# Strengthening TB infection prevention and control in health care facilities in the Western Cape, South Africa

**Academic Unit for Infection Prevention and Control**
Division of Community Health
University of Stellenbosch
Cape Town

**And**

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# ABSTRACT

**Background:** In South Africa, the Department of Health advocates IPC as a pillar for a sound healthcare delivery system. TB-IPC policies are in place although it is difficult to monitor compliance. This project evaluated a training programme for IPC at 8 public healthcare facilities in the WCP. **Method:** A context specific multi-stage methodology was applied. Following a baseline IPC assessment at 2 hospitals and 6 primary health clinics, a 5-day staff training course was delivered. Impact evaluation of the training was completed 12 months later. **Results:** There were significant improvements at post-intervention follow-up (n=91) for the following components of IPC: level of knowledge in the use of multi dose vials ($p= 0.04$) and primed administration sets ($p<0.05$); health and occupational safety (100% knew their HIV status vs 88% pre-intervention, 31% improvement in handling of sharps and a 16.4% improvement in the use of surgical masks). **Conclusions:** Monitoring of compliance with IPC policies must be on-going. Cost-effective programmes, including staff training at health facilities as well as regular supervision and evaluation are essential to strengthen IPC and prevent TB transmission.

## Contents

## List of Tables

# Contributors

## Core team members

Prof Shaheen Mehtar,Principal Investigator (University of Stellenbosch)
Prof Thomas Rehle, Principal Investigator (HSRC)
Prof Pamela Naidoo, Project manager (HSRC)
Dr Frederick Marais, Co-investigator (University of Stellenbosch)
Dr Ntabozuko Dwane, Co-investigator (HSRC)
Hewitt de Jager, Data Manager (University of Stellenbosch)
Ms Candice Minks, Data entry (University of Stellenbosch)

## Assessment team members (alphabetical order)

Sr Jayce Anand, IPC Specialist Nurse Practitioner
Sr Marina Aucamp, IPC Specialist Nurse Practitioner
Dr Angela Dramowski, Paediatric Infectious Disease Sub-Specialist
Sr Briette du Toit, IPC Specialist Nurse Practitioner
Dr Rebecca Edwards, Medical Microbiologist
Ms Candice Minks, Fieldworker
Sr Magda Mocke, IPC Specialist Nurse Practitioner
Sr Yolanda van Zyl, IPC Specialist Nurse Practitioner

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## Abbreviations used in the report

| | |
|---|---|
| CDC | Community Day Clinic |
| CHC | Community Health Centre |
| HCF | Healthcare facility |
| HSRC | Human Sciences Research Council |
| IPC | Infection prevention and control |
| MDR | Multi-drug resistant |
| PHC | Primary Health Care |
| PPE | Personal protective equipment |
| SU | Stellenbosch University |
| TB | *Mycobacterium tuberculosis* |
| UIPC | Academic Unit for Infection Prevention and Control |
| WCDoH | Western Cape Department of Health |

# 1. Purpose of the report

This report presents a description of the background and methodology and summarises the findings of a multi-stage project towards strengthening *Mycobacterium tuberculosis* (TB) infection prevention and control (IPC) at pre-selected healthcare facilities in the Western Cape, South Africa. The report also highlights certain limitations and offers recommendations towards further sustained improvement and expansion of IPC measures in healthcare facilities.

# 2. Background

Healthcare facilities play an increasingly important role in the management and control of TB. Globally, there is growing acknowledgement of the importance of robust IPC systems to prevent healthcare associated infection, including TB. In South Africa, the National Department of Health advocates IPC as a pillar for a sound healthcare delivery system. Despite the existence of TB infection control policies at national level, the transfer of policy directives and IPC knowledge into practice has yet to be evaluated. Accordingly, a one year project, referred to below, has been implemented to strengthen IPC in public healthcare facilities in the Western Cape, and to use the lessons learned from the project to promote wider implementation of TB-IPC measures in healthcare facilities.

The Academic Unit for Infection Prevention and Control (UIPC); Division of Community Health, Faculty of Medicine and Health Sciences, Stellenbosch University (SU), Cape Town, was a sub-recipient of an Human Sciences Research Council (HSRC) sponsored award by the CDC (USG PS000570-01) to undertake the project *Strengthening Tuberculosis* (TB) *Infection Prevention and Control* (IPC) *in Health Care Facilities in the Western Cape, South Africa* (henceforth referred to as the "TB-IPC project"). Approval for the TB-IPC project was obtained from the CDC, the Western Cape Department of Health (WCDoH), the HSRC Research Ethics Committee, and the SU Health Research Ethics Committee.

## *2.1 Purpose of objectives of the project*

The **purpose** of the project was to strengthen TB-IPC in public sector health care facilities in the Western Cape. The specific **objectives** of the project were to:

(a) Strengthen TB-IPC in at least two district hospitals in the Western Cape,

(b) Strengthen TB-IPC in at least four Primary Health Care (PHC) facilities in the Western Cape,

(c) Document the process and to use this to write a report on lessons learned with recommendations for improving, sustaining and scaling-up the implementation of TB-IPC measures, and finally,

(d) To publicise the findings widely to extend the reach of the lessons learned and to further strengthen TB-IPC measures in South African health care facilities.

