Overview of Infection Control and Prevention

Review of the Cesarean-section Antibiotic Prophylaxis Program in Jordan and Workshop on Rational Medicine Use and Infection Control

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Outline

- Key Definitions
- Introduction
- Epidemiology of nosocomial infections
- Root Causes of nosocomial infections
- Understand basic infection control (IC) concepts
- Core IC functions
- IC Resources

Key Definitions

- **Infection Control—**The process by which health care facilities develop and implement specific policies and procedures to prevent the spread of infections among health care staff and patients
- **Nosocomial Infection—**An infection contracted by a patient or staff member while in a hospital or health care facility (and not present or incubating on admission)

Key Definitions (2)

- **Disinfection—**The process of microbial inactivation that eliminates virtually all recognized pathogenic microorganisms, but not necessarily all microbial forms (e.g., spores)
- **Sterilization—**The use of physical or chemical procedures to destroy all microbial life, including large numbers of highly resistant bacterial endospores. Procedures include—
  - Steam sterilization
  - Heat sterilization
  - Chemical sterilization

Introduction—Why Infection Control?

- The combination of highly susceptible or immunocompromised patients, prolonged and at times irrational use of antimicrobials, and poor infection control (IC) makes hospitals focal centers for emergence of nosocomial infections caused by resistant pathogens.
- Resistant infections result in use of more expensive medicines, increased length of stay in hospitals, and increased health care costs.

Source: Implementing a Self-Assessment and Continuous Quality Improvement Approach to Improve hospital Infection Control Practices in Africa and Latin America. SPS. International Conference on Improving the Use of Medicines (ICIUM), Nov 2011

Introduction—Why Infection Control? (2)

- Antimicrobial resistance (AMR) is a rapidly growing public health problem that renders many first-line antimicrobial treatments ineffective. It is threatening to reduce past gains in the treatment of infectious diseases of public health importance, such as HIV/AIDS, TB, and malaria. Interventions that strengthen IC programs are therefore critically needed.
- IC is a fundamental intervention to prevent the emergence and spread of AMR in hospitals. WHO's 2001 Global Strategy for Containment of AMR recommends IC among key interventions. ICIUM 2004 and 2011 recommends improving IC practices to decrease nosocomial infections and prevent the development of AMR

Source: Implementing a Self-Assessment and Continuous Quality Improvement Approach to Improve hospital Infection Control Practices in Africa and Latin America. SPS. International Conference on Improving the Use of Medicines (ICIUM), Nov 2011

Introduction—Why Infection Control? (3)

- Implementing simple, effective, low-cost IC practices, such as improving hand hygiene, environmental hygiene, and waste management in health care facilities, helps reduce the spread of nosocomial infections
- Properly implemented IC programs result in reduced infection rates and decreased use of medicines in health facilities and ultimately improved quality of patient care and reduced health care-related costs for patients and health systems

Source: Implementing a Self-Assessment and Continuous Quality Improvement Approach to Improve Hospital IC Practices in Africa and Latin America. ICIUM 2011

Introduction—Why Infection Control? (4)

- Poor or absent IC practices, especially in intensive care units, results in cross-transmission of antibiotic-resistant bacteria.
- Resistant bacteria prompts even greater antibiotic use by physicians.
- Perception of knowledge by physicians of poor sterilization, disinfection, or patient care practices prompts increased antibiotic use (e.g., broad spectrum and prolonged surgical prophylaxis in an effort to prevent infections).

Epidemiology of Nosocomial Infections (1)

- Most common sites for nosocomial infections
  - Surgical incisions
  - Urinary tract (i.e., catheter-related)
  - Lower respiratory tract
  - Bloodstream (i.e., catheter-related)

Epidemiology of Nosocomial Infections (2)

- Common microorganisms
  - Aerobic gram-positive cocci (*Staphylococcus aureas* [MRSA], enterococci [vancomycin-resistant]),
  - Aerobic gram-negative bacilli (*Escherichia coli*, *P. aeruginosa*, *Enterobacter* spp., and *Klebsiella pneumoniae*)

Epidemiology of Nosocomial Infections (3)

- Nosocomial transmission of community acquired, multidrug-resistant organisms
  - *M. tuberculosis*
  - *Salmonella* spp.
  - *Shigella* spp.
  - *V. cholerae*

Root Causes of Nosocomial Infections (1)

- Lack of training in basic IC
- Lack of an IC infrastructure and poor IC practices (procedures)
- Inadequate facilities and techniques for hand hygiene
- Lack of isolation precautions and procedures

Root Causes of Nosocomial Infections (2)

