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LINKING THE HEALTH CARE FACILITIES INFECTION PREVENTION AND CONTROL AND THE LABORATORY

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Outline



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- Introduction
 - Requirements for Health Care Facilities (HCF)
 - The role of Infection Prevention & Control (IPC) in the health care facilities
- Define IPC
 - The Aim and whose responsibility is it?
- Discuss the role of a Microbiology laboratory will be discussed under the different areas:
 - Rapid accurate identification of infections (diagnosis and management)
 - Outbreaks: Detection and management
 - Surveillance
 - Organism Storage
- Other Roles by laboratory staff
 - Antimicrobial Stewardship
 - Infection control committee
 - Education and education

The logo of the National Health Laboratory Service, featuring a stylized map of Africa and the text 'NATIONAL HEALTH LABORATORY SERVICE' and 'NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES'.

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Introduction



- Health Care Facilities (HCF):
 - Quality in patient care: **SAFETY** – critical dimension
 - **HAI** → morbidity, mortality and cost
 - HAI Prevalence :
 - ✓ 5 – 10% patients (developed countries)
 - ✓ 7.7 (Kimberly hospital A Nair *et al*; SAMJ 2016)
 - ✓ 10 -20% (Developing countries, Allegranzi B *et al*; Lancet 2011)
 - ✓ Nejad SB *et al* (WHO Bulletin 2011) Developing countries
5 – 15% (general) and 50% (ICUs)
 - ✓ Warren Lowman (SAMJ 2016) – unquantified, resource dependent
 - ✓ Dranowski *et al* (SAMJ 2017) – Different methods having different PPV



Introduction



- DOH 2012 - requires HCF to document their HAIs
 - programs: monitor and prevent
- Several Legislatures:
 - Occupational Health and Safety Act,
 - The National Health Act which encompasses the National Core Standards for Healthcare Establishments and the Healthcare Waste Act
- Internationally: WHO and Centres for Disease Control (CDC) Policies



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Introduction



- Infection Prevention and Control (IPC)
 - Key management function which drives quality improvements and **safety** for all patients
- The aim of **IPC**:
 - To improve patient safety and standards of care
 - Prevent and control HAI
- IPC : The responsibility of every health care worker including **“the laboratory”**

IPC



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- Requirement: Ability to detect infections as they occur
- Roles of the laboratory = ASSIST IPC to achieve the AIM
 - Microbiology ****
 - Virology**
 - Chem path*, Haem* – \uparrow wcc, \downarrow platelets,
 - biomarkers (procalcitonin and CRP)



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**Microbiology is now
part of the healthcare
team**



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Role 1: Rapid and accurate diagnostic testing



- Accurate identification and susceptibility testing of the causative agents of HAI
 - Direct impact on patient care: clinical ward rounds
 - * Educate on proper specimen collection
 - * Monitor specimen quality – Gram stain smears
 - * Reject improper specimens eg urinary catheter tips

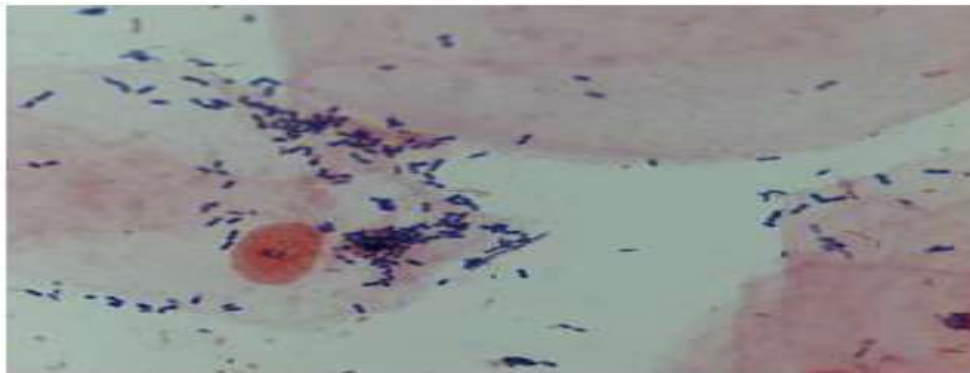


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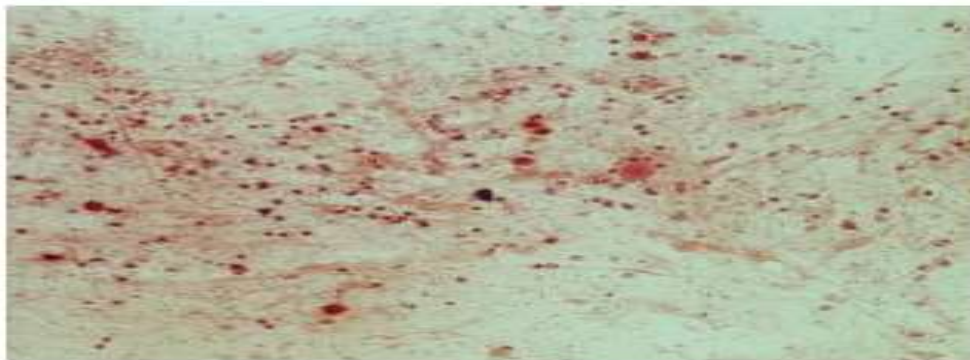
Quality of specimens – Gram stains

