

**Development and Validation of an instrument to measure knowledge, attitudes and perceptions (KAP) of tuberculosis as an occupational disease of the healthcare personnel from a III level hospital in Lima - Perú.**

**By**

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**A Dissertation submitted**

**for the**

**Master in occupational safety and health**

**University of Turin**

**International Training Centre of ILO (ITCILO)**

**November, 2016**

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## 1. Abstract

**Background:** Tuberculosis (TB) is an infectious bacterial disease that commonly affects the lungs and is caused by *Mycobacterium tuberculosis*. WHO through its Global Tuberculosis Report 2015 indicates that 1.5 million people worldwide died from tuberculosis in 2014. Peru is one of the countries with the highest number of TB cases in the Americas, according to the WHO Global report. The International Labour Organization (ILO) published in 2010 the revision of the list of occupational diseases where TB disease is included as an occupational disease in the group of biological agents and infectious or parasitic diseases, for healthcare personnel that works in hospitals.

**Purpose:** Develop and Validate an instrument to measure knowledge, attitudes and perceptions (KAP) of healthcare personnel about the risk of developing occupational tuberculosis in a hospital level III Lima Peru.

**Methods:** An observational cross sectional study that aims to develop and validate a KAP instrument through content validation by 6 experts related to tuberculosis and methodology. As well as evaluating the reliability by pre-testing the KAP instrument to a pilot group. The validated instrument was applied on a pilot group of 65 healthcare workers in a hospital level III in Lima, Perú.

**Results:** The developed instrument was validated by a group of 6 experts achieving a Content Validity Index for Items (ICVI) of 0.83 and a Content Validity Index for Scale (SCVI) of 0.93 proving a favorable approval. As well validated by a pilot group of 65 participants seeking for doubts and problems on comprehension but none was presented. The instrument also was validated by psychometric methods achieving validation on 2 unidimensional scales, Knowledge and Practices, with aKR-20 of 0.59 for both scales indicating a moderate reliability. Although the factorial analysis was low for both scales, KMO of 0.41 and 0.59 respectively which indicates the small sample size for the validation process of an instrument with dichotomous items. The data results that was gathered with this instrument showed an important negative correlation between 2 variables, the perceived difficulty on applying the control measures and the TB practice scale. (Fisher's exact test=14,  $p=0.01$ , Tau-b Kendall=0.34,  $p=0.01$ ).

**Conclusion:** Tuberculosis among healthcare personnel is still an important disease all around the world but predominant in developing countries. Peru has one of the highest number of TB cases in the Americas reported during 2015. (1) Although in the same year there are none occupational tuberculosis reported to the Ministry of Labour, which shows an underreported status specifically on this disease. There should be more efforts on the research field to understand the causes and improvement opportunities, the importance of establishing a baseline and exploring the level of knowledge, attitudes, perceptions and practices of healthcare personnel on behalf the risk of developing tuberculosis as an occupational disease. This study proposes an initial form of a KAP instrument, which has content validity by 6 experts, applied on a pilot group of 65 workers and 2 scales psychometric statistically validated with internal validity and moderate reliability applicable for groups. We propose

there should be more research to extensively validate this instrument among Peruvian healthcare personnel.

## **2. Description of the Problem:**

Tuberculosis (TB) is an infectious bacterial disease that commonly affects the lungs and is caused by *Mycobacterium tuberculosis*. The disease is transmitted from person to person through droplets expelled from the airways of people with active disease (1). TB primarily affects adults in economically productive age, it is estimated that about two thirds of cases occur in people between 15 and 59 years of age (1). WHO through its Global Tuberculosis Report 2015 indicates that 1.5 million people worldwide died from tuberculosis in 2014. However, it is estimated that worldwide 9.6 million people have suffered from tuberculosis during 2014, of which only were reported to 6 million new cases during the same year (1).

Peru is one of the countries with the highest number of TB cases in the Americas, according to the WHO Global report. During 2014, 30 008 new cases with an incidence rate of 120 x 100 000 (1) were reported. The Baussano et al meta-analysis indicates that the risk of acquiring TB among health personnel is consistently higher than the risk in the general population worldwide (2). The management report of the Peruvian Technical Unit for Tuberculosis multidrug resistant (MDR) of the National Health Strategy for Prevention and Control of Tuberculosis (ESN PCT), reports that during the years 1997 to 2007, 154 cases of health personnel were presented MDR TB. In 2010 Ticona Alberto Mendoza et al publication indicated that the incidence of tuberculosis in Peru Hospital "Dos de Mayo" was 30% (3) (4) among health workers. It also describes that this high transmission of tuberculosis is associated with an insufficient number of controls, such as lack of triage of suspected cases of tuberculosis, promoting cough etiquette, lack of use of masks in patients with cough, the lack of isolation facilities of detected cases and limited and inadequate N95 respirators with filters use. (3)

The International Labour Organization (ILO) published in 2010 the revision of the list of occupational diseases where TB disease is included as an occupational disease in the group of biological agents and infectious or parasitic diseases, for health personnel that works in hospitals. There are some articles related to the evaluation of the healthcare personnel perception of tuberculosis. In Colombia Carvajal-Barona et al evaluated the knowledge, attitudes and practices of tuberculosis in healthcare workers describing a validation of the instrument by cognitive interviews (5). Also in Cuba, Arroyo Rojas et al published an evaluation study of knowledge and perception of health personnel about tuberculosis with a qualitative instrument conformed by open questions (6). While in Brazil, Wojciechowski de Carvalho et al published a qualitative study of perception on preventable immune diseases among nurses (7). Muñoz Sanchez et al published in 2009 a study of healthcare worker's perception of tuberculosis in Brazil. Although there are several related items there wasn't a published practical and validated instrument that measures knowledge, attitudes and perceptions of occupational tuberculosis among health personnel. (8)

During 2014, 337 occupational diseases were reported to the Ministry of Labor in Peru (9) considering that in the same year there were 15,683 workers per every 1,000 Peruvians

reported by the Peruvian Institute of Statistics (10). Among the reported occupational diseases, there were none of occupational tuberculosis. This shows that in Peru there is an underreported status of occupational tuberculosis cases, leaving a space to research the causes and improvement opportunities; as well as highlights the importance of establishing a baseline and exploring the level of knowledge, attitudes and perceptions of healthcare personnel on behalf the risk of developing tuberculosis as an occupational disease.

### **3. Background**

#### **3.1 Tuberculosis:**

The *Mycobacterium tuberculosis* is transmitted from person to person through airborne particles, droplet nuclei, expelled by patients with tuberculosis disease through cough or sneeze. This airborne particle called droplet nuclei have a size approximately of 1-5  $\mu\text{m}$  and usually transmitted through air not by surface contact. Once a person gets in contact with these droplets nuclei, it is carried from the mouth or nasal passages, upper respiratory tract, and bronchi to reach the alveoli., generating a local infection and followed by dissemination to draining lymphatics and hematogenous spread throughout the body. In order to an infection condition gets established, the host person should be susceptible. After the initial infection from 2–12 weeks the immune system of the host response limits additional multiplication of the tubercle bacilli. This status of infection is called latent tuberculosis infection, which is asymptomatic and not infectious. (43)

According to the CDC review, 5%–10% of persons who become infected with *Mycobacterium tuberculosis* and not yet treated for latent infection, will develop Tuberculosis disease during their lifetimes (44). The risk of developing the disease will be related on the concentration of the initial contact with droplet nuclei and the duration of the exposure, being a higher risk more concentration and longer duration.

Another important factor to consider on behalf the risk of developing the disease is related to the susceptibility of the host. The persons that are at higher risk are the ones infected with HIV within the previous 2 years, infants and children aged less than 4 years, comorbidities as silicosis, diabetes mellitus, chronic renal failure, leukemia, lymphomas, cancer, body weight more than 10% below ideal body weight, prolonged corticosteroid use, organ transplant, end-stage renal disease, gastrectomy and persons with a history of untreated or inadequately treated Tuberculosis disease. (43)

The characteristics of the contagiousness of a patient or a source reservoir of the bacilli that increases the risk for infectiousness are the presence of cough, cavitation on chest radiograph, positive acid-fast bacilli sputum smear result (AFB), respiratory tract disease with involvement of the larynx or the lung, incorrect duration of antituberculosis treatment, undergoing cough inducing or aerosol generating procedures (43)

The environment is another factor to take into consideration on the analysis of the risk for transmission of the *Mycobacterium tuberculosis*. There is a higher risk when the exposure occurs in small and enclosed spaces, inadequate local or general ventilation (insufficient

dilution of droplet nuclei), recirculation of air containing infectious droplet nuclei, inadequate cleaning procedures and improper handling infected specimens. (43)

### **3.2 Occupational Tuberculosis:**

Nosocomial transmission routes of Tuberculosis are from patient to healthcare worker, from patient to patient and even from healthcare worker to patient. In developing countries, the nosocomial transmission represents an important impact compared to developed countries because of the higher number of patients with tuberculosis, the minimal or none control measures of tuberculosis infection and open wards. The level of contact with patients is considered an important factor because in most of the outbreaks the transmission is higher in healthcare workers that are directly involved in patient care as emergency departments and inpatient medical wards. (12)

On behalf, the risk assessment of the transmission of tuberculosis between the patient with the disease and the contact, Rodriguez Bayarri et al on 2004 in Spain expressed the risk analysis of developing tuberculosis as a professional disease. There are three main factors that should be evaluated to assess the risk. The first factor is the source, the reservoir emitter of the infectious agent which is the sick patient; from which the bacillus is expelled out by the aerosol through breath, cough or sneeze. The frequent source are those tuberculosis patients with active pulmonary and larynx disease, drug resistant tuberculosis and patients with immunosuppressive diseases. The second factor, the transmission vehicle which is the aerosol emitted by the source. The droplet nuclei of Wells are around 1 to 10 microns ( $\mu$ ) and are capable to stay suspended on the air. In one cough, we could found around 3000 droplet nuclei. The third factor, the transmission medium is the environmental air between the source and the affected person. The medium would depend of the cubic meters, the distance between the source and the worker, the health condition of the person and the exposure time. (11)

On behalf, the probability of infection, it depends on the infective doses from the source and the susceptibility of the contact to get infected or develop the disease. The capacity of the source to transmit the infection depends on the type of tuberculosis disease, the bacillus characteristic and expelled quantity, the patient status on treatment, the cubic meters in between the shared room, the ventilation system of the room, implemented control systems like natural sunlight, ultraviolet artificial rays and low percentage of environmental humidity. Infectious doses are measured as the quantity of bacillus in the shared air and the exposure time. (11)

From the group of people infected by the mycobacterium tuberculosis it is estimated that 10% will develop the active disease of tuberculosis in their life and only 5% will develop the disease on the next 5 years. (3)

According to a literature review from Alberto Mendoza et al on 2012 in Peru it is estimated that 30 to 40% of the Peruvian population is infected with mycobacterium tuberculosis being predominant among healthcare personnel and public transportation. (12) (13) Lima, the capital of Peru, has the highest demographic density, around 282.4 hab/km<sup>2</sup> of the country and has the highest number of vehicles for public transportation, specially “combis” small

buses. Garaycochea study in 2011 determined a direct correlation between the number of public transportation routes and the tuberculosis status in districts of Lima, Perú. (13)

In order to determine if the tuberculosis disease is an occupational disease the direct causality have to be establish. According to the Snider classification about the exposed professional groups there are three groups. The first group are workers that work with people in high risk of developing tuberculosis. The second group are workers that have an increased susceptibility to develop the active tuberculosis disease. The third group are workers that develop their job at a workplace with and increased risk of exposure to tuberculosis. The healthcare personnel are considered on the third group, where the direct causality of occupational tuberculosis, could be determined. The exposure is demonstrated during the direct contact with patients (face to face), as well during diagnostic procedures that seek to produce the cough and as a result the expel of bacillus. On respect this direct contact and these kinds of diagnostic procedures have the intrinsic characteristic to expose the healthcare worker, during its regular work activity, to tuberculosis infected patients. (38)

The occupational tuberculosis is determined when a healthcare worker that has a direct contact with patients with tuberculosis or infected material without another form of non laboral infection. On 2008 a referential official Peruvian list of professional diseases was published. This legislation establishes the definition of a professional disease, as the disease of which the relation cause effect of the identified risks related to the economic activity, has been established. (39) The professional diseases established by this Peruvian legislation are segregated into 6 groups determine by agents, chemicals, physical, biological, inhaled substances and other agents, dermic exposition to substances and carcinogenic agents. (39) The third group of biological agents identifies the mycobacterium tuberculosis as a cause of tuberculosis among healthcare personnel of close institutions as a professional disease.