## *2.2 Project sites*

A total of eight healthcare facilities (HCFs) were pre-selected as project sites in consultation with the Western Cape Government Department of Health (WCDoH) and were considered a representative sample for the purposes of this study. The HCFs included two hospitals, both in rural districts and six community health centres and day clinics (Table1) distributed across the Western Cape representing both the rural and metropolitan districts.

***Table 1: Project health care facilities***

| **District** | **Hospital** | **Community Health Centre (CHC)** | **Community Day Clinic (CDC)** |
|---|---|---|---|
| Cape Metropole | - | Delft<br>Kleinvlei | Hout Bay Harbour |
| West Coast | Vredenburg | Louwville<br>Hanna Coetzee | - |
| Eden District | George | - | - |
| Overberg | - | Grabouw | - |
| **Total** | **2** | **5** | **1** |

# 3. Methodology

## *3.1 TB-IPC project activities*

The TB-IPC project consisted of several carefully planned sequential activities toward implementing contextually appropriate and sustainable IPC measures. These activities included:

(a) baseline TB-IPC assessment: completed between July and October 2011[1]

(b) training intervention: delivery of three tailor made training courses (*Introduction to Infection Prevention and Control for Health Care Workers):* [2-4], completed between November and December 2011

(c) TB-IPC knowledge transfer and WCDoH IPC policy[5] implementation, and/or adaptation thereof, at participating health care facility level: on-going since January 2012

(d) follow-up TB-IPC assessment: between June and October 2012,
(e) data management and analysis: between November 2012 and April 2013, and
(f) key stakeholder workshop to present and discuss the findings of the IPC assessments, and to identify recommendations for sustaining and strengthening IPC measures: during May 2013
(g) formulation and dissemination of the final project report – June 2013.

## *3.2 TB-IPC assessment (pre- and post-intervention data)*

The undertaking of a baseline (pre-intervention) assessment at each of the eight HCFs, using a comprehensive tool as described in section 3.2.1, comprised the first project activity. The baseline data formed the basis for the subsequent inter-linked activities of the TB-IPC project. The data served as a benchmark of existing TB-IPC structures, knowledge, provisions and practices among healthcare workers (HCWs) at the participating HCFs. The findings allowed the UIPC to design tailored-made training courses toward IPC strengthening in these institutions as an intervention.[2-4] The follow-up assessment (post-intervention) was to measure the improvements or not, between the two sets of results. This report will provide healthcare managers access to the findings to assist with prioritisation in ongoing planning and training in IPC at institutional level. The follow-up assessment was to happen six months later, but due to logistical reasons at HCF level (including building alternations and staff shortage), was delayed and completed in October 2012. The comparison between the baseline and follow-up assessment identified areas with existing strengths as well as areas requiring further strengthening and appropriate action. The WCDoH and to the Facility Managers of the participating HCFs will be consulted for guidance to sustain improvements and expand IPC measures.

### 3.2.1 The TB–IPC assessment tool

The TB-IPC assessment tool was developed by the UIPC and has been validated in several African and international settings. The tool is adaptable to match specific contexts and settings in order to strengthen or implement effective and sustainable IPC policies, measures and practices. Accordingly, based on the findings from previous key stakeholder consultations and field visits, the tool was customised to the public healthcare context of the Western Cape, ensuring a contextually appropriate methodology and resulting interventions toward the strengthening of TB-IPC. To test content clarity and ease of operation, the customised tool was piloted at Tygerberg Academic Hospital, Cape Town, resulting in some minor modifications. The TB-IPC assessment tool is divided into five inter-linked parts which facilitate a comprehensive assessment:

Form A obtained general information about the HCF, including clinical workload (total admissions, HIV and TB cases admitted over the past year), number of staff of all cadres and staff training in IPC. The form was completed by the facility manager of the respective pre-selected project sites prior to the baseline assessment visit. In cases where information was missing, the assessors (IPC experts from the UIPC) completed Form A during the baseline assessment visit through an interview with the facility managers. Written copies of IPC-related institutional policies and protocols were obtained, where available, and noted.

Form B examined HCW knowledge and perceptions of IPC in a convenient heterogeneous sample of HCWs interviewed at participating HCFs. All categories of HCW were interviewed, depending on availability to answer a questionnaire which lasted approximately 10-20 minutes. Not all questions were applicable to all categories of HCWs therefore the denominator for certain questions were less than the overall number of HCWs interviewed. The data was expressed as a percentage of those who answered the questions. The difference between the baseline and the follow up assessments would reflect improvement, or not, in knowledge amongst healthcare workers.

Form C documented IPC provisions at HCF level. If a specific IPC provision was not applicable to a particular clinical area, it was excluded from the analysis and therefore the denominators vary depending on the type of clinical area assessed. The baseline and the follow up assessments were compared to measure improvement in provision.

Form D observed HCW application of IPC in clinical practice. In some instances there was limited clinical activity during the visits by the IPC assessors and this was possibly because HCWs realised that they were being observed. However, where clinical activity was observed, the appropriate use of PPE, sequence of activities to maintain sterility (if required) during certain procedures and handling of medical waste was noted.

