



Improving Antibiotic Prophylaxis in Cesarean Section in Jordanian Hospitals: SIAPS Technical Report

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Improving Antibiotic Prophylaxis in Cesarean Section in Jordanian Hospitals: SIAPS Technical Report

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March 2013



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About SIAPS

The goal of the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program is to assure the availability of quality pharmaceutical products and effective pharmaceutical services to achieve desired health outcomes. Toward this end, the SIAPS result areas include improving governance, building capacity for pharmaceutical management and services, addressing information needed for decision-making in the pharmaceutical sector, strengthening financing strategies and mechanisms to improve access to medicines, and increasing quality pharmaceutical services.

Recommended Citation

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Key Words

Antibiotic prophylaxis; antimicrobial resistance; health system strengthening; cesarean section; standard treatment guidelines; protocol; continuous quality improvement; indicators; evidence-based medicine; Jordan.

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ACRONYMS

ABP	antibiotic prophylaxis
AMR	antimicrobial resistance
CS	cesarean section
CQI	Continuous Quality Improvement
DfID	UK Department for International Development
DTC	Drug & Therapeutics Committee (or Pharmacy & Therapeutics Committee)
EDL	Essential Drug List
EMT	Excel Monitoring Tool
FAR	Foreign Assistance Reform
GDP	Gross Domestic Product
GHI	Global Health Initiative
HAI	Health Action International
HCAC	Health Care Accreditation Council
HSS	Health Systems Strengthening
HSS II	Health Systems Strengthening II Project
ICC	Infection Control Committee
IRs	Intermediate Results
JOD	Jordanian Dinar
JFDA	Jordan Food and Drug Administration
JNDF	Jordan National Drug Formulary
M&E	monitoring & evaluation
MCH	mother and child health
MeTA	Medicines Transparency Alliance
MOH	Ministry of Health
MSH	Management Sciences for Health
NQS	National Quality and Safety
NQSG	National Quality and Safety Goals
OBGY	obstetrics and gynecology
OR	operating room
P&P	Protocol & Procedures
PHR <i>Plus</i>	Partners for Health Reform Plus Project
RDL	Rational Drug List
RDU	rational drug use
RPM <i>Plus</i>	Rational Pharmaceutical Management Plus Program
RMS	Royal Medical Services
SIAPS	Systems for Improved Access to Pharmaceuticals and Services
SPD	Supply and Procurement Directorate
SPS	Strengthening Pharmaceutical Systems Program
SSI	surgical site infection
STG	Standard Treatment Guidelines
USAID	United States Agency for International Development
WHA	World Health Assembly
WHO	World Health Organization

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EXECUTIVE SUMMARY

About one-third to one-half of all antibiotics used in hospitals is for surgical prophylaxis; however, 30 to 90 percent of this use is inappropriate.¹ The Jordan Food and Drug Administration (JFDA) recently conducted a study in Jordanian hospitals that provided data on surgical antibiotic prophylaxis practices, including for cesarean section.² The study findings indicated that these practices could be improved. In the context of the JFDA's study findings and recommendations, the U.S. Agency for International Development-funded Strengthening Pharmaceutical Systems (SPS) program, and its follow-on Systems for Improved Access to Pharmaceuticals and Services (SIAPS), provided technical assistance to help strengthen practices regarding antibiotic prophylaxis for cesarean sections at three Ministry of Health (MOH) hospitals in Jordan—Prince Hussein Hospital, Prince Faisal Hospital, and Dr. Jameel Al Totanji Hospital.

Process

Initially, SPS oriented each facility's key stakeholders on the objectives and scope of the program. Following this, SPS provided technical assistance for creating detailed mapping and profiling of CS-related practices at each facility, including generation of baseline data on antibiotic prophylaxis in CS. During this phase, the hospital team became more involved and aware of the program goals and expected outcomes. Engaging the hospital teams at this early stage was essential not only for learning about their own practices, but also for building in the key principles of multi-stakeholder collaboration, local ownership and long-term program sustainability.

While the hospital profiles were being studied, the SPS team put together the latest international evidence and recommendations on antibiotic prophylaxis for women undergoing CS. Available local studies or references were also included. This information was summarized and presented to the hospital stakeholders as one of the tools for the development of their own protocols.

With the baseline information mapped out, and the relevant evidence-based material summarized, the hospital teams were ready to develop their own CS prophylactic antibiotic protocol and procedures (P&P). The SPS team helped develop several tools to facilitate the development process, including a System Redesign Worksheet.

Following these initial foundational activities, the multi-disciplinary stakeholder group at each hospital collaborated with SPS to develop their own customized protocol and procedures for the prophylactic use of antibiotics in cesarean section. Each hospital's team organized themselves, led their own local discussions, completed the system redesign worksheet, drafted a new protocol and procedure, and agreed on the general principles of continuous quality improvement (CQI) plans for their hospital.

¹ Munkhof W. Antibiotics for surgical prophylaxis. *Aust Prescr* 2005; 28: 38-40.

² Jordan Food and Drug Administration. Rational antibiotic use in Jordan: auditing antibiotic use targeting surgical prophylaxis at Jordanian hospitals. JFDA, Rational Drug Use Department, May 2009.

Implementation of the new protocols in the hospitals is an ongoing process, and requires monitoring and continuous quality improvement (CQI). Working with the hospital teams, SPS, and from November 2011 onwards the follow-on program SIAPS, continued to help develop, use and refine simple tools to facilitate monitoring important indicators resulting from protocol implementation. These key indicators agreed for longitudinal tracking included:

- Adherence to protocol recommended antibiotic
- Time of administration of first dose of prophylactic antibiotic
- Administration of the appropriate number of antibiotic doses
- Rates of surgical site infection
- Cost-savings

The tools developed for monitoring included a patient CS Log and an Excel Monitoring Tool (EMT). When fully and continuously implemented, the CS Log and Excel Workbook facilitated and standardized the process of longitudinally mapping the performance on the agreed indicators.

The multi-stakeholder groups at the hospitals implemented their protocols, working together to continually identify gaps and gradually improve the overall process. In this manner, iterative approaches consistent with CQI became a part of the groups' approach to implementing the pilot program. The relevant units of the MOH also supported and supervised the process.

Results

Baseline profiling done for the period September 15 to October 14, 2010 had shown that the local practices at the participating hospitals did not match with the current best international evidence and recommendations in terms of the choice of antibiotic and dose, timing of administration, and duration of prophylaxis. In 2011, the hospital stakeholders developed their customized protocols and procedures, and gradually established a CQI-like system to help implement the program. In 2012, the stakeholders further consolidated the program and achieved high levels of adherence to these agreed protocols and procedures. Table 1 highlights combined results for 2012 for all the key program indicators at all the three hospitals. These results indicate good compliance to the protocols and procedures in terms of the use of the antibiotic of choice (cefazolin), use of a single dose (except in cases with pre-identified exceptions), and administration of the antibiotic prior to skin incision (within an hour before skin incision). The use of the new protocols also resulted in substantial cost-savings when compared with the cost of antibiotics used during the baseline period. All these results were achieved with a low overall surgical site infection rate of 1.59%.