According to Juan Alonso-Echanove et al. research developed at a Peruvian Hospital during 1997 they founded that the incidence rate among healthcare workers was 4 to 8 times higher than the reported for the country, which for the same year was 111 cases per 100 000 people approximately 27 000 new cases in Perú. This study during 1994 to 1998 showed that 63% of healthcare workers tested positive to the tuberculin skin test with non-prior positive reaction, non-specifying if the same group was BCG vaccinated. (12)

### **3.2.1) Preventive Measures**

Tuberculosis is a preventable disease in that sense our efforts should be oriented on evaluating, analyzing and implementing preventive measures in order to prevent the exposition and way of transmission. The factors that should be considered are the patient source reservoir of the bacillus, the air carrier, the workplace and the possible host receiver.

According to the CDC one of the most important risks for healthcare personnel on the transmission of Tuberculosis are the unrecognized TB disease patients who are not handled with appropriate airborne controls. The recommendation for healthcare settings is to implement a TB control program that aims to ensure early detection, airborne control measures and early treatment, through 3 levels of the hierarchy of controls, administrative, engineering and respiratory protection (PPE). (43)



## **Medical Measures**

The health and safety system should implement measures in order to identify the biological source reservoir of the bacillus aiming to avoid the worker's exposition and to implement well oriented controls to be more effective. This recommendation includes patients and workers, in order to offer early treatment and proper surveillance. Identifying the worker that has been infected with the bacillus, the host receptor, in order to include him into the medical surveillance program and to implement preventive treatment that will prevent the host to develop the TB disease and to avoid other workers (contacts) that are not infected to prevent becoming infected.

The medical surveillance of workers should evaluate workers with suspicious symptoms of possible tuberculosis, workers with previously diagnose of fibrotic diseases and workers with signs of changes on the PPD (Purified Protein Derivative skin test) reaction.

## **Engineering controls**

The workplace should have an adequate ventilation system that helps eliminate or diminish the infected droplets. A sterilization system with ultraviolet rays or highly effective air filters, aims to eliminate those infected droplets. Also an isolation system of infectious patients with negative pressure environments and physical barriers can be implemented.

## **Personal Protective System**

The NIOSH recommendation is to implement the use of N95 Particulate Filtering Facepiece Respirators for Mycobacterium tuberculosis exposure control. Healthcare personnel should use this respirator when they get in contact with any patients, because especially in triage and emergency areas there are non-diagnosed patients.

## **Reporting TB Program**

The healthcare centers should have procedures for notifying if a worker is suspected or diagnosed with Tuberculosis diseases, which should include a protocol of attention and control. If a healthcare worker is diagnosed an investigation should be developed to identify the probable cause; in which a comparative analysis should be performed to encounter if the worker had a previously documented positive test result for Mycobacterium tuberculosis infection. (43)

The investigation should consider the identification of contacts, evaluation of contacts and notification to the correspondent public health institution. Especially in healthcare and considering the number of contacts, we should seek whether the disease was transmitted from the HCW to another HCW, to patients or to visitors. The main goal on identifying contacts it to identify secondary cases or latent infection, in order to initiate early treatment. (43)

## **4. Developing a valid questionnaire**

Considering the important impact on public and occupational health of the healthcare workforce of this infectious disease, we looked for tools that would help researchers understand the problem and the importance of adopting specific control measures. According to the published literature review of Lujan-Tangarife et al on 2015 about the construction and validation of measurement scales in health, there is a high demand of measurement scales and instruments to evaluate variables and topics of interest in the health field specially when there are no direct ways to measure or directly observable what it is aimed to study. (21)

#### **4.1.1 Definition of questionnaire**

A questionnaire is an instrument that can be used to collect data with a standardized set of questions and system of coding the responses, in order to ensure that the differences in responses to questions can be interpreted as differences among respondents not in the processes that produced the answers.

#### **4.1.2 Design of a questionnaire**

Although a questionnaire is an instrument that can be use by researchers to gather data in order to study a specific problem, to develop a new instrument should not be the first option. The researcher should do a thorough investigation in order to find other means to gather the required data as well to find an already developed and validated instrument that can be used completely or partially in the decided context.

### **5. Validation of a questionnaire**

#### **5.1.1 Experts Review**

The initial process of the expert's review or criteria is crucial for the construction and validation of scales which includes determining the objectives of the research, the selection criteria of the board of experts, the dimensions of the instrument, the norms of evaluation of results and the qualification method on the expert's review. (21) There are different methods for developing an expert's review, Delphi method, Content Validity Index for items and scales, averaging experts' ratings using a pre-established criterion of acceptability, coefficient alpha to quantify agreement of items, computing a multirater kappa coefficient. (22) (23) The Content Validity Index is a matter of judgment that involves two phases, efforts to enhance content validity through careful conceptualization and domain analysis and efforts to evaluate the relevance of the scale's content through expert assessment, as well as the degree to which a sample of items, constitute an adequate operational definition of a construct. (22).

On the review of instrument content validity processes, the content validity index is widely used. For this methodology, a group of experts are asked to rate each item in terms of clarity and relevancy on a 4 points ordinal scale. The ICVI aims to determine the proportion of agreement on the relevancy and clarity of each item, meanwhile the SCVI determines the proportion of items of an instrument that achieved a rating of 3 or 4. (45)

After the rating, the number of experts giving a rate of 3 or 4 is added and divided by the number of experts. The acceptable index is on relation to the number of experts, when there are less than 5 experts must be 1.00 and more than 5 it should be at least 0.83. (22)

There are two methods to determine the SCVI, the universal agreement and the average. To determine the index on the universal agreement method, the number of items rated as relevant is divided by the total number of ratings. As well, on the average method the sum of ICVI is divided by the total of items. (45)

### **5.1.2 Reliability**

The level of which an instrument is capable to measure without error, determining the proportion of the variance attributable to real difference between the subjects. The Cronbach alpha is the most used method to determine an instrument reliability (21). Its value is scaled between 0 and 1 and should be calculated for each dimension. Achieving a minimum value of 0.7 is accepted and higher than 0.90 would mean there is redundancy of items that are evaluating the same and should be eliminated.

### **5.1.3 Internal Consistency**

The level of correlation and coherence between items that integrate the same dimension. Evaluates if the items of the same dimension have homogeneity in between measuring what they are intended to. (21) The Pearson correlation, the spearman split half, the Kuder-Richardson formula and Cronbach alpha are methods that can be used to measure the internal consistency.

### **5.1.4 Discriminant Power**

Determines the level of correlation between items of one dimension and the score of the others dimensions. The objective should be to determine that the discriminant power demonstrate that the items of one dimension are not measuring the same of the ones in the others. The percentage of discriminant validity success uses the Pearson correlation coefficient between the items and the dimensions.

### **5.1.5 Reliability test retest or intra-observer**

This reliability aims to validate that when the instrument is used by the same evaluators in the same group of participants and the same method in two different moments the obtained results should be the same. The moment should be taken into account because it could cause a different result when applying it with a too long or too short gap of time between them. The Pearson Correlation Coefficient, Spearman-Brown or intraclass coefficient.

### **5.1.6 Validity**

The capability of an instrument to measure the construct that intends to measure. The validity of appearance, of content, of criteria, convergent-divergent and construct. The different types of validity are used according to the scale and the kind of instrument.

#### **5.1.6.1 Validity of Content**

The different items of the instrument represent correctly the dimensions of the construct that is intended to measure. The validity of content determines if the scale guarantees that the problem is covered completely and well represented by its items and dimensions. The factorial analysis method is used to evaluate the dimensions of the instrument that correspond to the construct that is intended to measure. In order to explain the existent correlations between the evaluated items from the identified factors. For which is used the factorial model,

adequacy of the sample, the Barlett sphericity and the Kaiser-Meyer-Olkin (KMO) with rotations like varimax. The score of the factorial saturation should be equal or more than 0.3.

#### **5.1.6.2 Validity of Construct**

The level of which an instrument measures what it claims to be measuring according to a theoretical conceptual framework that allows us to interpret the obtained results. An estimate of the extent to which variance in the measure reflects variance in the underlying construct. From the evaluation of the construct validity it could be concluded either the measure needs to be refined, the construct or even both. The factorial analysis initially exploratory, determining the internal structure of the items and dimensions and then confirmatory to validate the factorial structure supported by the theoretical framework. (21)

#### **5.1.7 Utility**

The instrument should not be found as difficult, complex or expensive to apply. For this evaluation it should be taken into consideration the time used to apply it, the length of the instrument, the simplicity of the structure, the clarity of the questions, if there should be and additional training for the evaluators that apply it. For this phase a pilot pretest should be performed in small groups.

### **6. Peruvian OSH legislation**

Peru is a member of the ILO since 1919 and has ratified 75 conventions among which is the Safety and Health in Mines, 1995 and was ratified on 2008. Perú has ratified 4 ILO conventions about Occupational Safety and Health for safety provisions, maximum weight, occupational cancer and safety and health in mines (14). There are 29 current Peruvian laws on behalf of occupational accidents, professional diseases, pregnant working women, OSH management systems, inspections and other themes concerning safety and health at work.

#### **6.1.1 OSH National Policy**

The Peruvian national policy on Occupational Safety and Health (OSH) was published on 2013, establishes the objective to prevent accidents, occupational diseases and reduce damage that could be caused to the health of workers and workers who are arising out of, relate to work or occurring during work they perform. (15). The OSH National Policy establishes the principles of prevention, integral management, responsibility, universalization, integral health assistance and social dialogue and participation.

#### **6.1.2 Occupational Safety and Health Peruvian Law**

The Peruvian OSH law N° 29783 was first published on 2007 and its last review published on 2012, mandates over the rights and duties on Occupational Safety and Health in Perú (16), it establishes the principles of every OSH management system:

#### **Principle of Prevention**

The employer guarantees in the workplace, the establishment of the means and conditions to protect the life, health and well-being of workers, and those who, having no employment

relationship, providing services or within the scope of the work center. You should consider social, employment and biological factors, differentiated by gender, incorporating the gender dimension in the evaluation and prevention of occupational health risks.

### **Principle of Responsibility**

The employer assumes the economic, legal and any other as a result of an accident or illness suffered by the employee in the performance of their duties or as a result of the, according to current standards implications.

### **Principle of Cooperation**

The State, employers and workers and their unions established mechanisms to ensure ongoing collaboration and coordination of safety and health at work.

### **Principle of Information and Training**

Trade unions and workers receive employer timely and adequate information and training on preventive task to develop, with an emphasis on potentially risky for the life and health of the workers and their families.