Form E identified the TB-IPC related experiences of patients and was an essential part of the validation of the practices reported by the participating HCWs. The form was completed during personal interviews with hospital and clinic patients currently receiving TB treatment, to assess their knowledge of TB and prevention of TB transmission, and their observations of IPC care received. The overall TB patient sample size was small and therefore the baseline and follow-up

assessment data from the hospitals and clinics was pooled to give adequate numbers for an overall analysis.

## *3.3 Data collection*

The baseline assessments in all HCF project sites (N=8) were conducted between July and October 2011. In line with WCDoH regulations and to secure access to the HCF and cooperation of HCWs, the respective sites received advanced written notification of the date of the undertaking of the baseline assessment. Each assessment was undertaken by at least two members of the UIPC team, comprising trained IPC Nurse Assessors, a Medical Microbiologist, a Senior Registrar in Medical Microbiology, a Paediatric Infectious Disease Sub-Specialist, and an Intern Data Capturer. The data was captured manually using the TB-IPC assessment tool. The assessment was completed during a one-day visit to each site, except for George Hospital which required a two-day visit to complete an adequate sample. The overall aim of the assessment was to establish the existing levels of IPC knowledge, provision and practice, and to identify any key deficits that would require specific emphasis during the subsequent training intervention[1-3] and by the management structures of the respective participating HCFs.

The follow-up assessment data was collected one year after the pre-assessment. The initial plan was to conduct the follow-up six months after the training intervention (November to December 2011)[2-4] to allow adequate time for the transferring of IPC knowledge into practice. However, logistical challenges, such as building alterations and staff shortage, at several of the participating HCFs necessitated postponement of the assessment which was undertaken between June and October 2012.

## *3.4 Data analysis*

Immediately on return from each respective HCF, data from the baseline and the follow-up assessments were entered into a Microsoft Access database by the UIPC data management team; then cleaned, verified and validated. For Forms A and E, hospital and clinic data were pooled for analyses due to the low denominators. Analyses were performed using Excel software (2010 version) for descriptive statistics and further analysed by the HSRC epidemiological team using STATA. The results were discussed with the UIPC assessment team to confirm validity.

# 4. Results: Form A

## *4.1 General information on hospitals and clinics visited*

The two hospitals, George Hospital (regional) and Vredenburg Hospital (provincial), had 258 and 81 inpatient beds respectively. George Hospital provided intensive and high care services in addition to the acute services such as medicine, surgery, maternity, paediatrics, trauma and general oncology. Vredenburg Hospital provided mainly maternity, paediatrics, general medicine and casualty (trauma). Both hospitals offered an outpatient service.

The six clinics provided a comprehensive service for the population served. The annual patient load and number of staff were documented where such data was available (Table 2). The multi-drug resistant (MDR) cases are shown as a percentage of all TB cases seen. This data did not alter significantly between the pre- and post- assessment evaluaton and therefore only one table (Table 2) is reported here.

***Table 2: Annual patient load and number of staff***

| **Staff** | **George Hospital** n (%) | **Vredenburg Hospital** n (%) | **Hanna Coetzee CHC** n (%) | **Louwville CHC** n | **Grabouw CHC** n (%) | **Delft CHC** n (%) | **Kleinvlei CHC** n (%) | **Houtbay Harbour CDC** n (%) |
|---|---|---|---|---|---|---|---|---|
| Dr | 67 | 7 | 0 | 0 | 3 | 0 | No info | 2 |
| Nurses | 299 | 74 | 6 | 4 | 26 | 137 | No info | 7 |
| Other HCW | 71 | 0 | 6 | 5 | 5 | 0 | No info | 2 |
| Care givers | 1 | 0 | 1 | 1 | 0 | 0 | No info | 9 |
| Dental | 1+1* | | | | | | | |
| **Patient load** | | | | | | | | |
| Admissions/ pts seen | 69387 | 10200 | 39600 | 33000 | 156000 | No info | No info | 39600 |
| HIV (% of patients seen) | 1399 (2%) | No info | No info | No info | No info | 3000 | | 334 (0.8%) |
| TB (% of patients seen) | 400 (0.57%) | 220 (2.1%) | 350 (0.8%) | No info | 561 (0.35%) | 912 | 134 | 5 (0.14%) |
| MDR (% of TB patients seen) | 12 (3%) | No info | 8 (2.3%) | 15 | | 39 (4.3%) | 15 (11.2%) | No info |

* dentist and dental assistance. No info= information not available.

## *4.2 IPC staffing*

George Hospital had one full time named IPC nurse practitioner who also managed the Sterile Services Department. At the other HCFs, including Vredenburg Hospital and the community clinics (CHC/CDCs), there was no dedicated IPC practitioner but this role was occasionally carried out by someone on duty that day. Clearly the IPC structure was less than robust, and IPC was not considered a priority in the HCF visited. Further none of the IPC practitioners had formal (> 6 months) training in the field of IPC, however one nurse had attended a five-day course. All

facilities had regular general meetings where IPC-related issues can be discussed as part of a larger nursing management agenda.
There was no change in the IPC structure and staffing between the two assessments.

## *4.3 IPC policies and occupational health services*

George Hospital and Kleinvlei CHC had written IPC policies which were revised within the past 12 months. None of the other HCF could produce IPC policies or documentation. None of the HCFs had a written plan for notification of communicable disease outbreaks on site.