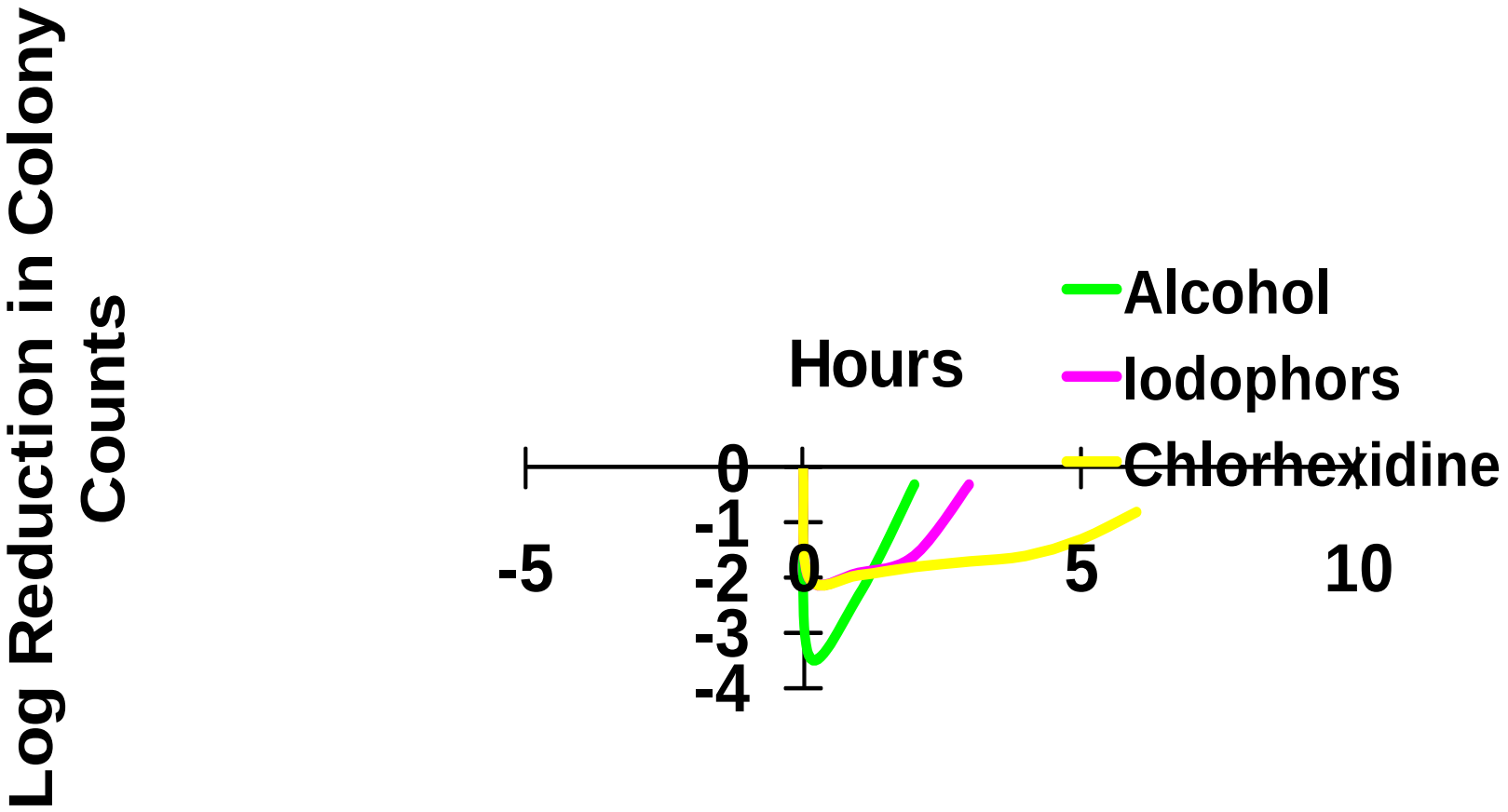
- Use of advanced and complex treatments without adequate training and supporting infrastructure, including—
  - Invasive devices and procedures
  - Complex surgical procedures
  - Interventional obstetric practices
  - Intravenous catheters, fluids, and medications
  - Urinary catheters
  - Mechanical ventilators
- Inadequate sterilization and disinfection practices and inadequate cleaning of hospital

Core Strategies to Reduce Nosocomial Infections—Hand Hygiene

To ensure appropriate hand washing techniques—

- Provide sinks, clean water, and soap at convenient locations
- Where sinks, clean water, and hand washing supplies are unavailable, use alcohol-based products which are inexpensive, produced locally, convenient, and effective for hand hygiene.
- Monitor compliance
- Use gloves when necessary

Effect of Antiseptics on Colony Counts After Hand Scrub



Source: Modified from Larson, E. 1988. Guideline for Use of Topical Antimicrobial Agents. *American Journal of Infection Control* 16:253.