### **Principle of Integrated Management**

Every employer promotes and integrates the management of safety and health at work to the general management of the company.

### **Principle of Integral Health Care**

Workers who suffer an accident at work or occupational disease are entitled to health benefits necessary and sufficient to their recovery and rehabilitation, ensuring their reintegration.

### **Principle of Consultation and Participation**

The State promotes mechanisms for consultation and participation of employers and workers' organizations and most representative stakeholders to adopt improved safety and health at work.

### **Principle of Primacy of Reality**

Employers, workers and representatives of both, and other public and private entities responsible for the enforcement of legislation in health and safety at work provide complete and accurate information on the subject. Of any discrepancy between reality and documentary support, the authorities choose what found in reality.

### **Principle of Protection**

Workers are entitled to the state and employers ensure decent working conditions that guarantee them a healthy condition, physically, mentally and socially, life continuously. Such conditions should seek to:

- a) The work is carried out in a safe and healthy environment.

- b) That working conditions are compatible with the welfare and dignity of workers and offer real possibilities for achieving personal goals of employees.

### **Peruvian Workers' rights**

According to the Peruvian OSH legislation the workers' rights are the following:

1. Communication with labor inspectors
2. Protection against acts of hostility
3. Participation in training programs
4. Participation in identifying risks and dangers
5. Adaptation of the job worker
6. Protection of workers, contractors, subcontractors and other workers, whatever their type of contract. They are entitled to the same level of protection as regards safety and health at work.
7. Right of a periodic review of all risk factors

The employer's obligations according to the Peruvian OSH legislation (16):

1. Ensure the safety and health of workers in the performance of all aspects of its work, in the workplace or in connection with it.
2. Develop permanent actions in order to improve existing levels of protection.
3. Identify the changes that may occur in working conditions and provide for measures for the prevention of occupational hazards.
4. Practice medical checkups before, during and at the end of the employment relationship to workers, in line with the risks they are exposed in their work, by the employer.
5. Ensure that the election of workers' representatives take place through trade unions; and failing that, through democratic elections of workers.
6. To ensure real and effective work of the joint committee on health and safety at work, allocating the necessary resources.
7. Ensure timely and appropriately, and training in health and safety in central and specific job or role, as outlined below:
  - a) Upon recruitment, irrespective of the type or duration.
  - b) During the performance of the work.
  - c) When changes occur in the function or job or technology.

As the legislation determines the workers' rights and employer's obligations, inspectors from the Ministry of Labour are empowered to ask for the fulfillment of the works rights.

## **7. Peruvian OSH Prevention**

Peru, as a member of the Andean Community of Nations, has the instrument Safety and Health at Work, which establishes the obligation for Member States to implement a policy of prevention of occupational risks and monitor compliance. The duty of employers to identify, assess, prevent and report workplace hazards to workers; and the right of workers to be informed of the risks of lending activities. (17)

On the Peruvian legislation, one of the principles of the OSH management is about prevention. The employer must guarantee the establishment of the conditions to protect the life, health and well-being of workers in the workplace. As well as for those who are providing services even though they are not employees. (16)(17)

Institutions must establish a Safety and Health Policy that compromise with the protection of the health and safety of all members of the organization by preventing injuries, illness, diseases and work-related incidents. (16) (18)

The regulation of the law 29783 establishes the obligation of companies to implement on behalf of the Safety and Health Management system the need of prevention programs and health promotion. This programs should be orientated on the prevention of the identified risks. (17)

As well, Peruvian legislation establishes the obligation of the employer's to provide training to all workers on behalf of prevention of risks. This training should have the following requirements (17):

- a) Focused on the specific job or function that each worker plays, whatever the nature of the link, form or duration of their contract.
- b) Focused on the changes of the working activities they perform when they occur.
- c) Focused on the changes in technology or in teams, when they occur.
- d) Focused on the measures to adapt to the evolution of risks and the prevention of new risks.
- e) Focused on the periodic updating of knowledge.

Peruvian legislation establishes that the measures of prevention on the Safety and Health Management System should be applied on the following order of priority (16):

1. Elimination of the identify dangers and risks. It must fight and control risks at their source, in the transmission medium and the worker, favoring collective control to the individual
2. Treating, controlling or isolating the hazards and risks, adopting technical or administrative measures.

3. Minimizing the hazards and risks, adopting safe work systems that include administrative control measures.
4. Program and the gradual replacement as soon as possible, procedures, techniques, media, dangerous substances and those that produce less or no risk to the worker products.
5. As the last resource, provide appropriate personal protective equipment, ensuring that workers use and maintain properly.

## **8. Peruvian Tuberculosis OSH legislation**

There are laws and regulations published in the Peruvian legislation that protects workers diagnosed with tuberculosis.

On 2010 a Peruvian strategic multisectorial plan to control Tuberculosis 2010 to 2019 was published by the Ministry of Health which establishes the action lines for the contribution from different sectors. Related to this publication the Ministry of Labor published a methodologic guideline for workplaces to contribute to the tuberculosis control National Plan. Inviting enterprises to contribute by implementing cost effective measures to prevent, identify and avoid worker's tuberculosis spread; being the objective to protect the labor force productivity. The control program should be developed by three basic activities, organization, organizational policy and monitoring. It is recommended that the enterprise include principles of non-discrimination, confidentiality, acknowledge tuberculosis as a labor concern, healthy workplace, support and social dialogue. The framework of the program should be to protect the rights of the affected workers, prevention and support.

In 2015 the Peruvian Congress approved the Law for the prevention and control of tuberculosis in Perú (19). This law determines the responsibility of enterprises, healthcare centers and also people diagnosed of tuberculosis. It describes the rights of the patients that are diagnosed of tuberculosis. Which includes the right of being able to receive continued, free and permanent integral health attention. The integral attention includes different ways of approach, health promotion, prevention activities, diagnose, treatment and rehabilitation. Every person that suffers from tuberculosis has the right of non-discrimination and every claim of discrimination would be investigated by the ministry of justice. The right of education, to be well informed about any medical intervention, to be able to accept or deny any surgical intervention, to be respected about his religious and cultural believes. This law as well declares the duties of the patients that are diagnosed of tuberculosis, which includes to informed about their diagnosis and health history to the healthcare personnel, close friends, family and others that could have been infected. It is a duty of the tuberculosis patients to fulfill the assigned treatment in order to protect his health. As well to contribute to the community wellness by identifying possible new cases and providing guidance to approach a health center for screening. This law has a chapter that describes that cases of occupational tuberculosis should be considered of the tuberculosis that occurs related to the healthcare



working sector. Healthcare personnel have the right of working under circumstances that provides measures that controls de risk of tuberculosis infection.

In 2016 the Peruvian Ministry of Health published the regulation of the Law for the prevention and control of tuberculosis in Perú (20). This regulation specifies the rights of the patients diagnosed of tuberculosis, which includes the right of available free integral treatment, the non-discrimination from the health center or the workplace with the susceptibility of denouncement to the Ministry of Labour and Justice. This regulation specifies the patient right of receiving complete information about tuberculosis, copy of his medical history, being informed about the adverse effects and the right of accepting or denying their participation on research studies. The right of the privacy of his diagnosis is specify as well in this law and another Peruvian Law N°29733, law of protection of personal information, which establishes the definition of personal sensitive information, which includes medical information. On behalf the duties of the diagnosed worker it declares the worker's duty to inform the employer about his diagnose and the employer's duty to assure the respective privacy and non-discrimination acts at the workplace. According to this regulation every workplace private or public has the duty to implement control measures and programs oriented to prevent the tuberculosis transmission. The regulation determines the protection of the labor rights of the worker about the dismissal caused directly of being diagnosed of tuberculosis.

A control program should be implemented after identifying a baseline situational diagnose, understanding the target group, their difficulties, barriers, limitations and perception about Tuberculosis.

The objective of this research is to develop an instrument that is able to explore the healthcare's level of knowledge, attitudes, practices and perceptions about occupational tuberculosis, risk of infection and control measures. Gathering this information related to existing knowledge gaps and behavioral patterns of healthcare personnel may be useful to guide and establishing priorities for prevention programs for tuberculosis control.

#### **9. Knowledge, Attitudes and Practices (KAP) instrument**

The World Health Organization published on 2008 a guideline as part of the Stop TB Partnership for Tuberculosis control, in which a knowledge, attitudes and practices (KAP) instrument is recommended to gather information about a specific population. (24)

A KAP survey is defined as a representative study of a specific population to collect information on what is known, believed and done in relation to a particular topic. (24) This instrument can be useful to identify knowledge gaps, cultural beliefs and behavioral patterns that may be used on prevention programs for tuberculosis control. We can also use it to evaluate communication sources, identify population's problems and perceived control measures' barriers.

### **9.1.1 Developing a KAP instrument**

In order to develop an instrument first there should be performed a thorough literature review. This will tell us if there is already a published instrument that fulfills the information has to be gathered. Even though every instrument should be applied according to the culture and oriented to the specific characteristics of the population we try to evaluate. The literature review will also give us the scientific background we need to elaborate the questions of the survey.

In order to develop a KAP instrument we have to establish the objective of the tool and the potential effect of the outputs. The results should be useful to make decision for a TB prevention program. The guideline establishes 3 main objectives of a KAP instrument, an exploratory instrument that gathers information about a specific population, to test a hypothesis about a proposed intervention strategy or to establish a baseline before any intervention. (24) The objective should be realistic, focused and relevant in order to reflect a clear focus on what we are trying to look for and should be target to the specific characteristics of the selected audience.

The target population is a crucial factor when we develop an instrument, because the same question in different audiences could be understood differently and as well the results. In that sense we should generally identify demographic characteristics, job or social category and other relevant characteristics proper to the audience culture.

On behalf of selecting the sample for the KAP instrument according to the guideline are mainly 3, random, purposeful and convenience sampling. The convenience sampling is a practical method because it produces an estimate without the cost or time required to select a random sample. (24) To determine the sample size and the selecting method we have to take into account the budget and the time it will take.

There should be established a protocol that will guide the implementation as a master plan of the activities, the objectives, the participants and the selected methodology. (24) This protocol should be presented to the appropriate ethics committee regarding the related institution. An ethics approval is recommended because there will be personal information collected and used to delivery reports that will be useful for the TB control program. Related to working with personal information and being a voluntarily participation, there should be implemented an informed consent. Usually the investigator explains the research objective and should let the participants know their right to decline or discontinue their participation on the KAP instrument.

Developing an instrument should take into account the importance of all the settings trying to be suitable for each setting. The questions should be elaborated goal oriented depending on the target of the study, in order to investigate participant's knowledge, attitudes and practices. As well, the guideline recommends not to include questions that are not intended to gathered important information related to TB program decisions. (24) The questions could be open ended and close ended type. After the preliminary instrument is elaborated there is a pre-test phase in order to evaluate how well the questions are understood by the participants. The guideline indicates that this process is an essential step that will determine if the data we

intend to collect is going to be useful. The pre-test phase requires a small group of participants randomly selected from the target group, between 10 to 30 people (24).

### **9.1.2 Research on Knowledge, Attitudes, Practices and Perceptions**

There are some articles related to the evaluation of knowledge, attitudes, practices and perceptions of healthcare personnel about tuberculosis.