Program Achievements

The pilot program initiated in the three MOH hospitals in Jordan with technical assistance from the USAID-supported SIAPS Program and its predecessor, SPS, was able to build evidence- and consensus-based local protocols, and a system-based implementation mechanism to bring about improvements in antibiotic prophylaxis in CS. The pivotal approach taken was to work closely with in-country partners to strengthen local capacity and health systems in order to achieve sustainable improvements. The program's activities were complementary to the Jordan National

Health Strategy's goal of providing efficient, high-quality health care services in accordance with international standards.³

Table 1: Pilot Program on Improving Antibiotic Prophylaxis in Jordanian Hospitals: Indicator-based Data for the period January to December 2012

Description	P. Hussein Hospital	P. Faisal Hospital	Totanji Hospital	Combined for all 3 Hospitals
Total number of CS prophylaxis cases presenting through Obstetrics and Gynecology (OBGY) ward regardless of protocol implementation or CS Log completion (denominator for indicator 6 below)	659	1,065	1,105	2,829
Number of CS prophylaxis cases for which a CS Log was completed appropriately (denominator for indicators 1 to 5 below)	641	682	980	2,303
CS Log capture rate: CS cases captured with a completed CS Log	97% (641/659)	64% (682/1065)	89% (980/1105)	81% (2303/2829)
% Cases in which correct prophylactic antibiotic (cefazolin) administered (indicator 1)	87% (559/641)	93% (634/682)	81% (791/980)	86% (1,984/2303)
First dose of prophylactic antibiotic administered at appropriate time (indicator 2)	89% (573/641)	95% (648/682)	92% (897/980)	92% (2,118/2303)
Correct number of prophylactic antibiotic doses administered (indicator 3)	90% (580/641)	87% (593/682)	88% (860/980)	88% (2,033/2303)
Antibiotics other than recommended antibiotic (not per protocol) prescribed (indicator 4)	17% (109/641)	19% (132/682)	42% (407/980)	28% (648/2303)
Followed-up by clinic visit and/or by telephone (indicator 5)	86% (550/641)	83% (567/682)	89% (872/980)	86% (1,989/2303)
CS surgical site infection (SSI) cases relative to total number of CS cases (indicator 6)	2.12% (14/659)	1.03% (11/1065)	1.81% (20/1105)	1.59% (45/2829)
Current average antibiotic prophylaxis (ABP) cost per case (JOD = Jordanian Dinar)	JOD 1.515	JOD 0.731	JOD 1.425	JOD 1.245
Baseline average ABP cost per case	JOD 8.553	JOD 5.448	JOD 5.980	JOD 5.980
Percent decrease in average ABP cost per case (when the current average ABP cost per case is compared with the baseline average ABP cost per case)	82%	87%	76%	79%

The program contributed to Element 1.6 (MCH) of the U.S. Government's FAR Framework for Health (Investing in People), which represents a priority area for USAID/Jordan. It also

³ High Health Council. National Health Strategy General Framework. http://www.hhc.gov.jo/more_e.html

supported the Millennium Development Goal #5 in improving maternal health. Further, this program contributed to the 2007 World Health Assembly (WHA) Resolution (A60.24) which urges member states to implement rational medicine use activities to help contain antimicrobial resistance. Additionally, the program supported several goals of the current Global Health Initiative (GHI), such as contributing to approaches that support women's health, building sustainability through health system strengthening (HSS), improving metrics and monitoring, increasing impact through strategic coordination, and encouraging country ownership. By taking a deliberate 'systems thinking' approach, the Jordan program contributed to all the SIAPS Intermediate Results (IRs)—IR1 (governance), IR2 (pharmaceutical management capacity), IR3 (information), IR4 (financing), and IR5 (pharmaceutical services).

Although the three hospitals performed at different levels of success, positive changes were observed in each of them. Each hospital is now providing better pharmaceutical care for women undergoing CS. Prior to the program intervention none of the women undergoing CS were receiving an ABP dose prior to incision, whereas the majority are now in fact receiving the first dose at the appropriate time. Additionally, all three MOH hospitals have demonstrated a decrease in both the number of doses of ABP given and in the prescribing of other, unnecessary antibiotics.

Also, when the current cost for ABP is compared with the information gathered during the baseline analysis, clear savings become obvious. When compared with the baseline costs, the use of new protocols shows a saving of Jordanian Dinars 10,905 (approximately US Dollars 15,397) for the 2,303 CS Log-documented cases in 2012. In its Annual Statistics Book of 2010, Jordan's Ministry of Health reported 17,823 cases of CS in its hospitals. If the new protocols with their cost reduction potential were to be extrapolated to all these 17,823 cases, a huge estimated saving of JOD 84,396 (approximately US Dollars 119,160) would be achieved.

Whereas rates of surgical site infections (SSI) were not specifically being monitored prior to the initiation of the pilot program, the hospitals now have appropriate documentation of such cases, and are able to monitor their performance in this regard. The documented percentages of SSIs (2.12% in P. Hussein Hospital, 1.03% in P. Faisal Hospital, 1.81% in Totanji Hospital, 1.59% combined for all 3 hospitals) at the program sites were well below the post-cesarean wound infection rate of 8.1% reported from another hospital in Jordan.⁴ This shows that the institution of the new protocols and procedures brought about several positive changes without compromising the quality of patient care.

Finally, the MOH was able to leverage the experience gained at the three participating hospitals in order to create one, unified CS ABP protocol and procedures based on the latest evidence for all MOH hospitals. The unified protocol was produced by an MOH team, and was approved by the Minister of Health in February of 2013. All hospitals providing OBGY services are now mandated to implement the protocol for CS cases.

In conclusion, the pilot program for improving antibiotic prophylaxis in CS in Jordanian hospitals led to local capacity-building, health system strengthening, improved performance and

⁴ Kaplan et al. Eastern Mediterranean Health Journal 2003; 9: 1068-74.

service delivery, and a move toward sustainability. The following evidences support this conclusion:

- *Evidence-based and standardized care* for mothers undergoing CS through high levels of compliance to locally agreed protocol and procedures based on international evidence and best practices, and *cost savings* through avoidance of unnecessary doses of prophylactic antibiotics. These benefits were achieved without increase in surgical site infections.
- *Support for AMR containment* through judiciousness and stewardship in the use of antibiotics for prophylaxis in surgery.
- *Improved pharmaceutical care* as a result of a common context and platform that the program offered for various stakeholders and committees to collaborate and work together.
- *Enhanced capacity and coordination* of various departments (e.g., OBGY, Anesthesia, Nursing, pharmacy) and committees (e.g. Pharmacy and Therapeutics Committee, Infection Control Committee) to develop and implement interventions to improve use of antibiotics.
- Support of the hospital administration and *official approval* of the protocol and procedures
- Implementation of a locally contextualized approach and methodology, including *the use of customized tools*, to support *medicine use review* or practice audit. Institutionalization of the culture of *continuous quality improvement* through a process of periodic reviews and analysis of indicator-based data, and small-scale incremental improvements.
- *Program sustainability* through integration of the approach within the context of the existing routine clinical practice; use of simple and locally customized tools; involvement and capacity enhancement of multi-disciplinary groups of stakeholders; local ownership; improved coordination between the participating hospitals and MOH; and use of a unified CS ABP protocol approved and mandated by MOH for use at all MOH hospitals providing OBGY care.
- *Broader positive system impact beyond the direct objectives of the program for CS* as evidenced by replication or expansion of the model for another surgical procedure (hernia).
- Contribution to the *hospital accreditation* process. Supported the Health Care Accreditation Council's 2012 National Quality & Safety (NQS) Goals, one of which is "appropriate use of prophylactic antibiotic during surgery".
- Improved pharmaceutical services through availability of the prophylactic antibiotic of choice (cefazolin) for use at the hospitals (not available when the program started)
- *Improved quality of MCH care* in hospitals, contributing to national, USAID, and other global initiative goals.