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Unacceptable sputum



Acceptable sputum



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Role 1- challenges



- Rapid and Accurate identification/Susceptibility testing of pathogens
- Expanding spectrum of microbes → seriously ill patients (challenge)
- Window of clinical relevance - smaller

- TAT : hours – replaced days/weeks
- Educated & well trained staff
- Automated systems
- Molecular testing



Resources - critical



MIC

Can be difficult to read



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Rapid and Accurate Results – Resource constraints

- ** Accredited laboratories → Quality Management Systems
 - Appropriate SOPs
 - Clear guidelines: Interpretation of results
- ** Translational research → Diagnostic improvements
 - eg POC tests – molecular or phenotypic
 - (quality assurance – an issue)



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Timeous communication of Results



- Laboratory Information System (LIS)
 - * User friendly systems
 - * Relevant - Serve the needs eg creation of epidemiological data
 - Early warning systems → Alert!!!!
 - IPC critical values eg Alert organisms (MDR – GN, MRSA etc)
- Antibiogram preparations
 - limitations of current CLSI guidelines: underestimation of Resistance
 - epidemiological data: monitor trends
- Standardized approaches to urgent notification of IPC personnel
 - *which organisms



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Provision of diagnostic service



- Challenges of consolidation of laboratories (reasons)
 - Trends of centralization globally
 - Often outside the HCF
 - Requires: investment in the logistics

- Impacts:
- specimen transportation (quality of results)
 - timeliness of the results
 - Interaction with clinicians
 - interaction with IPC personnel

Surveillance



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- Passive lab based: - Alert orgs & identifies clusters early
- alerts the IPC teams (effective regular communication) -
- Patient based
- Integrating the 2 - improvement -
- Active: - specified pathogens or screening for carriers of MDRO
- requires team work (clinicians)
- Periodic reports - at least annually (ICU more freq)
 - burden of isolates and antibiograms
 - assist with baseline incidences
 - base for risk assessment and planning of preventive measures



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Outbreak Recognition and Investigation

- Outbreak Investigations
 - Early recognition of clusters/outbreak
 - Immediate communication with wards & IPC personnel
 - Further case finding – more samples (patients and staff)
 - from environment (relevant hypothesis testing)
 - For potential sources or route of transmission
 - Monitor control of the outbreaks
 - Storage of the isolates
 - Isolate characterization:
 - phenotypic (antibiograms)
 - genotypic (eg PFGE) methods more reliable



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Outbreak Investigations cont.



Application of Molecular Typing Techniques:

- Recognize and confirm an outbreak
- Clusters of patients within hospitals
- Track spread between hospitals over time
- Document hospital transmission
- Measure impact of intervention strategies
- Distinguishing relapse from re-infection in individual patients

Pfaller MA. 2001. *Emerg Infect Dis*7:312-318



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Epidemiologic Typing Methods - Basic Principles

- Perform only with clear objectives
- Variability exists in all methods:
 - evaluate all implicated isolates simultaneously
 - compare to epidemiologically unrelated control isolates
- Demonstrate not only relatedness of clustered isolates, but differences from isolates not involved epidemiologically

Pfaller MA. 2001. *Emerg Infect Dis*7:312-318



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Organism Storage



- Without stored isolates supplemental tests cannot be performed
- The laboratory and IPC teams - to decide which isolates should be frozen and for what period of time
- Important isolates: any isolate from a sterile site (blood, CSF, etc.), anti-bi resistant organisms (MRSA, ESBL, CRO), and any other epidemiologically important pathogen
- Storage facilities: freezers (-70°C)





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Cultures of Specimens from Hospital Personnel and the Environment

- Controversial
- Should be performed rarely and only when epidemiologically necessary
- Detection of isolates does not determine cause
- Personal experience: Break in IPC practices

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Value of environmental swabs

Organism involved (section of hospital)	Surfaces where Cultured from
<i>Candida glabrata</i> (NICU)	IVAC pump, incubator door, mother's nametag
<i>K.pneumoniae</i> (NICU)	Ventilator knob
<i>A.baumannii</i> (AICU)	Curtains (beds 1, 4), Pat charts, ventilator knob, Telephone receiver
<i>Stenotrophomonas Maltophilia</i> (Uro OPD)	Urine glass beakers room 1 and 2



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Other roles - Laboratory staff



- Participation: **IPC committee:**
 - Provides expertise in the interpretation of culture results
 - Advice about the appropriateness and feasibility of microbiological approaches
 - Input regarding the laboratory resources necessary to accomplish the goals of the committee
 - Inform the committee of the strengths and limitations of methods employed to detect and characterize HAI pathogens
- Education: - formal /informal
 - microbes, biosafety



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Summary

- IPC aim: To improve patient safety and standards of care
- Responsibility of every HCW including the laboratories (Microbiology)
 - Accurate identification and susceptibility testing of the causative agents of HAI pathogens: Quality assurance
 - Timely communication of Results: LIS (appropriate)
 - Surveillance: passive and active
 - Outbreak Recognition, Investigation and monitoring
 - Organism Storage: Storage facilities and commitment
 - Cultures of Specimens from Hospital Personnel and the Environment
- Committee members: IPC & stewardship
- Micro laboratory – an essential element of IPC program in every HCF !!!



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