On 2004 in Brazil, Muñoz Sanchez et al conducted a qualitative study to identify healthcare worker's perception of tuberculosis through semi-structured interviews to 15 workers. They found perception loaded with stigma related to tuberculosis and patients, fear and resistance to be infected with for the researchers could affect the process of early diagnosis and treatment to patients. (8)

On 2009 in Cuba, Arroyo Rojas et al carried out a cross sectional study in La Lisa municipality an evaluation study of knowledge and perception of health personnel about tuberculosis with a qualitative instrument, a structured questionnaire with open questions about knowledge, measures of prevention and risk perception about tuberculosis. This research found that 94% of the interviewed workers referred to have knowledge but 54.6% achieved bad qualification. As well they found that the group of workers that indicated to be more in contact with patients had a higher risk perception than the workers that were not in contact with patients (6).

On 2013 in Colombia a cross-sectional descriptive study was performed by Carvajal-Barona et al on which they evaluated the knowledge, attitudes and practices of tuberculosis in 38 healthcare workers from 10 main districts of Nariño. They developed a questionnaire and the validation process was through cognitive interviews, asking healthcare workers if the questions were clear and comprehensible (5). The research found that the majority had expected knowledge about Tuberculosis and showed some risk practices concerning biosecurity standards, although the results about knowledge, attitudes and practices were described as individual questions not establishing a clear norm of evaluation.

Although there are several related items there wasn't a published practical and validated instrument that measures knowledge, attitudes and perceptions of occupational tuberculosis among health personnel. (8)

## **10. Objective**

Explore a healthcare sample group on behalf their level of knowledge, attitudes, practices and perceptions about occupational tuberculosis, risk of infection and control measures.

Develop and Validate an instrument to measure knowledge, attitudes and perceptions of healthcare personnel about the risk of developing occupational tuberculosis in a hospital level III Lima Peru.

## **11. Sources**

**University approval:** A dissertation proposal was developed and presented to the University of Turin.

**Hospital's Ethics Committee approval:** The Peruvian hospital that accepted to participate on this research required that a researcher from the hospital should be included. As well they required the approval from the Hospital's Ethics Committee.

**Hospital's Medical Director:** As well the hospital director had to approves the research after the Ethics Committee approval's.

## **12. Methodology**

### **Study Design**

An observational cross sectional study that aims to develop and validate an instrument to measure knowledge, attitudes and perceptions about the risk of developing occupational tuberculosis in a hospital level III Lima Peru, according to the reviewed methodology of instrument validation.

### **Inclusion criteria:**

Hospital staff workers in general with different professions, job position and level of exposure.

Age from 18 to 70 years old.

### **Exclusion criteria:**

Workers with active tuberculosis disease diagnosed by a medical center with or without therapy, declared on the moment of invitation.

### **Procedure**

For this research we asked permission to a level III national hospital in Perú. A research protocol was developed and presented to the hospital's Ethics Committee and approved by June 24<sup>th</sup> 2016.

### **Phase 1: Literature review**

On the first phase we searched for published information about occupational tuberculosis and try to find if there is an instrument that can measure Knowledge, Attitudes and Perceptions on healthcare personnel about occupational tuberculosis.

The search was made on Medline, PubMed, ILO, WHO, PAHO, MINTRA (Peruvian Ministry of Labour), MINSA (Peruvian Ministry of Health), Google Academic, PlosOne, Scielo. The time frame was defined over de last 10 years.

The Mesh items used were the followings:

<b>MeSH Terms</b>
Tuberculosis AND World AND Peru
Tuberculosis AND occupational disease
Perceptions AND Tuberculosis

Occupational tuberculosis AND questionnaires
Risk perceptions AND Tuberculosis AND Healthcare
Conocimientos AND Actitudes AND Percepciones AND Tuberculosis
KAP instruments AND occupational tuberculosis
KAP instruments AND tuberculosis

From the literature review, there were 41 articles selected that gave information about the situation of tuberculosis around the world and in Perú. There is significant less information about occupational tuberculosis and even less about Peruvian occupational tuberculosis.

The most important finding was that there is no developed instrument that measures Knowledge, Attitudes and Perceptions (KAP) of healthcare personnel on behalf occupational tuberculosis.

According to the WHO recommendation about KAP instruments for TB control we could use this instrument to explore or to establish a baseline about the problem we aim to analyze. In that sense, we establish Phase 2 for this research, developing a KAP instrument.

### **Phase 2: Develop a KAP instrument (Validation of Content)**

From the literature review we developed a preliminary KAP instrument with 17 closed ended multiple choice questions segregated by 7 demographics, 6 knowledge, 2 perceptions and 2 attitudes (1 with 6 options).

Type of Information	Questions	
	Version 1	Version 2
<b>Demographics</b>	1,2,3,4,5,6,7	
<b>Self-perceived level of knowledge</b>	8	
<b>Knowledge</b>	9,10,11,12,13	
<b>Risk Perception</b>	14,15	16*
<b>Perception of Place of learning TB</b>		17*
<b>Perception of Control Measures</b>	18	
<b>Practices</b>	19.1,19.2,19.3,19.4,19.5,19.6	
<b>Attitudes</b>		20*,21*

\* New questions recommended by experts

All the questions were based on published and scientific information about required demographic information, definition of tuberculosis, cause and contagious ways of tuberculosis, definition of occupational disease, risk perception levels and control measures for tuberculosis control implemented on Peruvian hospitals. (Annex 01)

A glossary of terms was established gathered from the literature review and according to the Peruvian culture and legal definitions (Annex 02)

## Validation of the Content

In order to ensure the content validity, we selected a group of experts to review and comment about the instrument. The experts selected were 2 pulmonologists, 2 infectious diseases specialists, 1 epidemiologist and 1 methodologist.

We explained to the experts the objective of the research and the instrument. They were asked to review and analyze each question of the instrument in terms of clarity and relevancy related to the aim of the research. The experts were asked to first review the whole instrument and eliminate or modify the items of the first version of the instrument; as well to recommend, if needed, additional questions to achieve the goal of the research.

They were asked to rate on 4 points scale the questions related to knowledge, attitudes and practices to answer the following general question “How well does the question evaluate?” with the scale categorized from 1 to 4 being 1 disagree, 2 evaluates improperly, 3 evaluates partially, 4 agree.

The analysis of the results determined that the Content Validity Index for Items (ICVI) was 0.83 for questions 8,9,10 and 11 and 1.00 for 12,13,14,15,16 and 17. For 6 experts the index results should be no lower than 0.78. (22) (Table A)

The Content Validity Index for Scale (SCVI) results was 0.93, which says the proportion of items on an instrument that achieved a rating of 3 or 4 by the content experts.

**Table A**

Experts	Evaluated Questions									
	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17
Pulmonologist 1	4	4	4	4	4	4	4	4	4	4
Epidemiologist expert on Tuberculosis	2	2	2	2	4	4	4	4	4	4
Pulmonologist 2	3	4	4	4	4	4	3	4	4	4
Epidemiologist expert on methodology	4	4	4	4	4	4	4	4	4	4
Medical Resident of Infectious Diseases	4	4	4	4	3	4	4	4	4	4
Infectious Diseases expert	4	4	4	4	4	4	4	4	4	4
I-CVI (Content Validity Index for items)	0.83	0.83	0.83	0.83	1	1	1	1	1	1
S-CVI (Content Validity Index for Scales)						Total Scale			0.93	0.93

According to this results we can determine that the validity of the content through the experts' evaluation is approved.

The experts agreed to add additional questions to the instrument that gather information of worker's perception of the institution where they have learned about tuberculosis, the frequency of the worker attending to the hospital's training on tuberculosis, if the worker has attended to a tuberculosis course in the last 6 months and about their perception of which area has a higher risk of tuberculosis infection. Developing a second version of the instrument with 21 closed ended multiple choice questions including them. (Annex 03)

### Phase 3: Validation of Context Pre Test

The principal investigator and an assistant from the hospitals research unit invited a first group of 10 workers conveniently selected to perform the KAP instrument and a comprehension evaluation survey of the questions. At first the verbal informed consent was read and everyone agreed to voluntarily participate. There were no questions or doubts even when we asked for them.

They were asked to review and answered each question of the KAP instrument first. After they finished we gave them an additional comprehension evaluation survey explaining them that they have to answer the following general question “How easy, comprehensive and simple to answer are the following questions?”. The scale was from 1 to 4 being 1 disagree, 2 evaluates improperly, 3 evaluates partially, 4 agree.

The results of this survey shows that 90% of all the answers were between level 3 to 4 and 80% of the answers were evaluated on the top level 4 (agree).

**Table B:**

Participants	Questions													
	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21
P1	4	4	4	4	4	4	4	4	3	3	1	4	3	4
P2	4	4	4	4	4	4	4	4	4	4	4	4	4	4
P3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P4	3	3	3	3	3	4	4	3	4	3	4	3	4	3
P5	4	4	4	4	4	4	4	4	4	4	4	4	4	4
P6	4	4	4	4	4	4	4	4	4	4	4	4	4	4
P7	4	4	4	4	4	4	4	4	4	4	4	4	4	4
P8	3	4	4	4	4	4	4	4	4	4	4	4	4	4
P9	4	4	4	4	4	4	4	4	4	4	4	4	4	4
P10	4	4	4	4	4	4	4	4	4	4	4	4	4	4
% Level 3 and 4	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
% Level 4 (Agree)	70%	80%	80%	80%	80%	90%	90%	80%	80%	70%	80%	80%	80%	80%

After this results we invited a second group conveniently selected of 65 workers to respond the KAP instrument. The Verbal Informed Consent was also read and we asked for doubts or problems on solving the questionnaire but none expressed any doubts.

### Internal Structure Validity

Even though the KAP TB guideline doesn't indicate a psychometric revision we tried to analyze which questions could have a structural validation. The psychometric revision of the internal structure validity was performed using quantitative tools. On this sense, an adjustment of the instrument was done, eliminating the question 10 (Item 10), selecting the

questions that showed were unidimensional, selecting 9,11,12 and 13 questions for the TB Knowledge scale and the question 19 with 6 options as a TB Practices scale. We performed an exploratory factor analysis (40) using the principal components method on a tetrachoric correlation matrix (Tables C and D). For selecting retained factors, we performed a parallel analysis. The sphericity assumption was verified by Bartlett Test, while the sampling adequacy was assessed by the Kaiser-Meyer-Olkin index.

**Table C. Tetrachoric correlations matrix, means and standard deviations of items from the TB Knowledge scale (N=65).**

	Item 9	Item 11	Item 12	Item 13	<i>mean</i>	<i>sd</i>
Item 9	1.00				16.92	7.27
Item 11	0.71	1.00			13.54	9.43
Item 12	0.53	0.27	1.00		14.46	9.02
Item 13	0.34	0.47	0.54	1.00	18.15	5.83

*Items dichotomous: 0 (zero) or 20 (twenty)*

*sd=standard deviation*

The tetrachoric correlations matrix between the Attitudes scale is a semi positive matrix, where we find a negative correlation (-0.14). According to a purely statistical validation recommendation the item 19.1, the use of N95 Particulate Filtering Face piece Respirators, should be eliminated, achieving a higher correlation index.