Lessons Learned

- Local stakeholders get motivated, coordinate and participate to organize and improve practice if they are supported with international and local evidence, clarity of purpose, locally contextualized approaches and tools, and follow-up technical support.
- When developed and implemented strategically adhering to the principles of evidence-based medicine, local relevance and feasibility, transparency, participation, and clarity in the roles and responsibilities of the various involved stakeholders, treatment or

prophylaxis guidelines/protocols standardize and improve pharmaceutical services and also save costs without compromising the quality of care.

- CQI is a methodology that encourages and supports incremental changes within the context of the existing environment and is thus highly relevant and practically useful to implement in resource-limited settings.
- Opportunities provided by the implementation of specific and discrete activities can be advantageously used to support wider health systems strengthening if they are designed and implemented with such a system-oriented focus in mind.

INTRODUCTION AND BACKGROUND

Pharmaceutical and Antimicrobial Use: The Global Scenario

The World Health Organization (WHO) estimates that 20 to 40% of the national health budget in resource-constrained countries is spent on pharmaceuticals, and more than 50% of those pharmaceuticals are used inappropriately.^{5,6} In resource-limited countries, less than 40% of patients in the public sector and 30% in the private sector are treated according to clinical guidelines.^{2,7}

Antimicrobials constitute one of the most commonly prescribed agents, accounting for up to 50% or sometimes even more of pharmaceutical expenditure. However, antimicrobials are also one of the most misused agents. Studies indicate that one-third to half of all the antibiotics used in hospitals is for surgical prophylaxis, with 30 to 90% of this use being inappropriate.⁸ Problems with antibiotic prophylaxis (ABP) occur in the selection of antibiotic as well as the timing and duration of use. Inappropriate use of ABP feeds the increasing problem of antimicrobial resistance (AMR). Additional consequences of misuse of antibiotics include adverse drug reactions, drug interactions, and increased cost for both the patient and the health system.

Pharmaceutical and Antimicrobial Use: The Jordan Scenario

The total expenditure on health in 2008 was US\$ 1,951 million (8.58% of the GDP), of which 496.4 million was spent on pharmaceuticals (35.94 % of the total health expenditure).⁹ An official National Medicines Policy document (updated 2002) exists, and covers aspects related to rational medicine use. However, pharmaceutical policy implementation is not regularly assessed or monitored. Written national strategy for the containment of AMR and intersectoral taskforce for the promotion of appropriate antimicrobial use do not exist.⁵

Consistent with the global scenario, antimicrobials account for a large share of pharmaceutical expenditures: 23% by Jordanian Dinar and 15% by unit.¹⁰ A study in 2002 in primary health care facilities revealed that more than 60% of prescriptions contained antimicrobials, which is very high compared to the numbers from India (43%), Nigeria (48%), Zimbabwe (29%), Lebanon (17.5%) and Yemen (46%).¹¹ The WHO's recent Level-II Facility Assessment found that nearly 57% of patients receiving outpatient treatment, in both public facilities and private hospitals, are prescribed at least one antibiotic. The survey also revealed that nearly 14% of the medicines

⁵ WHO, EB118/6, 11 May 2006

⁶ WHO. Rational use of medicines. Fact Sheet No. 338, May 2010. <http://www.who.int/mediacentre/factsheets/fs338/en/index.html#>

⁷ Rational use of medicines. *Lancet* 2010;375: 2052.

⁸ Munckhof W. Antibiotics for surgical prophylaxis. *Aust Prescr* 2005; 28: 38-40.

⁹ Jordan Pharmaceutical Country Profile, MOH-WHO, 2011. <http://apps.who.int/medicinedocs/documents/s19143en/s19143en.pdf>

¹⁰ Jordan Rational Use of Drugs Strategy Development Workshop, 21st-22nd September 2004, Dead Sea Valley / Jordan.

¹¹ Otoom S, Batiha A, Hadidi H, Hasan M, Al-Saudi K. Evaluation of drug use in Jordan using WHO prescribing indicators. *Eastern Mediterranean Health J* 2002; 8 (4&5).

found in surveyed households were antibacterials, and 28% of those antibacterials were in fact kept for future use.¹²

Jordan's Key Achievements in the Pharmaceutical Sector

Table 2 gives an evolutionary picture of selected milestones in the development of policy and system for rational selection and use of medicines.

Table 2: Key Achievements in Jordan's Pharmaceutical Sector

YEAR	POLICY, LEGISLATION, REGULATION, STRATEGY	STRUCTURES	TOOLS	PROCESSES
1996			Essential Drug List (EDL); later became Rational Drug List (RDL)	
1998			Jordan National Drug Formulary (JNDF)	
1999		Committees to promote rational drug use		
2001		Jordanian Pharmacovigilance Center	Jordan Rational Drug List (JRDL), 2 nd edition	
2002	National Drug Policy		Jordan National Drug Formulary (JNDF), revised (2 nd edition)	
2003		Jordan Food and Drug Administration established; Hospital Pharmacy & Therapeutics Committees		
2004	Rational Drug Use Strategy	Joint Procurement Department (JPD)		Jordan RDU Strategy Development Workshop; RDU Division Advisory Committee
2006			JNDF Version 1, 2006	
2007				Tender by JPD for anti-infective medicines

¹² WHO Level-II Household Survey. Medicines Survey in Jordan, Report of a survey conducted in October – December 2009. Ministry of Health. May 2012.