An occupational health service was provided on site at six of the eight facilities visited with the remaining two clinics referring their staff to the local hospital. All facilities offered voluntary counselling and testing (VCT) to staff as part of employee wellness programmes or after needle-stick injuries. TB screening for staff was available at all facilities on a 6-monthly or annual basis and at any time when HCWs exhibited TB symptoms. Hepatitis B vaccination and antibody testing was available to HCWs at all sites No differences between the two assessments were noted.

## *4.4 IPC training*

Facility managers at each site reported that most IPC-related teaching was provided in the form of regular in-service staff training but could not provide statistics to verify attendance. Most of the training was on aspects of IPC such as hand hygiene, waste management, occupational exposure to blood borne viruses and TB, but there was no coherent or sustained training in this field. There were some training programmes in IPC reported during the post assessment but these were part of a larger in service training curriculum.

## *4.5 TB management*

All the HCFs had a written provincial TB policy at facility level but only two of the healthcare clinics had a written TB-IPC policy. Every HCF had a person responsible for the management of TB including IPC, referral of patients and implementing the TB containment programme.

### *4.6 Decontamination and sterilisation of medical devices*

Both hospitals had a dedicated sterile services department, with written standard operating procedures (SOPs) available for staff working in the area. Both hospitals serviced most of the surrounding clinics. Due to shortage of equipment, many of the items such as vaginal speculae and wound dressing items were reprocessed locally within the clinics and used without proper validation systems- the items were sent for sterilization at the end of the day. No difference was noted between the two visits. The lack of support in decontamination and sterilization was of concern to the observation teams.

## 5. Results: Form B (hospitals)

### *5.1 Profile of healthcare workers (HCWs) interviewed*

A total of 25 HCWs were interviewed during the baseline assessment and this reflected approximately 9%, 5% and 6% of doctors, nurses and ancillary staff, respectively, of the total staffing complement present on the day of the assessment.

A total of 36 HCWs were interviewed during the follow-up assessment; these made up 7.5% of doctors and dentists, 14.2% of nurses and 12.3% of ancillary staff working on the day of the interviews. The number and percentage of HCW interviewed in the follow up assessment was higher than the baseline.

### *5.2 IPC training profile*

While none of the HCWs interviewed had ever attended any formal IPC training course, the individual aspects of crucial IPC knowledge was apparent during the interviews. Between 37.7% and 38.6% of all staff had attended some training in hand hygiene, management of sharps, use of protective equipment and waste management (Table 3) at baseline (Pre) and between 61.4% and 64.4% for the same in the Post intervention period. The least number of HCWs had been formally trained in intra-venous and intra-muscular injections yet this was a common procedure.

Table 3 shows the comparison between the baseline and follow- up assessment and the difference in percentage between the two. It should be noted that not all the HCWs who attended the 5-day *Introduction to Infection Prevention and Control for Health Care Workers* course (the training intervention) were necessarily the ones who were interviewed during the follow-up assessment.

## *Table 3: Training in IPC in Health Facilities*

| | Pre | | Post | | Total | | |
|---|---|---|---|---|---|---|---|
| | n | *%* | n | *%* | N | *%* | *p value* |
| | 70 | *43.5* | 91 | *56.5* | 161 | *100* | |
| **Hand hygiene** | | | | | | | |
| Yes | 26 | *37.7* | 43 | *62.3* | 69 | *100* | |
| No | 44 | *47.8* | 48 | *52.2* | 92 | *100* | 0.2 |
| **Appropriate PPE** | | | | | | | |
| Yes | 25 | *37.3* | 42 | *62.7* | 67 | *100* | |
| No | 45 | *47.9* | 49 | *52.1* | 94 | *100* | 0.18 |
| **Injection safety** | | | | | | | |
| Yes | 16 | *35.6* | 29 | *64.4* | 45 | *100* | |
| No | 50 | *46.3* | 58 | *53.7* | 108 | *100* | |
| Don't Know | 1 | *100* | 0 | *0* | 1 | *100* | 0.25 |
| **Sharps disposal** | | | | | | | |
| Yes | 27 | *38.6* | 43 | *61.4* | 70 | *100* | |
| No | 42 | *47.7* | 46 | *52.3* | 88 | *100* | |
| Don't Know | 1 | *100* | 0 | *0* | 1 | *100* | 0.27 |
| PEP policy | | | | | | | |
| Yes | 24 | *38.1* | 39 | *61.9* | 63 | *100* | |
| No | 45 | *47.4* | 50 | *52.6* | 95 | *100* | |
| Don't Know | 0 | *0* | 1 | *100* | 1 | *100* | 0.35 |
| **Cleaning of medical devices on wards** | | | | | | | |
| Yes | 24 | *42.9* | 32 | *57.1* | 56 | *100* | |
| No | 43 | *43* | 57 | *57* | 100 | *100* | |
| Don't Know | 0 | *0* | 2 | *100* | 2 | *100* | 0.47 |
| **Sterile services** | | | | | | | |
| Yes | 18 | *39.1* | 28 | *60.9* | 46 | *100* | |
| No | 45 | *42.5* | 61 | *57.5* | 106 | *100* | |
| Don't Know | 2 | *50* | 2 | *50* | 4 | *100* | 0.88 |
| **EBM/ formula preparation** | | | | | | | |
| Yes | 10 | *40* | 15 | *60* | 25 | *100* | |
| No | 37 | *38.9* | 58 | *61.1* | 95 | *100* | |
| Don't Know | 3 | *60* | 2 | *40* | 5 | *100* | 0.64 |
| **Neonatal feeding** | | | | | | | |
| Yes | 5 | *35.7* | 9 | *64.3* | 14 | *100* | |
| No | 42 | *39.6* | 64 | *60.4* | 106 | *100* | |
| Don't Know | 3 | *42.9* | 4 | *57.1* | 7 | *100* | 0.94 |
| **Waste management** | | | | | | | |
| Yes | 23 | *35.4* | 42 | *64.6* | 65 | *100* | |
| No | 46 | *48.4* | 49 | *51.6* | 95 | *100* | |
| 3 | 1 | *100* | 0 | *0* | 1 | *100* | 0.14 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **TB management** | | | | | | | |
| Yes | 30 | *47.6* | 33 | *52.4* | 63 | *100* | |
| No | 34 | *43* | 45 | *57* | 79 | *100* | |
| Don't Know | 0 | *0* | 1 | *100* | 1 | *100* | 0.33 |