**Table D. Tetrachoric correlations matrix, means and standard deviations of items from the TB Practices scale (N=65).**

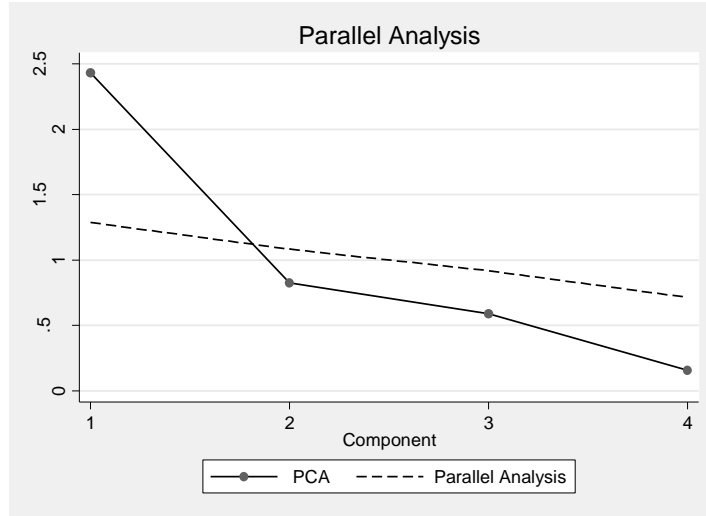
	Item 19.1	Item 19.2	Item 19.3	Item 19.4	Item 19.5	Item 19.6	<i>mean</i>	<i>sd</i>
Item 19.1	1.00						0.65	0.48
Item 19.2	0.25	1.00					0.58	0.50
Item 19.3	0.13	0.26	1.00				0.31	0.47
Item 19.4	-0.14	0.45	0.20	1.00			0.51	0.50
Item 19.5	0.29	0.69	0.37	-0.01	1.00		0.22	0.41
Item 19.6	0.05	0.77	0.31	0.65	0.56	1.00	0.28	0.45

*sd=standard deviation*

The selection of the questions 9,11,12 and 13 of the instrument determined a TB Knowledge scale which showed strong unidimensionality after subtracting one heterogeneous item, which was the item number 10 from the original instrument. The eigenvalue for factor #1 was 2.43, which explains 61% of the variability of the four retained items. Other factors had eigenvalues less than 1 and, after applying the parallel analysis, the scree plot (Figure A) suggests preserving just one-factor. We verified the sphericity assumption (Bartlett Test  $p < 0.001$ ) and sampling adequacy (Kaiser-Meyer-Olkin, Overall KMO=0.41), concluding that it was poor. This poor value of KMO show us that the sample size was small for this validation process for a dichotomous items instrument.

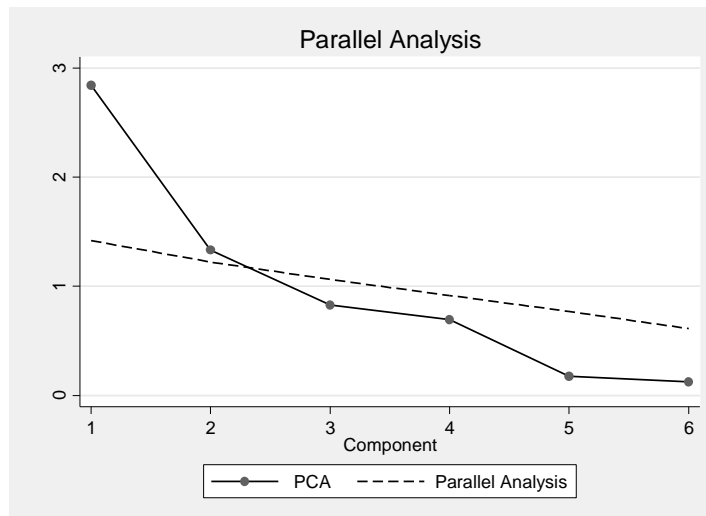
Figure A. Scree plot of the parallel analysis for the TB Knowledge scale.





The TB Practices scale showed moderate unidimensionality without subtracting any heterogeneous item. There was one heterogeneous item (19.1) identified but after the analysis it was preserved because of domain representativeness need, according to the content validity review, which is the use of N95 Particulate Filtering Face piece Respirators. The eigenvalue for factor #1 was 2.84, which explains 47% of variability of all the 6 items. After parallel analysis, the scree plot (Figure B) suggests preserving also a second factor: eigenvalue for factor #2 was 1.33, which explains 22% of the variability of the six items (cumulative 69%). We verified the sphericity assumption (Bartlett Test  $p < 0.001$ ) and sampling adequacy (Kaiser-Meyer-Olkin, Overall  $KMO = 0.59$ ), concluding that it was poor. As well this  $KMO$  low value demonstrate that the sample size should be increased or more pilot groups show be developed.

Figure B. Scree plot of the parallel analysis for the TB Practices scale.



## Reliability

On respect of the reliability analysis it was recommended by the statistician to use the Kuder-Richarson´s formula (KR-20), one specifically designed for assessing internal consistency of dichotomous items (41). First, each item was recoded in order to make them scaled from 0 to 1, being 1 the correct answer and 0 the wrong ones. Then, we used KR-20 formula and – additionally - calculated estimates of item difficulty (mean), item variance and item rest correlation.

The TB Knowledge scale has a KR-20 equal to 0.59 and the TB Practices scale has a KR-20 equal to 0.59 too, both signals of moderate reliability. The next tables show details about the other mentioned estimates.

**Table E. Item difficulty, item variance and item-rest correlations for the TB Knowledge scale.**

Item	Observations	Item difficulty	Item variance	Item-rest correlation
Item 9	65	0.85	0.13	0.46
Item 11	65	0.68	0.22	0.37
Item 12	65	0.72	0.20	0.32
Item 13	65	0.91	0.08	0.31
Test	***	0.79	***	0.37

The TB Knowledge scale (Table E) has a moderate variety of items – considering their difficulty-, from the easiest (item 13 with 91% of correct answers) to the hardest (item 11 with 68% of correct answers). Usually, a bigger difference of percentages between the easiest item and the hardest item is expected, in order to avoid ceiling or floor effects. The item variance was dissimilar among items and never bigger than 0.22, what does not help to control the previous limitation. The item-rest correlations had an average of 0.37, what reflects moderate internal consistency.

**Table F. Item frequency, item variance and item-rest correlations for the TB Practices scale.**

Item	Observations	Item frequency	Item variance	Item-rest correlation
Item 19.1	65	0.65	0.23	0.10
Item 19.2	65	0.58	0.24	0.50
Item 19.3	65	0.31	0.21	0.24
Item 19.4	65	0.51	0.25	0.24
Item 19.5	65	0.22	0.17	0.36
Item 19.6	65	0.28	0.20	0.50
Test	***	0.42	***	0.32

The TB Practices scale (Table F) has a good variety of items related to practices – considering their frequency-, from the most frequent (item 19.1 with 0.65) to the less frequent (item 19.5 with 0.22). The item variance was similar for each item and the worst item-rest correlation index was 0.10 (item 19.1). Despite of this low correlation (0.10), this item was preserved in order to maintain an enough representation of the practices domain (content validity).

### Norm

The design of the grading criteria, using a standard procedure. The raw scale (sum of items) does not have a complete meaning until there is a cut-off points system well defined (levels of TB knowledge or practices). Here, we have defined the standard procedure as follows:

- a) For the TB knowledge scale, each item is graded with zero (0) when respondent selects an incorrect answer; and with twenty (20) when respondent selects the correct answer. The sum of all items is divided by 80 and multiplied by 100. The result must be read as follows:

**Table G. Grading criteria for TB Knowledge scale.**

Transformed scale	Sample Frequency	Level
0	2	Very limited knowledge
25	4	
50	8	Limited knowledge
75	19	Modest knowledge
100	32	Good knowledge

- b) For the TB practices scale, each item is graded with zero (0) when respondent selects an incorrect answer; and with one (1) when respondent selects the correct answer. The sum of all items is divided by 6 and multiplied by 100. The result must be read as follows:

**Table H. Grading criteria for TB Practices scale.**

Transformed scale	Sample Frequency	Level
16.67	27	Bad Performance
33.33	6	
50	14	Moderate Performance
66.67	11	
83.33	2	Good Performance
100	5	

### 13. Results

#### Analysis of data

The data results of the 65 questionnaires were analyzed on the SPSS version 24 statistical software.

#### Demographic characteristics

The demographic characteristics of the 65 healthcare workers that voluntarily participated responding the questionnaires showed that the sample's gender was mostly female with 64.6% (42 workers) and between 26 to 34 years old with 35.4% (23 workers). On behalf of their job position the majority were administrative staff with a 26,2% (17 workers) and physicians with 20% (13 workers). Although when the participants were asked about their working area their response was mostly segregated by administrative area 33.8% (22 workers), hospitalization area 21.5% (14 workers) and emergency 18.5% (12 workers). When the participants were asked about the frequency on which they were in contact with patients, 50.8% of them (33 workers) responded always and only 6.2% (4 workers) never. (Table I)

<b>Table I: Demographic characteristics (N=65)</b>		
<b>Age</b>		
	<b>Frequency</b>	<b>Percentage</b>
18 – 25	14	21,5
26 – 34	<b>23</b>	<b>35,4</b>
35 – 45	14	21,5
46 – 59	11	16,9
60+	3	4,6
<b>Gender</b>		
	<b>Frequency</b>	<b>Percentage</b>
Female	<b>42</b>	<b>64,6</b>
Male	23	35,4
<b>Job Position</b>		
	<b>Frequency</b>	<b>Percentage</b>
Physician	13	20,0
Nurse	6	9,2
Nursing technician	5	7,7
Administrative Staff	<b>17</b>	<b>26,2</b>
Medical Resident	9	13,8
Medical Intern	1	1,5
Other	14	21,5
<b>Working Area</b>		
	<b>Frequency</b>	<b>Percentage</b>

Emergency	12	18,5
Hospitalization area	14	21,5
Laboratory	8	12,3
Triage	1	1,5
Consulting offices	8	12,3
Administrative Area	<b>22</b>	<b>33,8</b>
<b>Contact with patients</b>		
	<b>Frequency</b>	<b>Percentage</b>
Never	4	6,2
Rarely	7	10,8
Sometimes	8	12,3
Frequently	13	20,0
Always	<b>33</b>	<b>50,8</b>

### Perceived level of knowledge and TB Knowledge scale

The perceived level of knowledge about Tuberculosis is not related significantly with their results on the scale of knowledge on the instrument, achieving a Fisher's exact test=8 with a significance level of  $p=0.17$  and a Tau-b Kendall=0.15 with a significance level of  $p=0.20$  (being both  $p$  higher than 0.05). However, 19% of the participants declares to have a good and very good level of knowledge but actually achieved on the scale of limited or very limited knowledge and 26% an acceptable level. From the participants only 55% actually have the good level of knowledge that they perceive. (Table J)

**Table J: Cross table. How do you think is your knowledge about Tuberculosis? \* TB Knowledge scale (level)**

		TB Knowledge scale (level)				Total	
		Very limited knowledge	Limited knowledge	Modest knowledge	Good knowledge		
How do you think is your knowledge about Tuberculosis?	Very poor & poor	Count	1	0	3	0	4
		%	25,0%	0,0%	75,0%	0,0%	100,0%
	Acceptable	Count	1	4	5	9	19
		%	5,3%	21,1%	26,3%	47,4%	100,0%
	Good & very good	Count	4	4	11	23	42
		%	9,5%	9,5%	26,2%	54,8%	100,0%
Total	Count	6	8	19	32	65	
	%	9,2%	12,3%	29,2%	49,2%	100,0%	

## TB prevention course Attendance and TB Knowledge scale

The worker's statement on behalf the attendance to a course about TB prevention during the last 6 months is not related significantly to the achieved level of knowledge on the instrument obtaining a Fisher's exact test=5 with a significance level of  $p=0.17$  (being  $p$  higher than 0.05). Even though the participants that declared a positive attendance on the last 6 months have demonstrated some advantages like almost 23% more on level of very good knowledge of the scale, as well from this group none were on the level of very limited knowledge compared to the 13% that declared nonattendance. But these are not enough to conclude a significant relation between variables. (Table K)