YEAR	POLICY, LEGISLATION, REGULATION, STRATEGY	STRUCTURES	TOOLS	PROCESSES
2008	MOH mandate number 311 via the Hospital Administration: Reactivation of Hospital Pharmacy & Therapeutics Committees and outlining roles/responsibilities			Jordan became one of the MeTA pilot countries; Tender by JPD for 4 therapeutic groups
2009		National Committee for development of STG for hypertension		Tender by JPD for all 14 therapeutic groups
2010	Jordan Framework for Good Governance in the Pharmaceutical Sector (MeTA initiative)			
2011			JNDF Version 2, 2011	
2012	MOH setting accreditation goals for its hospitals with the Health Care Accreditation Council (HCAC)			The new National Quality and Safety Goals include the requirement for having, implementing, and monitoring antibiotic prophylaxis guidelines for all surgical procedures

Donor Support for the Jordan Pharmaceutical Sector

The U.S. Agency for International Development (USAID) has supported the pharmaceuticals sector in Jordan since the early 2000's through Management Sciences for Health's (MSH) Rational Pharmaceutical Management Plus (RPM Plus) Program and the Partners for Health Reform *plus* (PHR*plus*) Project. In collaboration with the WHO, RPM Plus conducted an international training course in Drug and Therapeutics Committees (DTCs), organized locally by the Jordan University for Science and Technology (JUST). PHR*plus* assisted with organizational reforms that included the formation of the Jordan National Drug Formulary (JNDF) Advisory Board, JNDF technical committees, a Rational Drug Use (RDU) Division at the Jordan Food and Drug Administration (JFDA), and support for rational selection of medicines (Rational Drug List).

In 2008, the UK Department for International Development (DfID), in partnership with the WHO and World Bank, supported the Medicines Transparency Alliance (MeTA) in Jordan. MeTA is an international, multi-stakeholder initiative that aims to promote increased transparency in the supply of essential medicines to ensure equitable access for low-income populations. The initiative officially closed on September 30th, 2010 and produced the Sector

Scan of the pharmaceutical system and the Disclosure Survey. With WHO support, Jordan also published a framework for good governance in the pharmaceutical sector in 2010,¹³ and conducted the Baseline Level-II Assessment and Household Survey along with the WHO/Health Action International (HAI) medicine pricing, availability, and affordability study. The MeTA initiative has been re-started in late 2012, with the WHO taking a larger technical role in program administration.

USAID continues supporting Jordan's health sector with the Health Systems Strengthening II (HSS II) Project, implemented by Abt Associates. HSS II works with the Ministry of Health (MOH) to reduce fertility rates, improve women's health, family planning and reproductive health services, and facilitate access to health services and information.

Antibiotic Prophylaxis in Cesarean Section

Studies have shown that inappropriate use of antibiotic prophylaxis (ABP) occurs for a variety of procedures, including cesarean section (CS). CS is a common surgery, carries major risk of post-surgical infections, and is the single most important factor for postpartum maternal infection. The risk of infections after CS is up to 20 times higher when compared with vaginal delivery. Literature shows that infection occurs in 7 to 20% of women after CS.^{14,15} Many studies and meta-analyses show high efficacy of ABP in preventing post-surgical infections, both in elective and non-elective cases of CS. Therefore, in applying evidence-based medicine, ABP is recommended in all cases of elective and non-elective CS.^{2,16,17}

In the Jordanian MOH hospitals, CS is a common procedure with nearly 18 thousand cases reported in 2010.¹⁸ A 2009 study conducted by the JFDA evaluated antibiotic prescribing for prophylaxis in appendectomies, CS, hernias and cholecystectomies in three Jordanian hospitals from different sectors. The study found overuse of antibiotics, including high use of expensive second and third generation cephalosporins in both low-risk clean and clean-contaminated operations, high cost of antibiotics used, and prolonged use for prophylaxis.¹⁹ A large scope thus exists for rationalizing ABP in CS in Jordan.

USAID Support for Improving Antibiotic Prophylaxis through SPS and SIAPS Technical Assistance

In the context of the documented pharmaceutical expenditure and trends in antibiotic-use, especially in surgical prophylaxis, the USAID/Jordan Mission decided to support the CS Pilot

¹³ A framework for good governance in the pharmaceutical sector: The Hashemite Kingdom of Jordan, 2010.

¹⁴ Smaill & Gyte. Cochrane Database of Systematic Reviews 2010, Issue 1. Art. No.: CD007482

¹⁵ Tita et al. *Obstet Gynecol* 2009;113: 675-82

¹⁶ Schalkwyk et al. *JOGC*, September 2010, No. 247

¹⁷ SIGN Guideline 104 (antibiotic prophylaxis in surgery), July 2008

¹⁸ Annual Statistical Book 2010. Ministry of Health. The Hashemite Kingdom of Jordan

¹⁹ Jordan Food and Drug Administration. Rational antibiotic use in Jordan: auditing antibiotic use targeting surgical prophylaxis at Jordanian hospitals. JFDA, Rational Drug Use Department, May 2009.

Program in Jordan. The decision for support was based on the options-analysis report²⁰ submitted by the USAID-funded Strengthening Pharmaceutical Systems (SPS) Program of Management Sciences for Health (MSH), as well as on the priorities and directions provided by the Mission. The pilot activity started in October 2010 with SPS technical assistance and continued with technical assistance from the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program from October 2011 onwards. SIAPS, a 5-year USAID-supported mechanism, is follow-on to SPS and aims to build activities, wherever possible, on the platform and achievements made by its predecessor.

²⁰ Lee D. 2010. *From Policy to Practice: Options for USAID Technical Support to Jordan's Pharmaceutical System*. Submitted to the U.S. Agency for International Development by the Strengthening Pharmaceutical Systems (SPS) Program. Arlington, VA: Management Sciences for Health.

STRATEGIC APPROACH OF SIAPS IN JORDAN

Problem Statement

Local health care providers (physicians and pharmacists) in Jordan perceive that antibiotics are excessively used.²¹ Local stakeholders have also expressed concern over the growing problem of antimicrobial resistance (AMR) in both the community and hospital settings.²² Although antimicrobial utilization study data are limited, the available evidence shows that inappropriate use is an issue in Jordan. More than 60% of prescriptions in primary health care facilities contain these classes of medicines, which is higher than the figures found in many other countries.²³ Further, research conducted on Jordanian consumers shows issues with knowledge and use of medicines, including high levels of non-adherence to medication and frequent use of antibiotics for coughs, cold, and flu.²⁴ Also, as mentioned above, a recent study conducted by JFDA found suboptimal use of antibiotics for surgical prophylaxis, including that for CS.²⁵

The public health sector in Jordan is well established and has a strong foundation, including a good existing structure to support an appropriate formulary process. However, formulary decisions are not always made using the latest medical evidence, standard treatment guidelines (STGs) are not produced or utilized to a good extent, and the inter- and intra-departmental set up within a hospital is not always optimal for implementing guidelines and procedures.

In the MOH, eight different administrations exist, each containing between 3 and 13 directorates covering technical, logistic, and administrative areas.²⁶ One of the administrative areas is *Hospital Administration*, which houses the following directorates, among others:

- Medical Specialties Directorate
- Nursing Directorate
- Clinical Pharmacy Directorate
- Laboratory Directorate
- Quality Directorate

Relatedly, an Infection Control Department is a part of the Communicable Disease Directorate of the Primary Health Care Administration.