While an improvement is noted in levels of training in essential IPC knowledge such as hand hygiene, appropriate use of personal protective equipment, and injection safety amongst others is illustrated in Table 3, no significant differences were noted; of concern is the lack of improvement in cleaning and decontamination of medical devices used directly on patients such as vaginal speculae.

## *5.3 Knowledge of hand hygiene*

Participants were asked about when they regularly washed their hands, responses were recorded for hand washing behaviours as indicated in Table 4. Hand hygiene was to be carried out before and after each patient contact by 43.6% of participants at baseline (58.75%) and this increased to 56.4% in the post intervention period, however this was not significant (p 0.41). A drop in levels of hand hygiene when coming on duty was noted between baseline (59.4%) and in the post- intervention period (40.6%) and this was of borderline significance (p 0.07). There was an improvement in "other" hand-washing behaviours between base-line (35.2%) and the post intervention period (64.8%) that was also of borderline significance (p 0.07). The appropriate use of alcohol rub was known to 40% (10/25) of those interviewed. It was noteworthy that there was not much difference (improvement) between the baseline and follow up assessment of knowledge illustrating that behaviour amongst HCWs was difficult to modify and that perceptions remained despite presenting the evidence in the 5-day IPC training interventions.

***Table 4: Hand washing***

| | PRE | | POST | | Total | | |
|---|---|---|---|---|---|---|---|
| | n | *%* | n | *%* | N | *%* | P value |
| | 75 | *45.2* | 91 | *54.8* | 166 | *100* | |
| **Before a procedure** | | | | | | | |
| No | 50 | *48.5* | 53 | *51.5* | 103 | *100* | |
| Yes | 25 | *39.7* | 38 | *60.3* | 63 | *100* | 0.23 |
| **Coming on duty** | | | | | | | |
| No | 56 | *41.8* | 78 | *58.2* | 134 | *100* | |
| Yes | 19 | *59.4* | 13 | *40.6* | 32 | *100* | 0.07 |
| **Leaving work** | | | | | | | |
| No | 53 | *42.1* | 73 | *57.9* | 126 | *100* | |
| Yes | 22 | *55* | 18 | *45* | 40 | *100* | 0.15 |
| **Before and after patient** | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | No | 17 | *51.5* | 16 | *48.5* | 33 | *100* | |
| | Yes | 58 | *43.6* | 75 | *56.4* | 133 | *100* | 0.41 |
| **After toilet** | | | | | | | | |
| | No | 48 | *49.5* | 49 | *50.5* | 97 | *100* | |
| | Yes | 27 | *39.1* | 42 | *60.9* | 69 | *100* | 0.19 |
| **Other** | | | | | | | | |
| | No | 56 | *50* | 56 | *50* | 112 | *100* | |
| | Yes | 19 | *35.2* | 35 | *64.8* | 54 | *100* | 0.07 |

## *5.4 Knowledge and usage of protective clothing*

The use of personal protective equipment (PPE) was based on personal preference rather than evidence. More than half (56%, 14/25) those interviewed knew that gloves were required to prevent exposure to blood and body fluids, and nearly half (48%, 12/25) for wound dressing or procedure. Gowns, aprons and other PPE were used in a more random manner but mainly for operating or cutting procedures (20%, 5/25), CVP insertion (20%, 5/25) or when nursing a patient with infectious disease (24%, 6/25). A larger number of HCWs (68%, 17/25) knew that the use of face masks or N95 respirators was indicated to prevent TB exposure. PPE was rarely out of stock, and when this did happen it was an administrative matter rather than a shortage in medical supplies.

Here again, there was little difference between the use of PPE between the baseline and follow up assessment.

## *5.5 Knowledge of injection safety and sharps disposal*

To assess knowledge of safety of injections and intravenous therapy participants were asked four questions and their responses were recorded (True, False and Don't Know). The staff was very aware of the risks associated with intra venous devices and therapy, however when asked to categorize risk, the results showed a lack of clarity and understanding, as indicated in Table 5.