**Table K: Cross table. Have you attended to any kind of course about TB prevention during the last 6 months? \* TB**

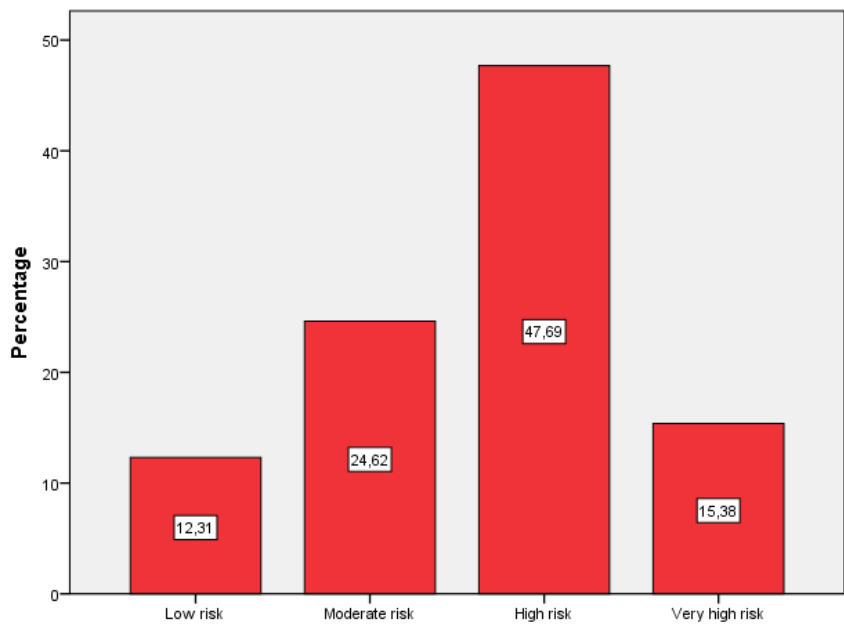
			Knowledge scale (level)				Total
			Very limited knowledge	Limited knowledge	Modest knowledge	Good knowledge	
Have you attended to any kind of course about TB prevention during the last 6 months?	No	Count	6	5	15	19	45
		%	13,3%	11,1%	33,3%	42,2%	100,0%
	Yes	Count	0	3	4	13	20
		%	0,0%	15,0%	20,0%	65,0%	100,0%
Total		Count	6	8	19	32	65
		%	9,2%	12,3%	29,2%	49,2%	100,0%

## Risk perception independent questions

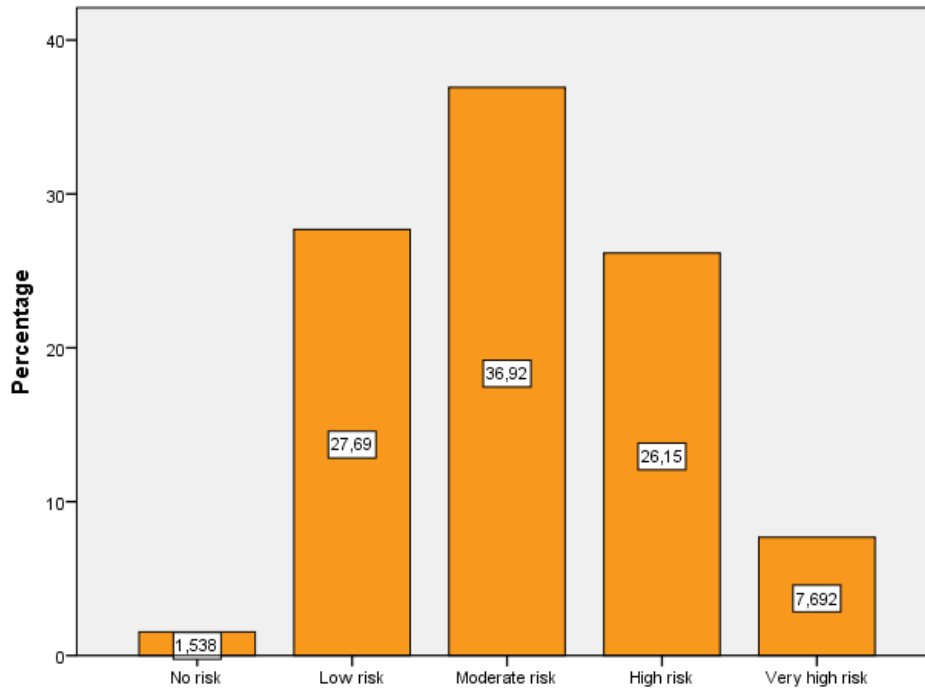
On behalf, the risk perception of contracting tuberculosis at the workplace doing working activities, 12.3% (8 workers) perceived there is low risk. (Table L) (Figure C) When the workers were asked about their perception of the level of risk on contracting tuberculosis outside the workplace 29.2% (19 workers) they perceived none and low risk, in comparison with the Peruvian TB incidence rate and the published correlation between the number of public transportation routes and the tuberculosis status (13).(Table M) (Figure D) According to the risk perception findings the perceived risk at the workplace is higher than outside comparing the 12.3% low risk at the workplace versus the 29.2% of none and low risk outside.

**Table L: What do you think is the level of risk of contracting tuberculosis doing working activities?**

	Frequency	Percentage	Valid Percentage	Accumulated Percentage
Valid Low risk	8	12,3	12,3	12,3
Moderate risk	16	24,6	24,6	36,9
High risk	31	47,7	47,7	84,6
Very high risk	10	15,4	15,4	100,0
Total	65	100,0	100,0	



**Figure C: What do you think is the level of risk of contracting tuberculosis doing working activities?**



**Figure D: What do you think is the level of risk of tuberculosis outside of work? (On the street, microbus, bus, etc.)**

**Table M: What do you think is the level of risk of tuberculosis outside of work? (On the street, microbus, bus, etc.)**

	Frequency	Percentage	Valid Percentage	Accumulated Percentage
No risk	1	1,5	1,5	1,5
Low risk	18	27,7	27,7	29,2
Moderate risk	24	36,9	36,9	66,2
High risk	17	26,2	26,2	92,3
Very high risk	5	7,7	7,7	100,0
Total	65	100,0	100,0	

On behalf, the working area risk perception 83% (54 workers) of the participants identified the emergency and triage as the ones with the highest risk. (Table N)



**Table N: Which do you think is the area with the highest risk of transmission of tuberculosis?**

	Frequency	Percentage	Valid Percentage	Accumulated Percentage
Emergency	53	81,5	81,5	81,5
Hospitalization	9	13,8	13,8	95,4
Valid Triage	1	1,5	1,5	96,9
Consulting offices	2	3,1	3,1	100,0
Total	65	100,0	100,0	

The perceived working area with the highest risk of TB transmission relation with the participants working area indicates that from the group of workers that are currently at a high risk area 92.3% properly identified it and 7.7% does not recognized it. From the group of workers that are currently working at a lower risk area, 80.8% identifies correctly the highest risk areas. (Table P)

**Table P: Cross table. Work Area Real Risk \* Correct Classification of Area Risk (Perception)**

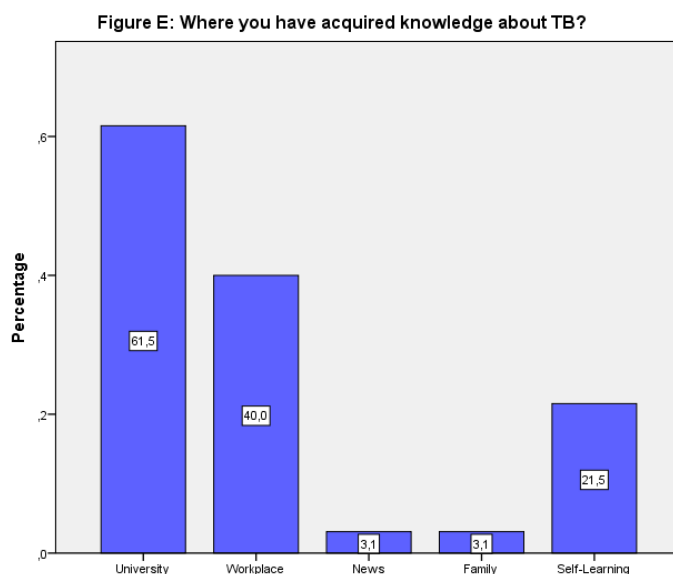
			Correct Classification of Area Risk (Perception)		Total
			Low risk	High risk	
			Work Area Real Risk	Low risk	Count
%	19,2%	80,8%			100,0%
High risk	Count	1		12	13
	%	7,7%		92,3%	100,0%
Total	Count	11	54	65	
	%	16,9%	83,1%	100,0%	

### Training and Workplace

The participants were asked on behalf where did they consider have learned about Tuberculosis with the option of selecting more than one. The workplace was selected by 40% of the participants as an important place of where they consider have acquired knowledge about TB, being for 61.5%, the majority, the University. (Figure E)

There is no significant relation between the worker’s election of the workplace as an important place of acquiring knowledge about TB and the frequency on which they attend to training offered by the same place, because of a Fisher’s exact test=7 and a significance level of p=0.12 (higher than 0.05). However, the positive attitude to attend to workplace training,

as always and almost always, is identified on the 50% of workers that recognized it as an important source for acquiring TB knowledge. (Table Q)



**Table Q: Cross table. Workplace \* Are you attending to the training offered by your workplace?**

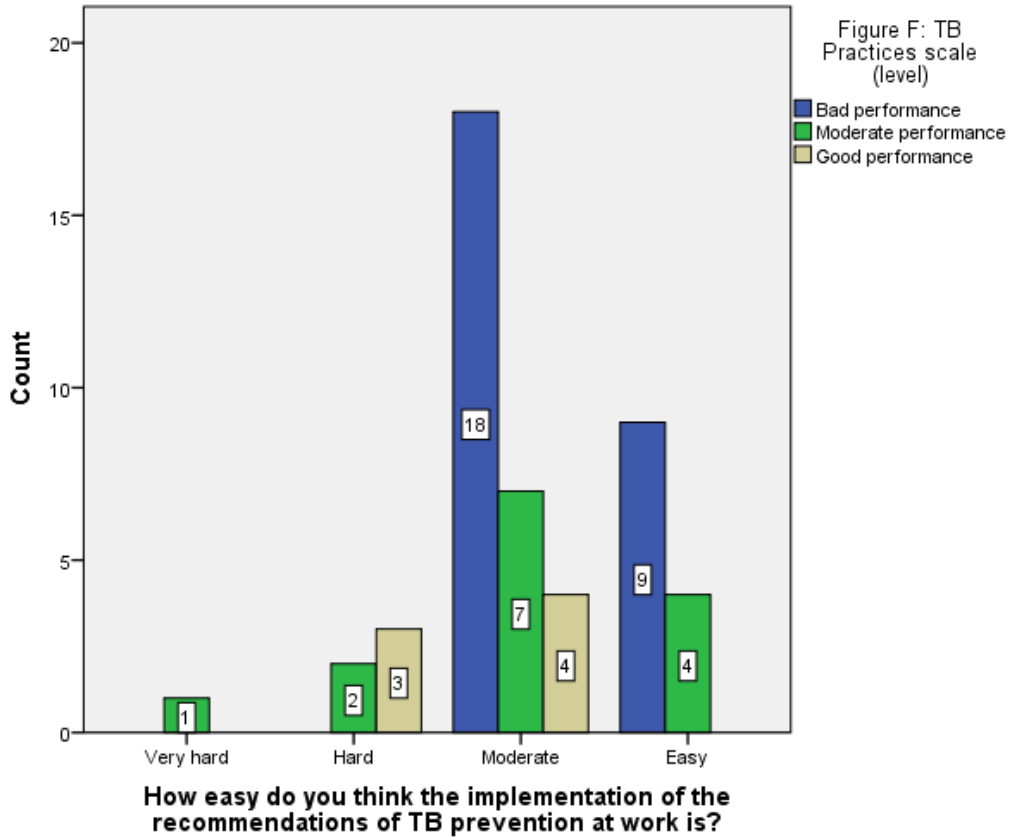
		Are you attending to the training offered by your workplace?					Total	
		Never	Almost never	Sometimes	Almost always	Always		
Workplace	No	Count	4	7	20	7	1	39
		% Workplace	10,3%	17,9%	51,3%	17,9%	2,6%	100,0%
	Yes	Count	2	4	7	12	1	26
		% Workplace	7,7%	15,4%	26,9%	46,2%	3,8%	100,0%
Total		Count	6	11	27	19	2	65
		% Workplace	9,2%	16,9%	41,5%	29,2%	3,1%	100,0%