Although many policies and procedures exist for the various administrations and their constituents, activities sometimes lack synchronization. Activities in one section do not necessarily contribute to similar efforts in another section, and possible complementarities may

²¹ Ootom SA, Sequeira RP. Health care providers' perceptions of the problems and causes of irrational use of drugs in two Middle East countries. *Int J Clin Pract.* 2006 May; 60(5): 565-70.

²² Jordan Rational Use of Drugs Strategy Development Workshop, 21st-22nd September 2004, Dead Sea Valley / Jordan

²³ Ootom S et al. Evaluation of drug use in Jordan using WHO prescribing indicators. *Eastern Mediterranean Health Journal*, Volume 8, No. 4&5, September 2002.

²⁴ Jordan Rational Use of Drugs Strategy Development Workshop, 21st-22nd September 2004, Dead Sea Valley / Jordan.

²⁵ Jordan Food and Drug Administration. Rational antibiotic use in Jordan: auditing antibiotic use targeting surgical prophylaxis at Jordanian hospitals. JFDA, Rational Drug Use Department, May 2009.

²⁶ www.moh.gov.jo/MOH/En/organizational_chart.php

get missed. Also, the High Health Council's National Health Strategy General Framework mentions inadequate coordination, communication and health information systems as existing weaknesses.²⁷

Each MOH hospital is mandated to have a DTC, with its composition, roles and responsibilities, and mode of function outlined in the official MOH memo number 311 dated August 28, 2008. However, few DTC-related activities take place among at the hospital level. The formulary process, therefore, does not always engage all relevant stakeholders, and decisions are not always made using evidence-based medicine. As a result, between 2006 and February of 2010, Jordan's RDL grew from around 632 items to more than 1,300 items. .

SIAPS Objectives for Jordan

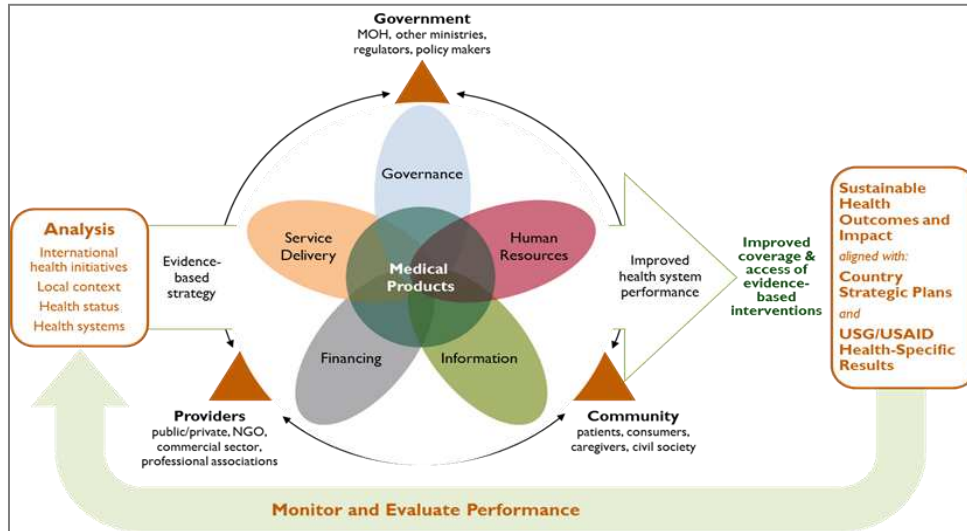
The *overall objective* of SIAPS is to promote and use a systems-strengthening approach consistent with the Global Health Initiative (GHI) that will result in positive and sustainable health impact. The USAID Intermediate Results (IRs) areas for SIAPS are:

- IR 1: Pharmaceutical sector governance strengthened
- IR 2: Capacity for pharmaceutical supply management and services increased and enhanced
- IR 3: Information for decision-making challenge in the pharmaceutical sector addressed
- IR 4: Financing strategies and mechanisms strengthened to improve access to medicines
- IR 5: Pharmaceutical services improved to achieve desired health outcomes

SIAPS places special emphasis on 'Systems Thinking', and therefore pays deliberate attention to the dynamics and interactions between the six building-blocks of the health system, i.e. medical products, governance, health workforce, information, finance and service delivery. Where possible, cross-support is facilitated between the various blocks, especially between the 'medical products' block and the rest of the other five blocks. Figure 1 shows the overall results framework for SIAPS.

²⁷ High Health Council. National Health Strategy General Framework. http://www.hhc.gov.jo/more_e.html

Figure 1: Overall SIAPS Results Framework



The **technical objective for SPS/SIAPS Jordan** was to strengthen national and institutional capacity for effective, safe, and cost-efficient use of antimicrobials to help contain antimicrobial resistance and improve patient outcomes.

Under this technical objective, the **specific activities** that SPS/SIAPS supported were:

- Development of locally suitable protocols and procedures for administering antibiotic prophylaxis in cesarean section
- Monitoring implementation of the protocols and procedures using an approach consistent with continuous quality improvement (CQI)

The pivotal approach taken to achieve this end was to work closely with in-country partners to strengthen their capacity and health systems, leading to sustainable health improvements. The program's activities were complementary to the National Health Strategy's goal of providing efficient, high-quality health care services in accordance with international standards.²⁸

²⁸ High Health Council. National Health Strategy General Framework. http://www.hhc.gov.jo/more_e.html

PROGRAM DESIGN AND IMPLEMENTATION

Key steps in the design and implementation of the program

I. Options Analysis

In April of 2010, the USAID Jordan Mission asked MSH to visit the country in order to explore options for technical support to the pharmaceutical sector. MSH conducted an initial desk review of the relevant available literature, followed by an in-country rapid appraisal. An MSH consultant visited Amman, Jordan in May to conduct rapid assessment of activities for strengthening the pharmaceutical sector. The assessment was based on interviews and meetings with selected stakeholders, including officials at the High Health Council, the Jordan Food and Drug Administration, The Ministry of Health, the Joint Procurement Department, the Supply and Procurement Directorate, several MOH hospitals, the Medicines Transparency Alliance, The World Health Organization, and the U.S. Agency for International Development. Both local and international available data, reports and journal publications were compiled and reviewed.²⁹

As a result of this options analysis, MSH identified the following three potential interventions for USAID support to strengthen the pharmaceutical sector in Jordan:

- Intervention 1: *Support to reduce inappropriate antibiotic surgical prophylaxis in Caesarean section*
- Intervention 2: *Support to revise the Rational Drug List*
- Intervention 3: *Support to analyze and use of procurement data*

Upon reviewing the suggested interventions, the USAID Jordan Mission prioritized Intervention 1 as the most relevant activity for mission support.

II. Intervention Design based on the Principles of Continuous Quality Improvement

The National Health Strategy of Jordan, produced by the High Health Council, outlined as a core principle the need to control expenditure and to increase efficiency using available resources.³⁰ The long term goal of the strategy was the ability to extend health insurance and coverage to all citizens while still providing high quality health care services according to international standards. The National Health Strategy also outlined the need to advance the practice of health care providers by relating incentives to performance as measured by indicators. In addition, a plan was outlined for health care centers and hospitals to achieve accreditation, with an initial step of creating a council to

²⁹ Lee D. 2010. *From Policy to Practice: Options for USAID Technical Support to Jordan's Pharmaceutical System*. Submitted to the U.S. Agency for International Development by the Strengthening Pharmaceutical Systems (SPS) Program. Arlington, VA: Management Sciences for Health.