Core IC functions (2)

- Isolation and Standard Precautions
- Ensuring a Clean Environment
- Cleaning, Disinfection, and Sterilization of Instruments
- Sterile Invasive Procedures and Intravenous Medications
- Respiratory Therapy
- Surgery and Surgical Site Care including antimicrobial surgical prophylaxis

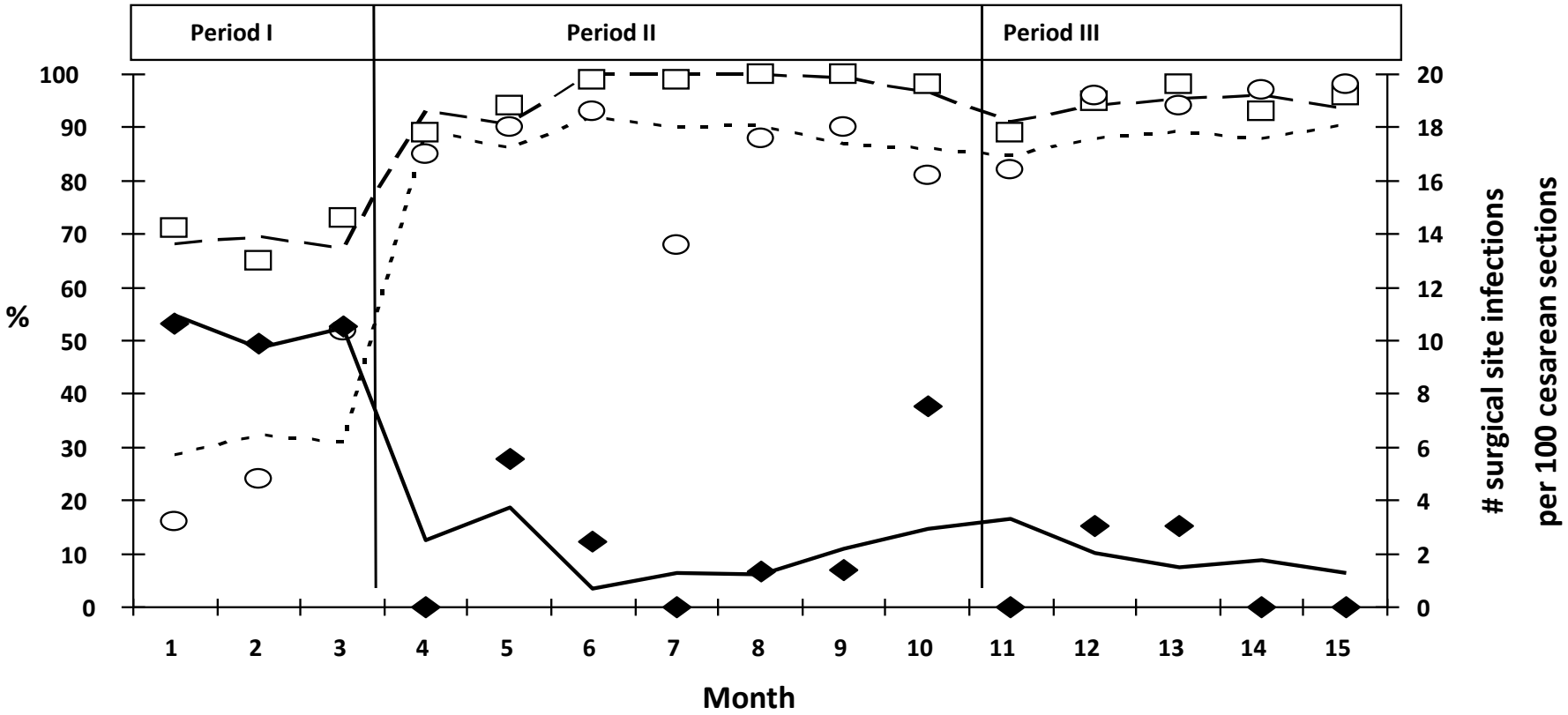
Case Study—Antibiotic surgical prophylaxis in Cesarean Section procedures

- The risk of endometritis after cesarean section exceeds 30%.
- Antibiotic prophylaxis reduces the incidence by two-thirds.

Inappropriate Timing of Antibiotic Prophylaxis for Cesarean Section

	Patients Receiving Prophylaxis	Patients Reciving Prophylaxixs <1 hour before Delivery
Hospital A	70%	31%
Hospital B	32%	70%

Effect of Appropriate Perioperative Antibiotic Prophylaxis on Surgical Site Infections after Cesarean Section



Source: Goldman, 2001, unpublished

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Infection Control Priority Matrix – Addressing Surgical Site Infections in Cesarean Sections

Factor	Importance	Within the Capacity of Hospital Personnel to Improve	Time Frame for Improvement
Antibiotic prophylaxis	4	4	Short
Skin preparation	3	4	Short
Surgical technique	4	4	Medium
Prenatal factors	3	1	Long
Peripartum events	4	2	Medium

Infection Control Resources

- **Infection control manuals, protocols, and training programs** (See Participants' Guide, annex 1)
  - WHO and CDC website—protocols and guidelines
  - EngenderHealth training program—web-based training for basic infection programs
  - ICAT—tool that can be used in low-resource countries to improve infection control practices (can be obtained from SPS/MSH)

Infection Control Assessment Tool

- The ICAT and quality improvement program provide a standardized approach.
- Combining an infection control self-assessment tool (ICAT) and rapid cycle quality improvement (RCQI) (or rapid team problem solving) methods improves hospital infection control practices.
- RCQI is a quality improvement approach in which a multidisciplinary team collaborates on improving an identified problem or situation.