### Perception about the controls measures and TB practices scale

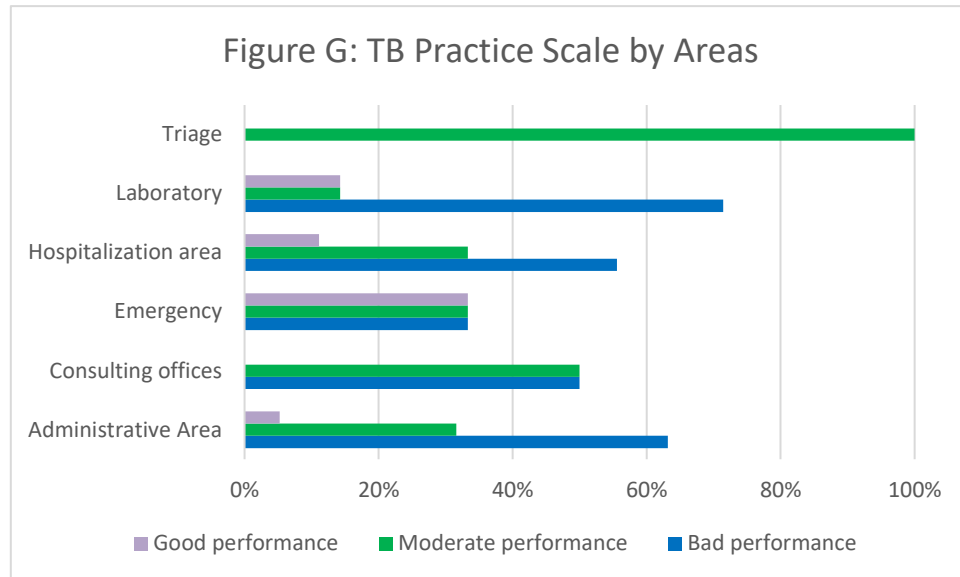
The worker's perception on the level of difficulty to implement the control measures of Tuberculosis prevention has a negative (inverse) correlation with the results on the TB Practice scale, achieving a Fisher's exact test=14 with a significance level of  $p=0.01$  and a Tau-b Kendall=0.34 with a significance level of  $p=0.01$  (being lower than 0.05). We can see on Table R the correlation between the variables, which indicates that the workers who perceived that the control measures are easy to apply are the ones that has the worst performance applying them, according to the TB Practice scale. (Figure F)

**Table R: Cross table. How easy do you think the implementation of the recommendations of TB prevention at work is? \* TB**

		Practices scale (level)			Total	
		TB Practices scale (level)				
		Bad performance	Moderate performance	Good performance		
How easy do you think the implementation of the recommendations of TB prevention at work is?	Very hard	Count	0	1	0	1
		%	0,0%	100,0%	0,0%	100,0%
	Hard	Count	0	2	3	5
		%	0,0%	40,0%	60,0%	100,0%
	Moderate	Count	18	7	4	29
		%	62,1%	24,1%	13,8%	100,0%
	Easy	Count	9	4	0	13
		%	69,2%	30,8%	0,0%	100,0%
	Total	Count	27	14	7	48
		%	56,2%	29,2%	14,6%	100,0%



On the analysis of the results of the TB Practice Scale by Areas, the major percentage of bad performance are in Laboratory, Administrative Area and Hospitalization. Another important result is that in a high-risk area as Emergency only 33% achieved a Good Performance and a 66% are bad and moderate performance. (Figure G)



## 14. Conclusions

Tuberculosis among healthcare personnel is still an important disease all around the world but predominant in developing countries. Peru has one of the highest number of TB cases in the Americas reported during 2015. (1) Although in the same year there are none occupational tuberculosis reported to the Ministry of Labour, which shows an underreported status specifically on this disease. There should be more efforts on the research field to understand the causes and improvement opportunities, the importance of establishing a baseline and exploring the level of knowledge, attitudes, perceptions and practices of healthcare personnel on behalf the risk of developing tuberculosis as an occupational disease.

On this research a novel form of a KAP instrument was propose and validated. The content validity was performed by the experts review method achieving a Content Validity Index for Items (ICVI) of 0.83 and a Content Validity Index for Scale (SCVI) of 0.93 proving a favorable approval of all the items of the instrument. On the psychometric analysis, the validation as scales determined from the set of questions only 2 unidimensional scales TB Knowledges and Practices proved to be positive interrelated and unidimensional. According to the characteristic of the dichotomous items of the instrument the statistician recommended Kuder-Richarson´s formula (KR-20) for assessing internal consistency, achieving a moderate reliability of 0.6, which is enough for assessing groups but not enough for assessing individuals (42). Their results can be understood by following the norm we developed here. In this sense, both scales have internal and content validity. Others items of the instrument only have content validity and must be used individually.

On the analysis of the data achieved on a sample size of 65 workers conveniently selected and asked their voluntarily participation from a III level hospital in Lima that approximately has 2500 workers.

The TB Knowledge scale showed that the majority of the participants had a Good Knowledge level about tuberculosis 49% and 9% a very limited and limited knowledge. The TB Practices scale showed that 51% had a bad performance level on applying control measures, selecting 1 to 2 from 6 of them, as well only 11% achieved a good performance level selecting 5 to 6 control measures. Considering that all the participants were healthcare personnel at an important level III hospital and being tuberculosis a crucial biological hazard for them, a higher percentage of good knowledge level should be found.

This study compared the auto perceived level of knowledge and the TB knowledge scale finding no significant correlation, even though an important result showed that only 55% of the participants have the good level of knowledge that they perceived. The same scale was compared with the question that asked for attendance to a course about tuberculosis prevention on the last 6 months finding as well no significant correlation. However, the group of workers that declared a positive attendance on the last 6 months showed 23% more on very good knowledge level. This advantage and a significance level of 0.17 could change with a bigger sample size. As well, this advantage on the level of knowledge could be showing some efforts of the organization on developing training at the workplace, even though there are not achieving an acceptable level.

There were two questions about risk perception at the workplace and outside, we found that there are 12.3% of workers that perceived a low risk at workplace and a 29.2% perceived non and low risk outside. Considering the Peruvian incidence rate of tuberculosis, the high demographic density in Lima, previous research that showed high risk of transmission at hospitals and the previously exposed research about public transportation related directly with tuberculosis, indicating none or low risk at workplace and outside could be understood as underestimating the risk. This could be approach with proper training to healthcare workers, if they do not perceive the risk they won't be able to implement controls and even identify occupational cause of tuberculosis.

Previous research has shown that the highest risk area for tuberculosis transmission at a hospital are emergency and triage. The results indicate that 83% of the participants identified high risk areas correctly but when comparing the answers with the participant's working area we found that 7.7% of workers that are currently at a high-risk area does not recognized it. If the worker does not recognize the high-risk area even though he develops daily activities in there, the perceived risk is underestimated and the probability of tuberculosis transmission would be higher.

A question in the instrument was intended to identify the worker's perception on the level of difficulty to implement the control measures of tuberculosis prevention. We analyzed if there was a relation between this perception and the TB practices scale result, finding there was a negative correlation with a Fisher's exact test=14 and a significance level of  $p=0.01$  also a Tau-b Kendall=0.34 with a significance level of  $p=0.01$ . Meaning that when the worker

perceived that the control measures are easy to apply they achieved a bad performance on the TB Practice scale. This could be understood as a lack of knowledge about properly applying all the required control measures to avoid tuberculosis transmission. Employers should make sure that all workers understand the control measures and acquired the ability to properly apply them.

This research faced an important limit on the validation of the instrument on behalf the small sample group and the expected bigger sample on the higher risk areas of the hospital. Another identified missing information of the sample is the length of working time in order to correlated with the results. This study proposes a novel form of a KAP instrument which requires a deeper psychometric study to improve the validity and reliability with a bigger sample size because of the characteristic of the dichotomous items of the instrument. There should be more research to extensively validate this instrument among Peruvian healthcare personnel.

## 15. Time and resources

Activities	Responsible	Apr	May	Jun	Jul	Aug	Sep
<b>Planning</b>							
<b>Developing the instrument</b>							
Literature review	Investigator						
Questionnaire development	Investigator						
Review and approval	Mentor						
<b>Participants</b>							
Invitation letters to Hospitals	Letters						
Ethics Committee Approval	Peruvian Hospitals						
<b>Intervention</b>							
Experts Validation	Investigator						
Pretest (Pilot)	Investigator						
<b>Analysis</b>							
Data analysis	SPSS						
<b>Results</b>							
Evaluation of results	Investigator						
Developing Dissertation	Investigator						

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## 17. Annexs

### Annex 01: KAP Questionnaire version 1

*Te invitamos a completar de forma voluntaria y anónima este cuestionario de 15 preguntas. Tu participación nos ayudará a conocer mejor los conocimientos, actitudes y percepciones sobre la enfermedad de tuberculosis en el Perú.*

1. ¿Eres personal de Salud en el Hospital?
  - a. Sí
  - b. No
2. Por favor indica el nombre del Hospital para el que trabajas:  
\_\_\_\_\_
3. Por favor indica tu puesto de trabajo:
  - a. Médico
  - b. Enfermera
  - c. Técnico de enfermería
  - d. Personal Administrativo
  - e. Medico Residente
  - f. Interno de Medicina
  - g. Otro: \_\_\_\_\_
4. Por favor indica tu área de trabajo:
  - a. Emergencia
  - b. Hospitalización
  - c. Laboratorio
  - d. Triage
  - e. Consultorios
  - f. Area Administrativa
5. ¿Con qué frecuencia estas en contacto con pacientes durante tu día de trabajo?
  - a. Nunca
  - b. Muy pocas veces
  - c. Algunas veces
  - d. Casi siempre

- e. Siempre
6. Por favor indica tu edad (años):
- a. 18 – 25
  - b. 26 - 34
  - c. 35 – 45
  - d. 46 - 59
  - e. 60 +
7. Por favor indica tu género:
- a. Femenino
  - b. Masculino

Por favor responde a las siguientes preguntas:

8. La enfermedad de Tuberculosis es causada por:
- a. Bacteria
  - b. Virus
  - c. Hongo
  - d. Parasito
  - e. Priones
9. La Tuberculosis es transmitida por:
- a. Exposición a la tos de una persona infectada
  - b. Por darle la mano a un paciente
  - c. Por heridas punzocortantes, cortes o transfusión sanguínea.
  - d. Ninguno
  - e. Todos
10. El paciente con tuberculosis deja de contagiar cuando:
- a. Inicia el tratamiento específico anti tuberculosis
  - b. La baciloscopia de control durante el tratamiento es negativa
  - c. Cuando el paciente empieza a alimentarse adecuadamente
  - d. El paciente con tuberculosis nunca deja de contagiar

e. Ninguno

11. ¿Qué es una enfermedad ocupacional?