³⁰ High Health Council. National Health Strategy General Framework. http://www.hhc.gov.jo/more_e.html

lead the effort. These efforts for controlling expenditure, increasing efficiency, and improving the quality of health care require a system of continuous quality improvement (CQI) management.

CQI management, a highly sustainable and recognized approach in the business and health care fields, provides potential to improve systems and outcomes relative to existing resources.³¹ In the CQI approach, small and incremental changes are made based on continual monitoring of outcomes produced by a system. Therefore, changes to a system are applied based on measurable outcomes. In order to determine if the changes resulted in improvements to the system, outcomes must be continuously monitored, and then evaluated at regular intervals.

The Jordan pilot program was designed using methods consistent with the principles of CQI. The program entailed implementing self-determined changes, reducing variations in the practice of antibiotic prophylaxis, and bringing opportunities for improved pharmaceutical care and cost containment. Using this framework, the program was designed to standardize protocols and procedures for antibiotic prophylaxis in CS using evidence based medicine, strengthen their systems through monitoring and evaluation, and continually improve antibiotic prophylaxis in CS. Such locally-led iterative cycles support incremental progress and generate motivation, self-confidence, and sustainability.

The program envisaged local capacity-building through actual development and implementation of a “hands-on” active approach rather than providing mere trainings. Stakeholder motivation and buy-in was planned early on in the program through site visits and direct discussions with all the relevant stakeholders. In order to motivate the local stakeholders, the Jordan Program was designed to engage relevant stakeholders to an extent that would bring *them* to actually develop the protocols and procedures, as opposed to simply importing a protocol from a different institution or country; this was explained to the stakeholders prior to actual program start. Protocol and procedures development was not only to be based on both the latest international evidence and on local realities, but also based on current processes and procedures, further generating local leadership and ownership.

In order to outline and understand the practices and procedures relating to ABP in CS in the selected hospitals, the program design included a baseline analysis phase. The goal of the baseline analysis phase was to produce enough information and data to accomplish the following for each hospital:

1. Document to stakeholders their current prescribing practice
2. Help identify deviations from the latest evidence and best-practice
3. Chart out baseline steps and processes in prescribing and administering ABP in CS
4. Produce baseline data of key indicators (see below) for subsequent longitudinal tracking an comparison with the baseline performance

³¹ Weinberg et al. Arch Intern Med 2001;161:2357-2365

III. Selection of Participating Hospitals and Creation of Baseline Profiles

In October of 2010, a second in-country visit by MSH took place to launch the pilot program.³² The team worked closely with the MSH country-based pharmaceutical management consultant to further engage local stakeholders from the Ministry of Health (both JFDA and the Directorate of Hospital Administration), Royal Medical Services, and hospital stakeholders providing obstetric services regarding the pilot activity. The SPS team identified several potentially suitable hospitals as participating sites, and carried subsequent visits to those hospitals in order to determine the level of interest of the management and of the technical staff.

Based on those visits, four hospitals were identified as participating sites for the Jordan Program:

- Dr. Jameel Al Totanji MOH Hospital in Sahab
- Prince Faisal MOH Hospital in Rusaifeh/Zarqa
- Prince Hussein MOH Hospital in Baqa
- Al Hussein Hospital/King Hussein Medical Center, Royal Medical Services, in Amman

During this second round of visits, SPS developed a template for the initial profiling of each hospital. Relevant information describing the structures and processes on the existing situation in each hospital was studied. This profiling included clinical data regarding prescribing, documentation, and monitoring and evaluation practices at the hospitals. In addition, logistic data describing the number of CS cases, presence and activities of committees, computerization of information, and availability of standard guidelines were also collected. While producing the initial profiling, SPS paid particular attention to engaging stakeholders and gaining their interest, commitment, and advocacy. A two-page brief describing the program and its vision was created in both English and Arabic for the stakeholders, and their input toward the program goals was collected and noted in order to incorporate into subsequent steps. Thus, ownership was built from the early steps, with the stakeholders sharing their vision and participating in the subsequent program-implementing steps.

In the first few months of 2011, SPS provided technical assistance for the more detailed profiling of CS related practices at the four hospitals. This stage of profiling included generation of baseline data describing the use of antibiotic prophylaxis (ABP) for CS specific to each hospital (Annex A). Patient files for women undergoing CS between September 15th and October 14th of 2010 were retrieved from each hospital's record-department. The time frame selected began with the middle of September because one of the hospitals, P. Hussein, had begun operating in late August, early September of that

³² Joshi M, Lee D, Gammouh S. 2010. Improving Antibiotic Prophylaxis in Cesarean Section: A Pilot Project in Jordanian Hospitals. Trip Report: October 19–29, 2010. Submitted to the U.S. Agency for International Development by the Strengthening Pharmaceutical Systems (SPS) Program. Arlington, VA: Management Sciences for Health.

year. Therefore, in order to allow better comparative analysis, the baseline data for all the hospitals were taken from the same time period.

The detailed baseline profiles included a *patient-flow chart* in addition to data describing types of CS surgery (elective or non-elective), documentation of operation time and medicines given, types of antibiotics used, timing of first dose of antibiotics, duration of use, and prescribing of additional antibiotics on discharge. In addition, the cost of the baseline practices were calculated based on the collected data; it included the cost of medical supplies such as tubing, needles and syringes, and diluents in addition to the actual cost of antibiotics. In both P. Hussein and Totanji Hospitals, members of the hospital teams assisted at this stage of profiling and producing baseline data. Of note, the records department at P. Faisal Hospital was computerized, and patient files were referenced electronically according to procedure: elective CS and non-elective CS. The team there had created the filing system themselves, thus making file retrieval easier and faster. During this period of collection of baseline data characterizing CS-related practices in each hospital, SPS Amman-based consultant made multiple rounds of visits to all the participating hospitals. In addition to generating the profiling information and baseline data, these hospital visits helped to further expand the stakeholder base and support for the initiative.

While the baseline profiles were being studied, the SPS team prepared the latest international evidence and recommendations on antibiotic prophylaxis for women undergoing CS procedures. Also included were available local studies and references. In building advocacy among the hospital teams, SPS shared the accumulated evidence prior to the actual protocol and procedures development workshops. Once all the evidence was gathered, a summary was prepared (Annex B) and presented to the hospital stakeholders for them to utilize in developing their own protocols.