Under half of the participants (46.1%) disagreed with the statement that an unused syringe in an open package is sterile and therefore safe for injections at baseline and this increased to just over 50% in the post intervention period. Similar responses were recorded for the use of a single syringe between different patients. However for both of these statements changes noted in levels of knowledge were not significant. Significant improvements in levels of knowledge were noted the use of multi dose vials (p 0.04) and primed administration sets (p 0.05).

When asked to rate risks of various activities (as high, medium or low), lack of hand hygiene before administering an injection was considered high risk (95.2%, 20/21) as was reuse of the same syringe (81%, 17/21), leaving a needle in a multi-dose vial (62%, 13/21) and leaving a hypodermic needle outside a sharps container (71%, 15/21).

The follow up assessment revealed an improvement in handling sharps and injection safety. Moving from the patient to the sharps container, if far, was done with the sharps being carried in a kidney dish (31% improvement), recapping of a hypodermic needle (reduced by 16%); the overall knowledge regarding reuse prevention devices or safety syringes had improved by 26.6%.

***Table 5: Injections and Intravenous Therapy***

| | PRE | | POST | | Total | | P value |
|---|---|---|---|---|---|---|---|
| | n | *%* | n | *%* | N | *%* | |
| | 75 | *45.2* | 91 | *54.8* | 166 | *100* | |
| An unused syringe inside an open package is considered sterile and can be used to give an injection | | | | | | | |
| True | 2 | *50* | 2 | *50* | 4 | *100* | |
| False | 59 | *46.1* | 69 | *53.9* | 128 | *100* | |
| Don't Know | 0 | *0* | 5 | *100* | 5 | *100* | 0.23 |
| A loaded syringe can be used between several patients if the needle has been changed for each patient | | | | | | | |
| True | 4 | *80* | 1 | *20* | 5 | *100* | |
| False | 56 | *44.1* | 71 | *55.9* | 127 | *100* | |
| Don't Know | 0 | *0* | 4 | *100* | 4 | *100* | 0.11 |
| A multi-dose vial with a hypodermic needle left in the septum is safe to use until the vial is empty | | | | | | | |
| True | 8 | *88.9* | 1 | *11.1* | 9 | *100* | |
| False | 49 | *41.2* | 70 | *58.8* | 119 | *100* | |
| Don't Know | 3 | *37.5* | 5 | *62.5* | 8 | *100* | 0.04 |
| An administration set can be primed and left awaiting use in an emergency (patient) | | | | | | | |
| True | 10 | *71.4* | 4 | *28.6* | 14 | *100* | |
| False | 47 | *42* | 65 | *58* | 112 | *100* | |
| Don't Know | 1 | *14.3* | 6 | *85.7* | 7 | *100* | 0.05 |

## *5.6 Occupational health and safety*

Occupational Health services were well provided and most of the staff knew where to go and what to do in case of an accidental exposure. Sixteen percent (4/25) reported a needle stick injury during the past 12 months; all of them were counselled and given timely post exposure prophylaxis. The follow up assessment confirmed improvement on the baseline findings. The number of sharps injuries reduced from 4 to 3 NSI between the two visits, Occupational Health

support was much better and 100% of the interviewees knew their HIV status which was an increase from 88% in the baseline assessment.

## *5.7 Cleaning of medical devices*

Over fourty seven percent of the interviewees reported cleaning medical devices in the clinical area at baseline, usually respiratory equipment, vaginal speculae and laryngoscope blades, a significant increase in participants who discontinued this practice was noted from baseline (26.5%) to the post intervention period to 73.5% (p 0.003) (Table 6). It was reported that 65% (13/20) of cleaning was carried out by the nurses, followed by either house staff or technical staff. On follow up fewer medical devices were cleaned on the wards (reduction of 41.5%) and those that were cleaned were mainly laryngoscopes and suction tubing and nozzles, also cleaned by the nursing or house staff.

***Table 6: Cleaning or decontamination***

| | PRE | | POST | | Total | | P value |
|---|---|---|---|---|---|---|---|
| | n | *%* | n | *%* | N | *%* | |
| | 75 | *45.2* | 91 | *54.8* | 166 | 100 | |
| Cleaning of instruments or equipment in ward | | | | | | | |
| Yes | 50 | *47.2* | 56 | *52.8* | 106 | 100 | |
| No | 9 | *26.5* | 25 | *73.5* | 34 | 100 | |
| Don't Know | 1 | *16.7* | 5 | *83.3* | 6 | 100 | 0.003 |
| Dedicated washbasin to clean | | | | | | | |
| Yes | 26 | *41.3* | 37 | *58.7* | 63 | 100 | |
| No | 18 | *48.6* | 19 | *51.4* | 37 | 100 | |
| Don't Know | 3 | *37.5* | 5 | *62.5* | 8 | 100 | 0.8 |

Although there were several clinical and patient care articles cleaned in clinical areas, the correct method of cleaning and decontamination was not clear to those that handled such items; very few of them wore PPE and none of them disassembled the items prior to cleaning. From the replies, it was evident that equipment such as laryngoscope blades and vaginal speculae were inadequately processed. The staff did not have adequate knowledge to differentiate between disinfectants and sterilants and did not really understand the significance and proper use of either. The area of handling and cleaning medical devices was greatly lacking in training and correct decontamination procedures. The use of PPE, method of cleaning medical devices or

patient care articles had not improved – this suggested that further dedicated training on cleaning of such devices was necessary.

