funding sources have to be secured for adequate TB drugs procurement after 2017, when international support from GFATM and Norway will be discontinued.
3. National regulations should be updated on:
 - requirements for airborne isolation units;
 - upper room UVGI installation, operation, monitoring and maintenance;
 - TB laboratory biosafety;
 - personal respiratory protection for airborne infection control (respirators certification, fit testing, use and disposal);

Based TB transmission risk assessment and TB infection control program evaluation findings the draft of the national TB IC guidelines has been developed together with Drs. Christian Popa and Madalina Dragos (see attached to this report).

Annex 1

List of places visited and people met during the mission

Ministry of Health

Dr. Amalia Serban, Head of the Public Health Directorate, Ministry of Health

Dr. Cassandra Butu , WHO Country Office

National Tuberculosis Control Program (NTP) and National Institute of Pneumophtysiology Marius Nasta

Dr Gilda Georgeta Popescu – Manager of the National Institute of Pneumophtysiology Marius Nasta

Dr. Victor Spinu, NTP Manager, Head of the MDR TB Ward National Institute of Pneumophtysiology Marius Nasta

Dr. Emilia Crisan, Medical Director, National Institute of Pneumophtysiology Marius Nasta

Dr. Cristina Popa, Doctor in the MDR TB ward, coordinator of the MDR TB Department, NTP

Dr. Mihaela Stefan, department coordinator, NTP

Dr. Mariana Andrei, department coordinator, NTP

Dr. Roxana Manescu, project coordinator, Romanian Angel Appeal

Dr. Florin Mihaltan, Professor of pulmonology, Carol Davila University, head of Department 3

Dr. Constantin Marica, Profesor of pulmonology, Carol Davila University, head of Department 1

Dr. Anca Macri, lung physician, Department 3, National Institute of Pneumophtysiology Marius Nasta

Dr. Delia Marta, lung physician, Department 5, National institute of Pneumophtysiology Marius Nasta

Dr. Emilia Tabacu, lung physician, Head of Department 8, National Institute of Pneumophtysiology Marius Nasta

Dr. Ana Maria Sasu, lung physician, Head of Department 7, National Institute of Pneumophtysiology Marius Nasta

Dr. Florin Murgoci, lung physician, Head of TB Paediatric Ward 1, National Institute of Pneumophtysiology Marius Nasta

Dr. Mihaela Petrea, lung physician, Head of TB Paediatric Ward 2, National Institute of Pneumophtysiology Marius Nasta

Dr. Adriana Moisoiu, Head of the NRL, National Institute of Pneumophtysiology Marius Nasta

Ms. As Anghelescu Dana, Head of the Nurses, National Institute of Pneumophtysiology Marius Nasta

Dr. Doina Boiculese, Head of Department for Quality Control, National Institute of Pneumophtysiology Marius Nasta

Dr. Negulescu Daniela, Epidemiologist, Head of Epidemiological Department, National Institute of Pneumophtysiology Marius Nasta

Ing. Ciurciubis, Head of the technical staff, National Institute of Pneumophtysiology Marius Nasta

Ing. Ionescu Bogdan, Coordinator of the technical staff, National Institute of Pneumophtysiology Marius Nasta

Ms. Nicoleta Manescu, project coordinator, NGO “Romanian Angel Appeal”

USA Embassy

Mr. Vladimir Dina, US Embassy, LN USAF

Ms. Corina Negoita, US Embassy

Ing. Florin Borcan, Di Carmine Construzioni

Ing. Ramon Borreguero, QA Engineer, NAVFAC EURAFSWA Rota

Hospital of Infectious and Tropical Diseases “Victor Babes”, Bucharest

Dr. Erscoiu Simona, Head of Infectious Disease Department, Victor Babes Hospital

Dr. Oprea Anca Cristiana, infectious disease specialist, Victor Babes Hospital

Dr. Ene Luminita, infectious disease specialist, Victor Babes Hospital

Dr. Nicolaescu Olimpia, lung physician specialist, Head of Department 1 of Pulmonology, Victor Babes Hospital

Dr. Zlatev Olimpia, lung physician, coordinator of the TB Program in Victor Babes Hospital

Dr. Verescu Octavian, lung physician specialist, Head of Department 2 of Pulmonology, Victor Babes Hospital

Dr. Emilian Ioan Imbri, General Manager, Victor Babes Hospital

Dr. Florescu Simin Aysel, Medical Director, Victor Babes Hospital

Sf. Stefan Hospital, Bucharest

Dr. Laurentia Badulescu, lung physician, Medical Director, Sf. Stefan Hospital

Dr. Daniela Chirita, lung physician, Head of Department 1, Sf. Stefan Hospital

Dr. Marian Ilie, lung physician, Head of Department 2, Sf Stefan Hospital