

Impact of a quality improvement project to strengthen infection prevention and control training at rural healthcare facilities

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Background. South Africa (SA) has a dire shortage of skilled infection prevention and control (IPC) practitioners with limited opportunities for IPC training, especially in rural areas.

Methods. This quality improvement research-based case study surveyed healthcare workers' IPC training needs and measured the impact of a targeted IPC training intervention at four healthcare facilities in a rural sub-district in the Western Cape Province of SA. Transfer and implementation of IPC knowledge and best practice were evaluated at the participating facilities, both pre and post intervention.

Results. Most survey respondents (239/271; 88.2%) practised in rural districts and reportedly received infrequent (either annual or no) in-service training in IPC (138/271; 51%). The IPC education intervention (five short courses) was attended by almost one-third of clinical staff (129/422; 30.6%) at the four rural healthcare facilities. The pre-intervention IPC assessment identified the following: poor knowledge and implementation of tuberculosis-IPC measures; limited knowledge of medical device decontamination; high rates of needle-stick injuries; low hand-hygiene compliance rates and poor compliance with personal protective equipment use. At the post-intervention assessment, IPC knowledge scores and hand-hygiene compliance rates improved significantly but some IPC practices were unchanged.

Conclusion. A structured IPC training programme in rural healthcare facilities can improve healthcare workers' IPC knowledge, but has limited impact on clinical practice.

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Infection prevention and control (IPC) programmes are pivotal to ensure safe, evidence-based clinical practice and quality healthcare provision.^[1] Strengthening of IPC programmes in South African (SA) healthcare facilities has been cited as one of six priority areas in *The National Core Standards for Health Establishments*.^[2] Recent baseline National Core Standards audits documented poor compliance (50%) with recommended IPC practices within the Western Cape Province and nationally.^[3] SA has a dire shortage of skilled IPC practitioners^[4] Opportunities for IPC training and support are also limited, especially for rural healthcare workers. In this quality improvement research-based case study, we determined healthcare workers' IPC training needs and measured the impact of targeted IPC training at four rural healthcare facilities.

Methods

The Stellenbosch University Rural Medical Education Partnership Initiative (SURMEPI)-IPC programme addresses an identified need for IPC training of rural healthcare workers. In order to

better understand the training needs of Western Cape healthcare workers, a paper-based survey was conducted in February 2012. A convenience sample of multidisciplinary healthcare workers was obtained from selected facilities in the Western Cape Province, with an emphasis on rural health facilities. Data were collected on healthcare workers' IPC knowledge, current and desired training frequency, preferred IPC training topics, methods and providers.

Based on the identified training needs, a structured intervention (an IPC training programme for multidisciplinary healthcare workers) was designed for implementation and evaluation in one rural subdistrict (Breede Valley, Cape Winelands District). The intervention comprised five IPC short courses: Introduction to IPC for District Managers (two courses); Introduction to IPC for Rural Healthcare Workers; Disinfection and Sterilisation; Train-the-Trainer in IPC) (Fig.1).

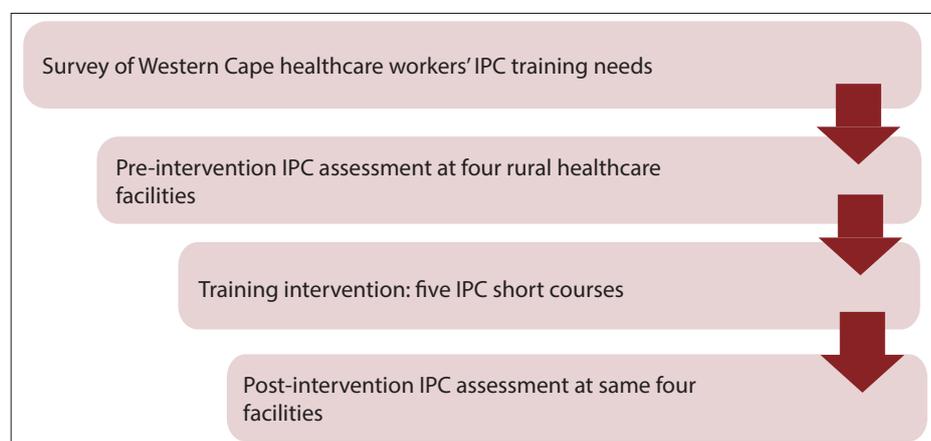


Fig. 1. Design of the IPC education intervention for rural healthcare facilities.

Table 1. Healthcare facility profiles at baseline IPC assessment

Healthcare facility (HCF)	Hospital 1	Hospital 2	Clinic 1	Clinic 2
Total clinical staff	297	145	44	23
Bed allocation	269	199	n/a	n/a
Admissions (H)/consultations (C) in 2011	21 847	700	120 000	65 880
HIV-related visits (% of all visits)	607 (2.8)	252 (36)	6 000 (5)	7 740 (11.7)
TB-related visits (% of TB patients with drug-resistant TB)	588 (0.2%)	700 (21.7%)	3 600 (0.6%)	1 692 (0.7%)
Reported NSI in 2011 (NSI as a % of HCF clinical staff)	40 (13.5%)	3 (2.1%)	1 (2.3%)	3 (13%)
IPC practitioner post filled	No	Yes*	Yes*	No

*IPC practitioner has additional roles including occupational health and sterile services department duties.
H = hospital; C = clinic; NSI = needle-stick injuries.