### *5.8 Knowledge of health care waste management*

The appropriate procedure for disposal of sharps and clinical waste was clearly understood and followed by all HCWs. There was little difference between the baseline and follow up findings in that there was clear knowledge relating to colour coding and segregation and transportation of waste amongst all those who were interviewed.

### *5.9 Knowledge of TB management*

When dealing with a known case of TB, 68% (17/25) of the staff would wear a face cover yet none of the N95 respirators had been fit tested for the type of face; 65% (15/25) said that they would wear gloves. All the staff identified taking of a sputum sample in a closed environment under the watchful eye of a HCW worker was high risk and a separate well ventilated area should be provided for patients who had to give a sputum sample.

In the follow up assessment the usage of surgical masks improved by 16.4% but there was no noticeable difference relating to the N95 respirator usage. However, when collecting a sputum specimen, there was a 40% increase in the number of HCW who said they would make sure the patient was in a separate, well-ventilated area away from other patients.

## 6. Results: Form C (hospitals)

### *6.1 IPC provision*

Overall, 12 ward or clinical areas were visited in the baseline assessment, George hospital (n=7, including one SSD) and Vredenburg Hospital (n=5). All specialities, including paediatrics, labour ward, medical, surgical, intensive care and neonatal as well as the sterile services unit at George Hospital were audited.

In the follow up assessment 19 wards and clinical areas were visited of which 12 were in George Hospital and 5 were in Vredenburg Hospital respectively. The clinical areas were as noted previously in the baseline study (Table 7).

***Table 7: Clinical areas visited in hospitals***

| | Pre | Post |
|---|---|---|
| George | 7 | 12 |
| Vredenburg | 5 | 5 |
| Total | 12 | 17 |

Overall the hospitals were clean, well maintained and the surrounding environs looked after. Rarely were there areas with blood splashes on the walls or found to be dirty. Of the 12 wards, six of the automated systems for bed pans and urinals were working, two wards at George hospital had macerators (disposable bedpans) while the others were cleaned manually. Linen was still being sluiced in the clinical sluice area, but a majority of the wet linen was transported in waterproof plastic bags. In the follow up assessment, the high standard of cleanliness and care was clearly visible and maintained.

The provision for hand hygiene was excellent (100%) and all the hand wash basins at George Hospital had mixer taps while those at Vredenburg Hospital had elbow operated ones. Rarely was a hand wash basin without soap or paper towels found. Alcohol hand rub was readily available in eight of the eleven clinical areas but not necessarily next to the high care beds. There was adequate stock of PPE in all the clinical areas visited. The staff and patient toilets were clean, dry and well stocked with soap, paper towels and toilet paper.

The bedpan washer disinfectors differed between the two visits. In the first visit, 66.7% (8/12) had automatic bedpan washer disinfectors with 16.7% (2/12) disposable systems in place. During the follow up visit, the number of automatic bedpan washer disinfectors went down to 21.1% (4/19) while the disposable systems increased to 36.8% (7/19)-manual cleaning had increased from 8.3% (1/12) to 26.3% (5/19)..

A few wards were short on stocks for syringes, needles and other intra venous equipment items, however the use of latex gloves as tourniquets was common throughout the hospitals. It was noted that there was a lack of safety engineered devices and spikes for multi-dose vials despite the fact that these have been advocated as provincial policy.[4] The sharps containers were appropriately labelled in all the wards visited, however, it was noted that two containers were overfilled. There were no sharps lying outside the containers during the visit, representing adequate supplies of sharps containers. The healthcare waste management programme was fully compliant.

There was a dedicated basin usually in a separate area of the ward or unit for the cleaning of patient care articles or clinical equipment, however the cleaning provisions and the use of PPE was inadequate and erratic and the use of disinfectants incorrect. Standard operating procedures were not visible in the healthcare facilities and no significant changes were noted between baseline and post intervention. Separate sluicing areas for linen and washing of medical devices went from 71.4% (5/7) to 58% (11/19) and 91.7% (11/12) to 52.6% (10/19) respectively.

The provisions for the containment of TB cases were disappointing. There were very few single rooms available, less than 6% (15 in all), for such patients. In one hospital, three isolation rooms with en-suite facilities were noted although the doors remained open. In other isolation facilities there were no doors which meant that isolation of TB cases was inadequate. PPE was available but were not directly visible in majority of areas visited, so it was not used. It was noted with interest that although there were adequate numbers of aprons, some were found hanging around the patient area and were being reused (for cost reasons). There was no visible negative pressure ventilation in any of the clinical areas including the isolation facilities visited.
On the return visit, the number of single rooms had increased marginally but there was still a problem of finding single rooms to isolate TB cases especially with en suite toilets.