- a. La enfermedad contraída como resultado de la exposición de factores de riesgo derivados exclusivamente de la actividad laboral.
- b. La enfermedad contraída en el mismo distrito donde se encuentra el centro de trabajo.
- c. La enfermedad con múltiples causas, donde los factores ambientales toman importancia junto con los factores de riesgo del centro de trabajo.
- d. Cualquier enfermedad que ocasione descanso médico durante la vigencia del contrato.
- e. No se

12. ¿La enfermedad de tuberculosis podría ser considerada una enfermedad ocupacional para el personal de salud?

- a. Sí
- b. No

13. Para ti, ¿Cuál crees que es el nivel de riesgo de contraer tuberculosis haciendo tus actividades de trabajo?

- a. No hay riesgo
- b. Riesgo Bajo
- c. Riesgo Medio
- d. Alto riesgo
- e. Muy alto riesgo

14. Para ti, ¿Cuál crees que es el nivel de riesgo de contraer tuberculosis fuera de tu trabajo? (En la calle, micro, bus, etc.)

- a. No hay riesgo
- b. Riesgo Bajo
- c. Riesgo Medio
- d. Alto riesgo
- e. Muy alto riesgo

15. Por favor marca las formas en las que previenes la tuberculosis en tu trabajo.

- a. Usando el Respirador N95.

- b. Adecuada ventilación en las áreas de trabajo.
- c. Asistiendo y aprendiendo de las charlas de tuberculosis.
- d. Me alimento con una dieta nutritiva y balanceada.
- e. Tengo mi vacuna de BCG.
- f. Me lavo las manos frecuentemente.

Gracias por tu participación en esta encuesta de salud.

## Annex 02: Glossary of terms

**“Trabajador” (Worker):** Every person that develops an activity either regular or temporarily for someone else and paid. “Toda persona, que desempeña una actividad de manera regular o temporal por cuenta ajena y remunerada o de manera independiente o por cuenta propia.”

**“Área de Trabajo” (Working area):** The physical place where workers develop their labor. “Lugar en donde los trabajadores desempeñan sus labores.”

**“Capacitación” (Training):** Activity that consists on giving theoretical and practical knowledge to the participants. “Actividad que consiste en instruir conocimientos teóricos y prácticos del trabajo a los participantes.”

**“Control de Riesgos” (Risk’s control):** It is the decision-making process, using the information obtained in the risk assessment, to treat and / or reduce risks, to implement corrective measures, enforce and periodic evaluation of its effectiveness. “Es el proceso de toma de decisión, mediante la información obtenida en la evaluación de riesgos, para tratar y/o reducir los riesgos, para implantar las medidas correctoras, exigir su cumplimiento y la evaluación periódica de su eficacia.”

**“Enfermedad Ocupacional” (Occupational Disease):** The disease that is developed because of the exposure to risk factors inherent of the work activity physical, chemical, biological and ergonomic agents. “Enfermedad contraída como resultado de la exposición a factores de riesgos como agentes físicos, químicos, biológicos y ergonómicos, inherentes a la actividad laboral.”

**“Equipos de Protección Personal” (Personal Protective Equipment):** Specialized equipment that aims to be used adequately by the worker in order to be protected from one or more risks that could threaten the health and safety of him. “Los dispositivos específicos destinados a ser utilizados adecuadamente por el trabajador para que le protejan de uno o varios riesgos que puedan amenazar su seguridad o salud en el trabajo.”

**“Riesgo Laboral” (Working risks):** The probability that the exposure to a working hazard causes a disease or an injury to the worker. “Probabilidad de que la exposición a un factor ambiental peligroso en el trabajo cause enfermedad o lesión.”

**“Percepción” (Perception):** It is the constructive active process in which the perceiver, before processing the new information and data files on his awareness, builds an anticipatory information scheme, which allows you to compare the stimulus and accept or reject it as fit or not to proposed scheme. “Es un proceso activo-constructivo en el que el perceptor, antes de procesar la nueva información y con los datos archivados en su conciencia, construye un esquema informativo anticipatorio, que le permite contrastar el estímulo y aceptarlo o rechazarlo según se adecue o no a lo propuesto por el esquema.”

### **Annex 03: Verbal Informed Consent**

#### **TITULO DEL ESTUDIO: Percepción del riesgo de Tuberculosis Ocupacional - Cuestionario**

*[Este documento deberá ser leído por el profesional entrenado para realizar la encuesta]*

#### **Investigadores:**

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#### **Persona de Contacto:**

Si tiene preguntas sobre este estudio de investigación, puede comunicarse con:

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#### **Introducción:**

Buenos días/tardes, estamos invitándolo a Usted a participar en un estudio de investigación llamado “Percepción del riesgo de Tuberculosis Ocupacional”, en el que les haremos entrega de un cuestionario de preguntas para conocer sus opiniones y percepción sobre la Tuberculosis Ocupacional en el Perú”

Esta encuesta será aplicada de manera anónima a los trabajadores del Hospital Cayetano Heredia. Usted puede hacer preguntas acerca de esta investigación en caso necesite mayor aclaración para decidir su participación.

#### **Confidencialidad y consentimiento:**

La encuesta que usted llenará es completamente anónima, por lo tanto no tomaremos información alguna sobre su identidad ni su nombre aparecerá escrito en ningún trabajo para el que se usen las respuestas a esta encuesta. No tiene que participar si no lo desea; y puede dejar de participar en este estudio en el momento que desee.

El documento que se le está leyendo ha sido aprobado por el Comité de Ética del Hospital Cayetano Heredia.

#### **Beneficios y compensaciones:**

Usted no recibirá ningún beneficio directo, pero estará contribuyendo con este estudio el cual pretende conocer la percepción del riesgo de tuberculosis ocupacional en el Perú. Esto puede ser beneficioso para la salud de la comunidad y de su entorno.

¿Estaría Usted dispuesto (a) participar?

*[Con ello, finaliza el acto del Consentimiento Informado Verbal de los pacientes]*

Nombre del Facilitador: \_\_\_\_\_

Firma

Fecha de aplicación del consentimiento: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

Revisado por el Supervisor: \_\_\_\_\_

Firma

Fecha de Revisión: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

- CC.: 1) Copia para el participante  
2) Copia para el estudio



## **Annex 04: KAP Questionnaire version 2**

### **Cuestionario a validar**

*Lo invitamos a completar de forma voluntaria y anónima este cuestionario de 21 preguntas. Su participación nos ayudará a conocer mejor los conocimientos, actitudes y percepciones sobre la enfermedad de tuberculosis en el Perú.*

*Si tiene alguna duda con las preguntas del cuestionario a validar, por favor hacérselo saber al investigador en cualquier momento del llenado y cuantas veces desee.*

1. ¿Es Ud. personal de Salud en el Hospital?
  - a. Sí
  - b. No
2. Indique el nombre del Hospital para el que trabaja: \_\_\_\_\_
3. Indique su puesto de trabajo:
  - a. Médico
  - b. Enfermera
  - c. Técnico de enfermería
  - d. Personal Administrativo
  - e. Médico Residente
  - f. Interno de Medicina
  - g. Otro: \_\_\_\_\_
4. Indique su área de trabajo:
  - a. Emergencia
  - b. Hospitalización
  - c. Laboratorio
  - d. Triage
  - e. Consultorios
  - f. Área Administrativa
5. ¿Con qué frecuencia está en contacto con pacientes durante su día de trabajo?
  - a. Nunca
  - b. Muy pocas veces
  - c. Algunas veces

- d. Casi siempre
  - e. Siempre
6. Indique su edad (años):
- a. 18 – 25
  - b. 26 - 34
  - c. 35 – 45
  - d. 46 - 59
  - e. 60 +
7. Indique su género:
- a. Femenino
  - b. Masculino

Por favor responda a las siguientes preguntas:

8. ¿Cómo considera su nivel de conocimientos sobre la Tuberculosis?
- a. Muy bajo
  - b. Bajo
  - c. Regular
  - d. Bueno
  - e. Muy bueno
9. La enfermedad de Tuberculosis es causada por:
- a. Bacteria
  - b. Virus
  - c. Hongo
  - d. Parasito
  - e. Priones
10. La Tuberculosis es transmitida por:
- a. Exposición a la tos de una persona infectada
  - b. Por darle la mano a un paciente
  - c. Por heridas punzocortantes, cortes o transfusión sanguínea.

- d. Ninguno
  - e. Todos
11. El paciente con tuberculosis deja de contagiar cuando:
- a. Inicia el tratamiento específico anti tuberculosis
  - b. La baciloscopia de control durante el tratamiento es negativa
  - c. Cuando el paciente empieza a alimentarse adecuadamente
  - d. El paciente con tuberculosis nunca deja de contagiar
  - e. Ninguno
12. ¿Qué es una enfermedad ocupacional?
- a. La enfermedad contraída como resultado de la exposición de factores de riesgo derivados exclusivamente de la actividad laboral.
  - b. La enfermedad contraída en el mismo distrito donde se encuentra el centro de trabajo.
  - c. La enfermedad con múltiples causas, donde los factores ambientales toman importancia junto con los factores de riesgo del centro de trabajo.
  - d. Cualquier enfermedad que ocasione descanso medico durante la vigencia del contrato.
  - e. No sé
13. ¿La enfermedad de tuberculosis podría ser considerada una enfermedad ocupacional para el personal de salud?
- a. Sí
  - b. No
14. Para Ud. ¿Cuál cree que es el nivel de riesgo de contraer tuberculosis haciendo sus actividades de trabajo?
- a. No hay riesgo
  - b. Riesgo Bajo
  - c. Riesgo Medio
  - d. Alto riesgo
  - e. Muy alto riesgo
15. Para Ud. ¿Cuál cree que es el nivel de riesgo de contraer tuberculosis fuera de su trabajo? (En la calle, micro, bus, etc.)

- a. No hay riesgo
  - b. Riesgo Bajo
  - c. Riesgo Medio
  - d. Alto riesgo
  - e. Muy alto riesgo
16. Para Ud. ¿Cuál cree que es el área con mayor riesgo de contagio de tuberculosis en su centro de trabajo?
- a. Emergencia
  - b. Hospitalización
  - c. Laboratorio
  - d. Triage
  - e. Consultorios
  - f. Área Administrativa
17. Para Ud. ¿Dónde adquirió los conocimientos que tiene sobre la Tuberculosis? Marque los más importantes para Ud.
- a. Universidad
  - b. Centro de Trabajo
  - c. Noticias
  - d. Familiares
  - e. Autoformación
18. ¿Qué tan fácil le parece aplicar las recomendaciones de prevención de la tuberculosis en su trabajo?
- a. Muy difícil
  - b. Difícil
  - c. Regular
  - d. Fácil
  - e. Muy fácil
19. De los siguientes enunciados marque sólo las formas en las que Ud. previene la tuberculosis en su trabajo:
- Usar el Respirador N95.

- Adecuada ventilación en las áreas de trabajo.
- Asistir y aprender de las charlas de tuberculosis.
- Alimentarse con una dieta nutritiva y balanceada.
- Vacunarse con la BCG.
- Lavarse las manos frecuentemente.

20. ¿Acude Ud. a las capacitaciones que brinda su centro de trabajo?

- a. Nunca
- b. Muy pocas veces
- c. Algunas veces
- d. Casi siempre
- e. Siempre

21. ¿Ha asistido a algún curso, capacitación o charla informativa sobre la prevención de Tuberculosis en los últimos 6 meses?

- a. Sí
- b. No

*Gracias por su participación en esta encuesta de salud.*