All courses included didactic teaching sessions and interactive practical components, e.g. group discussions, role plays, structured observations and audit of IPC practice at local facilities.

Four healthcare facilities in the subdistrict participated in the IPC education intervention, two clinics and two hospitals (Table 1). Each facility underwent a comprehensive baseline IPC assessment in January 2012 and a post-intervention assessment in March 2013. A validated IPC audit tool was used at pre- and post-intervention assessments to compare changes in facility profile, provisions for IPC, clinical practices, healthcare worker and patient knowledge of IPC and tuberculosis (TB)-IPC.

The research protocol was approved by the Stellenbosch University Health Research Ethics Committee (N11/09/290) and the Western Cape Provincial Government Health Research Committee (RP134).

Results

The survey included 271 multidisciplinary Western Cape healthcare workers, with the majority (239; 88.2%) practising in rural districts. Most participants (138; 51%) reported infrequent (either annual or no) in-service training in IPC. TB-IPC, waste management, outbreak management, risk management and IPC policy development were identified as the top five IPC training needs. Respondents suggested in-service, short courses and workshops as their preferred training methods. Specialist IPC practitioners and university or nursing college lecturers were identified as preferred IPC training providers.

The IPC education intervention (five short courses) was attended by 129/422 (30.6%) clinical staff (including healthcare managers

and workers) at the four participating rural healthcare facilities. All participants on the four short courses passed a certificate of competence examination, and 6 (50%) of the healthcare workers enrolled for the 6-month Train-the-Trainer in IPC course completed the programme successfully. Course evaluations were completed by all participants (incorporating questions on course content, teaching style and relevance), yielding an overall satisfaction score of 88.4%. Course participants' mean knowledge gain (assessed as the difference between their pre-course and post-course examination mark) was 17% (from 64% to 81%) and 29% (from 61% to 90%) for the four short courses and the Train-the-Trainer in IPC course, respectively.

At the baseline IPC assessment, only 2/4 facilities had IPC nurse practitioners, although in both instances they were required to perform additional functions (provision of occupational health services and clinical duties). Only one facility had an on-site sterile services department with trained technicians. In general, provisions for IPC were in place (with adequate stock of personal protective equipment and hand-hygiene facilities). Eighty-three and 51 healthcare workers respectively completed the IPC knowledge component at the pre- and post-intervention assessments. A convenience sample of healthcare workers at the four facilities (staff who were on duty and available for interview on assessment day) completed the IPC knowledge assessment section.

Key findings of the pre-intervention assessment included: poor knowledge and implementation of TB-IPC measures; limited knowledge of medical device decontamination; high rates of needle-stick injuries (9.4%, range 2.1 - 13.5%); low hand-

hygiene compliance rates (observed compliance of 28%) and poor compliance with personal protective equipment use (reported at 50.6%).

The post-intervention assessment measured change in facility profile, IPC knowledge scores and staff practices (with reported and observed compliance rates measured after a 14-month interval, during which the five IPC training interventions were delivered). Facility profiles did not change significantly between assessments, except for Hospital 1 which acquired an IPC nurse practitioner and Hospital 2 which built a dedicated sterile services department. Healthcare worker composite knowledge scores of TB-IPC measures and medical device decontamination improved significantly between assessments (odds ratio (OR) 0.36; 95% confidence interval (CI) 0.28 - 0.47; $p < 0.0001$). Reported compliance with personal protective equipment use improved marginally (50.6% (42/83) to 60.8% (30/51)) ($p = 0.3$). Observed hand-hygiene compliance improved significantly (28% (18/64) to 50% (26/52)) ($p = 0.03$; 95% confidence level). Although bed numbers and admission rates remained unchanged, prevalence of needle-stick injuries increased dramatically (9.4% (48/509) to 40% (135/422)) ($p < 0.0001$). This trend was driven by a three-fold increase in injury rates at one facility.

Reflections

Our study had several limitations including the lack of a control facility, possible sampling bias and the failure to document whether participants in the post-assessment had attended an IPC training short course. It is therefore difficult to ascertain whether improvements in IPC were due solely to the IPC training intervention. In addition it was unclear how much gain in healthcare worker IPC knowledge could be attributed to attendance at an IPC short course v. secondary knowledge transfer to colleagues at a particular facility (who had not attended training).

There is a large and unmet need for ongoing training of healthcare workers in IPC in the Western Cape, especially in rural areas. An intensive IPC education intervention in one rural subdistrict successfully trained almost one-third of healthcare workers from four participating healthcare facilities. Most course participants were nurses. In future, medical doctors and allied health professionals should be targeted for in-service IPC training programmes. IPC knowledge gains (measured during the

courses and at the healthcare facilities post assessment) were significant. However IPC-related clinical practices and behaviours showed less marked improvement. Alternative strategies to increase desired clinical behaviours should be explored including regular audits, performance feedback to healthcare workers and use of behavioural economics-based incentives for compliance. The dramatic increase in needle-stick injury rates requires further investigation. Interventions including sharps management training, procurement and training on the use of safety-engineered devices should be implemented.

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