# 7. Results: Form D (hospitals)

## *7.1 IPC practice*

Ten procedures/practices were observed during the allocated time, there was no correlation between knowledge reported, provision and the practice observed. Procedures were carried out without gloves in some instances, without any form of hand hygiene and cleaning of instruments was unsatisfactory. Several known TB patients were observed to be wearing N95 respirators while the staff was not wearing any face cover. Loaded syringes and needles lying next to the patient's bed were observed and repeated entries into a multi-dose vial with the same needle (spike not used) were noted. In TB isolation facilities where the rooms had doors, the doors were not kept closed in all instances. PPE was not used appropriately and it was clear that there was a shortage of staff and isolation facilities. N95 respirators were not worn correctly on both visits

A visit to the waste area at one hospital revealed clinical infectious waste such as IV bags, syringes but no sharps were found lying outside waste containers. Healthcare waste

management had improved considerably during the follow up visit and sharps management had improved.

During the follow up visit, there was little noticeable change in behaviour which was disappointing. However the frequency of hand hygiene overall improved by 42.6% before and after procedures; alcohol rub was used more frequently. More HCWs wore gloves when inserting an intra-venous injection and were more vigilant when disposing of sharps.

# 8. Results: Form E (hospitals and community healthcare facilities)

## *8.1 TB patient knowledge*

Overall, TB patients in the Western Cape were well informed and aware of their disease and how to contain transmission in their social environment and the knowledge base did not vary between the two visits.

Thirty six patients receiving treatment for TB at the various healthcare facilities were interviewed of which four were from Vredenburg Hospital and the rest were from community health centres and clinics. On follow up 70 patients were interviewed.

The knowledge regarding TB amongst those interviewed was good regarding their disease, how to manage it and how to reduce spread. Most patients reported that they had received counselling and advice from HCWs on how to prevent TB transmission. Nurses (61.1%, 22/36) were the primary source of information on TB prevention, however peer educators, doctors, family members and printed media also reportedly provided TB education.

The majority of TB patients (77.7%, 28/36) knew how to reduce the risk of household TB transmission and cough etiquette or cover their mouth when coughing, open windows and appropriate discard of sputum contaminated tissues or toilet paper was mentioned. When asked where they would produce sputum sample for laboratory testing, the majority replied that if they were at home it would be in the toilet, but in the clinic it would be outside, the pot would then be closed firmly and handed to the HCW.

Regarding the use of face covers/masks by HCW, 66.6% (24/36) reported that HCW wore face covers when caring for them. The type of mask used was described by colour (blue, orange or other). The most common colour used was orange (possibly N95 respirators) by 75% (18/24), followed by blue (surgical masks) by 25% (6/24), and the rest were other types of masks.

Just over half (52.8%, 19/36) of the patients said they wore masks mainly when visiting the clinic or when they were admitted to hospital early in their disease, only two said they had to wear their masks at home. Of the 19 that reported wearing masks, six wore orange face covers particularly at Vredenburg Hospital and Delft clinic, ten wore blue masks, and three patients could not remember the colour.

# 9. Conclusion and recommendations

These results from the baseline and follow up assessments further identified key areas which require more attention during IPC training as part of the TB-IPC project, and by healthcare managers in ongoing planning and training at HCF level. These areas include:

- Awareness of, and skills for, cleaning and sterilization of medical devices especially at clinic level.
- Appropriate wearing of personal protective equipment and discarding after use.
- Documentation, such as standard operating procedures for specific, high risk, procedures at least.
- The use of safety engineered devices and when to use them
- The use of alcohol rub for hand hygiene according to the WHO 5 Moments of Hand Hygiene
- Methods for IPC knowledge transfer into practice

All the above areas were included in, and emphasized during, the 5-day *Introduction to IPC for Healthcare Workers* short course training provided by the UIPC.[2-4] It must be kept in mind that the UIPC trained only a small portion of staff in the participating facilities that were assessed. In addition, those who attended the course were not necessarily interviewed during the follow-up assessment. It is therefore not possible to determine the level of knowledge transfer into practice on an individual level.

# 10. References


1. Mehtar S, Marais F, Dramowski A. (2012) *Report on Baseline Assessment: Strengthening TB infection prevention and control (IPC) in health care facilities in the Western Cape, South Africa.* Academic Unit for Infection Prevention and Control, Stellenbosch University, Cape Town, South Africa.

2. Marais F and Mehtar S (2011) *Training Report: Introduction to Infection Prevention and Control for Health Care Workers, Cape Town: 21st to 25th November 2011*. Academic Unit for Infection Prevention and Control, Stellenbosch University, South Africa

3. Marais F and Mehtar S (2011) *Training Report: Introduction to Infection Prevention and Control for Health Care Workers, George: 28th November to 2nd December 2011*. Academic Unit for Infection Prevention and Control, Stellenbosch University, South Africa

4. Marais F and Mehtar S (2011) *Training Report: Introduction to Infection Prevention and Control for Health Care Workers, Vredenburg: 5th to 9th December 2011*. Academic Unit for Infection Prevention and Control, Stellenbosch University, South Africa

5. UIPC (2012) *Infection Prevention and Control Manual: Tygerberg Hospital, Cape Town, South Africa*. Academic Unit for Infection Prevention and Contorl, Tygerberg Hospital and Stellenbosch University, South Africa.

6. Allegranzi B, Pittet D. (2009) *J Hosp Inf.* The Role of hand hygiene in healthcare associated infection prevention. 73; 305-15.