IV. Development of Protocols and Procedures

In collaboration with SPS, the MOH and stakeholders at each hospital developed their own protocols and procedures (P&P). This was done through an initial combined workshop (Workshop 1) to present the common issues and findings, and then a series of individual workshops (Workshop 2 Series) in each hospital to actually develop the customized protocols and procedures. These workshops were held from April 24 to May 2, 2011.³³

Workshop 1 included all the stakeholders from the four hospitals in addition to stakeholders from the MOH Directorates, the JFDA, and RMS (Table 3) and took place on April 24, 2011. Presentations describing the program, including the overall baseline analysis performed for the hospitals were given to the attendees. Other key presentations included those on evidence-based medicine, antibiotic prophylaxis recommendations

³³ Gammouh S., Green T., Joshi M., Patel S. Cesarean Section Antibiotic Prophylaxis: Protocol and Procedure Development Workshops, Amman, Jordan, April 24 to May 2, 2011 Submitted to the U.S. Agency for International Development by the Strengthening Pharmaceutical Systems (SPS) Program. Arlington, VA: Management Sciences for Health.

specific to CS (Annex C), and the principles of continuous quality improvement (CQI) (Annex D).

Each workshop participant received a customized binder for their specific hospital. The contents of the binder included: a comprehensive literature review and synthesized summary matrix of current international evidence and recommendations (Annex B), system redesign worksheet (Annex E), illustrative implementation action plan, ‘CS Log’ (Annex F) for recording antibiotic prophylaxis and surgical site infection (SSI), copies of relevant studies and reports, and Arabic-translated versions of all the workshop presentations. The hospital specific baseline profiles of current hospital practices were also included in the binder.

Workshop 2 was hospital-specific and therefore conducted four times separately for each of the four participating hospitals according to this schedule:

- April 25th, 2011—Dr. Jameel Al Totanji Hospital
- April 27th, 2011—Prince Hussein Hospital
- April 30th, 2011—Prince Faisal Hospital
- May 2nd, 2011—RMS Al Hussein Hospital / King Hussein Medical Center

During this Workshop 2 Series, each hospital’s team led discussions, completed their own *system redesign worksheets*, drafted new P&P, and agreed on the general principles of CQI management system for their hospital. Representatives from the MOH Quality, Nursing, and Clinical Pharmacy Directorates were present during the P. Hussein-specific workshop, and witnessed the process of developing the new P&P. At the Totanji Hospital workshop, two personnel from JFDA’s Rational Drug Use Department attended in addition to the hospital team.

Table 3 shows the total and disaggregated numbers of the stakeholders from various sectors and disciplines that attended Workshop 1 and 2. The total number of female participants was higher than the number of male participants.

Table 3: Stakeholders Participating in April 2011 Workshop

Workshop	Total Number of participants	Male : Female ratio
Workshop 1 (Combined Initial Workshop)	86	37:49
<i>MOH</i>	12	3:9
<i>JFDA</i>	6	2:4
<i>Totanji</i>	17	12:5
<i>P. Faisal</i>	16	6:10
<i>P. Hussein</i>	16	7:9
<i>RMS</i>	19	7:12
Workshop 2 (Hospital-specific)	76, 2 JFDA, 3 MOH	39:37
<i>Totanji</i>	29; 2-JFDA	21:8 (<i>without JFDA</i>)
<i>Al-Hussein (RMS)</i>	17	7:10
<i>Faisal</i>	11	4:7
<i>Hussein</i>	19; 3- MOH	7:12 (<i>without MOH</i>)
TOTAL (<i>combined workshop 1 and workshop 2 participants</i>) <i>*duplicate names taken into account</i>	115	51:64

Although each hospital drafted its own P&P individually without the participation of other hospitals, the resulting hospital-specific protocols and procedures were in fact very similar. When armed with the latest international medical evidence, the teams from each hospital opted to adhere to the evidence, and the resulting protocols therefore contained many similarities.

The *procedures* sections were also similar among the three hospitals, with minor variations accounting for difference in both the involved personnel and structures at the hospitals. Overall, the active departments among the hospitals were similar and assumed the same relative roles in their hospital's P&P. Table 4 summarizes the involvement of different hospital departments during the P&P development workshop (Workshop 2).

Table 4: Hospital Departments Involved in P&P Development Workshop in the three participating MOH Hospitals

	Hospital Director	Assistant Director	OBGY Surgeons	Head of Nursing	OBGY Nursing	Pharmacy	Infection Control	Quality Control	Out Patient Clinic	Anesthesia	Laboratory	Nursing Education Unit
Prince Faisal		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Prince Hussein	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Totanji		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓

Once the P&P were drafted, SPS provided additional technical assistance as implementation began at the hospitals. The teams made further small changes and edits as they faced initial obstacles on implementation, and the CQI process got integrated from the very beginning. The P&P were finalized between 4 and 6 weeks (Annex G) after the

initial drafts, and the copies were submitted to each hospital's administration via the hospital's DTC. While the RMS hospital succeeded in producing their baseline analysis, participated in the workshops, and produced their own P&P, the finalized copies were not processed to higher levels of administration and activities relating to further program implementation did not proceed.

The small changes made in finalizing the P&P were all in the *procedures* section, and were necessary given specific hospital policies and stakeholder roles. Most notably, the departments of anesthesia in all the hospitals opted not to be included in the *procedures* as the units administering the antibiotic for prophylaxis. The reasons for this decision was due to where the antibiotic would be available, the requirement for having a skin sensitivity test performed prior to administration, and timing-conflict between mixing the antibiotic and then administering it to the woman undergoing CS.

V. Implementation and Monitoring

The MOH hospitals began implementation within weeks after the initial P&P drafts were produced even though the antibiotic of choice, cefazolin, was not available at the MOH. Cefuroxime was identified by the local hospital teams and used as an alternative antibiotic until such time as cefazolin would be available. The Department of Pharmacy at P. Hussein Hospital also searched the latest resources and found documentation supporting the use of cefuroxime as an alternative to cefazolin.³⁴

In adhering to evidence-based medicine and naming cefazolin as the antibiotic of choice in their protocols, the hospitals were in fact taking a step in improving the formulary process at the MOH. By including in the protocol cefazolin, although it was during that time not available in the hospitals, the protocols from the three hospitals acted as a tool for change. SPS assisted the hospitals in requesting cefazolin from the MOH, and in turn worked with the relevant departments at the MOH to finally make it available. In collaboration with the hospitals, SPS also helped forecast the amounts of cefazolin that would be needed, taking into account both the number of cases presenting at each hospital as well as input from the physicians. The estimated amounts were presented to the Director of MOH Hospital Administration, who subsequently took the necessary steps with the Supply and Procurement Directorate (SPD) to make cefazolin available. Based on the request and program material submitted, the SPD made further plans for making cefazolin available in the subsequent years. Therefore, the Pilot Program has made an important antibiotic agent, supported by evidence-based medicine for a specific use, available for use throughout the MOH.

During the P&P development workshops in April of 2011, MSH presented the hospital teams with two basic tools to be used in monitoring and evaluation (M&E) of program implementation. The first monitoring tool is a simple log that would be used to record information regarding each CS case presenting through the ward (Annex F).

³⁴ AlexanderJW. Ann Surg 2011;253:1082–1093

Implementation of the new protocols in the hospitals is an ongoing process, and requires monitoring and evaluation of indicators reflecting protocol implementation. Therefore, the log was designed to efficiently capture relevant information that would allow subsequent calculation of indicators relating to:

- Adherence to protocol recommended antibiotic
- Time of administration of first dose of prophylactic antibiotic
- Administration of the appropriate number of antibiotic doses
- Rates of surgical site infection
- Cost-savings

While working with the hospital teams, SPS was aware that designing a system that involved a lot of additional paper-work would create extra burden to the involved stakeholders and potentially diminish compliance to gathering the recommended information. So, the CS Log was created to be as easy to use as possible, and did not require any additional action apart from recording the work that had already been performed. The log was designed so that the person filling out a certain section would simply need to “check-off” in the appropriate field what action had been performed. Completing the CS Log would begin on admission to the OBGY ward for elective CS, or once a decision is made for a non-elective case. The physicians and nursing staff would complete each section according to the agreed *procedures* developed for their hospital’s P&P.

Once a case is discharged from the ward, the CS Log is removed from the case file and sent to the outpatient clinic. Women undergoing CS are scheduled for a follow-up visit one week post discharge, and the staff at the outpatient clinic would then complete their section by indicating whether the woman returned and if a surgical site infection (SSI) was diagnosed by the physician. In the case of an infection or a re-admission due to SSI, a wound infection sample is to be sent to the laboratory for culture and sensitivity analysis. All this information is captured on the CS Log.

Once the CS Log completes the cycle, it is received by the Infection Control Committee (ICC) for aggregation, analysis, and production of indicator data. In order to facilitate data production, SPS worked with the hospital teams in developing the second monitoring tool using the Microsoft Excel program. The Excel Monitoring Tool (EMT) program is used for entering indicator data captured on the CS Log, and automatically produces summaries and analyses for the team to use in their monitoring, evaluation, and CQI process. In all the three hospitals, the ICC has taken responsibility for entering indicator data into the EMT. The aggregated data is then submitted to the hospital’s DTC for further review, discussion, for making necessary plans, and providing needed feedback to the different departments and to the administration during regular meetings

As the hospital teams began completing the CS Logs and aggregating the data using the EMT, they performed the following with technical assistance from SPS:

- Quality checks on the completeness and accuracy of the CS Logs relative to patient files
- Quantifying the number of CS Logs relative to the number of CS cases reported
- Following up with women not returning to outpatient clinic by telephone

Performing quality checks on the correctness of the completed CS Logs revealed that the OBGY nursing staff needed additional training and instructions. The log, which was initially prepared in English, was misleading to some of the nurses with regard to the fields pertaining to which antibiotic was prescribed for prophylaxis and whether additional doses or other antibiotics were prescribed. In order to minimize this problem, training sessions were organized for the nursing staff (Table 5) with technical assistance from SIAPS (follow-on to SPS which started from the last quarter of 2011).

Table 5: Technical Training of OBGY Nursing Staff on CS Protocols and Procedures

	P. Faisal	P. Hussein	Totanji
Training Date(s)	Oct 22-24, 2011	Nov 27, 2011	Jan 24, 2012
Staff Trained	32	13	10

Although the training sessions were primarily aimed at improving the quality of information recorded on the CS Logs, SIAPS took advantage of the opportunity by covering additional technical and scientific materials in order to both build further capacity and improve commitment and participation among the OBGY nursing staff. The training sessions presented the following topics:

- Background program information
- Baseline practice profile at the hospital
- International evidence on antibiotic prophylaxis
- Implementation and monitoring of the Protocol and Procedures and the principles of continuous quality improvement

Further editing of the initial CS Log document, in addition to its translation into Arabic, were performed as a result of the training sessions. The nursing staff was highly involved during the sessions, and steered the needed modifications in the sections and in the language of the log. Its translation into Arabic further facilitated its use by all the OBGY staff.

The EMT produces aggregated and averaged results reflecting the five main indicators listed above, in addition to percentages reflecting levels of adherence. Noting that the results reflect only those CS cases captured with CS Log, the teams were convinced of the need to quantify the percentage of cases captured with a log relative to the total number of CS cases presenting through the ward. Adherence, or non-adherence, for the cases not captured with a log would be missed, and the lower the percent of cases captured, the weaker the indicator data produced would be. With technical assistance from SIAPS, the teams therefore incorporated another indicator into the EMT, the CS Log Capture Rate, in order to more accurately measure their performance.

Finally, the ICC noted that the number of infections relative to the Capture Rate and to patient follow-up may exaggerate rates of surgical site infections (SSI). Therefore, there was a need to document what happened in the cases not returning to the outpatient clinic in order to better understand rates of infection. The hospital team decided to make telephone calls to the cases not returning as follow-up. These changes are reflected on both the CS Log and the EMT.

Another change in the monitoring tool was related to the reporting of cases of surgical site infections (SSI). Initially, the consensus was that documenting all cases of SSI was critical. However, the physicians, the hospital ICC, and the MOH Infection Control Department later discussed this issue during a presentation at Totanji Hospital (Table 5). A decision was reached that cases of infection reported by the patient or patient-family over the telephone could not be recorded as an SSI unless appropriate documentation by a physician supporting such a diagnosis was made. This type of documentation must be obtained by the team in order for it to be recorded as an infection; otherwise, some cases would be recorded as positive for infections based on the opinion of non-qualified individuals. The EMT was subsequently adjusted to allow for more accurate recording depending on the source of the information beginning with the month of July 2012. .

The hospital teams therefore played an important role in continually improving the monitoring tools to better capture their work throughout the program. By continually utilizing information gathered through the CS Logs and its evaluation by the EMT in order to improve the monitoring tools, the hospital teams were in fact applying an ongoing process of continuous quality improvement (CQI) early on in the program.

One essential role of DTCs in a health system is to help develop standard treatment guidelines, implement them, and perform continual monitoring of compliance to the guidelines.³⁵ As described in the *Problem Statement* section, MOH hospitals are mandated to form a DTC for the hospital. The roles and responsibilities are also outlined, and the mandate is linked with Clinical Pharmacy Directorate in the MOH.

While implementing the program in Jordan, SPS/SIAPS sought to engage the relevant stakeholders both at the hospital level and centrally in the MOH in a manner that would bring greater coordination and support. Each stakeholder group or body at the hospital level (e.g., DTC or ICC) is part of a similar entity (department or directorate) within the central MOH, with the roles and responsibilities being strategized and overseen centrally. Thus, SPS/SIAPS engaged each central MOH entity, listed in the *Problem Statement* section, in complementarity to the hospital stakeholders groups or bodies involved. By doing so, the principles being applied through this primarily hospital-based program would be incorporated centrally in order to create sustainability. This way the central MOH entities would subsequently carry on the responsibility of overseeing and supporting further implementation, monitoring and evaluation, and possible expansion of gained capacity onto other clinical areas.

³⁵ Drug and therapeutics committees, A practical guide. WHO-MSH/RPM Plus, 2003.

In order to further consolidate the program implementation, a second workshop (*Review of the Cesarean Section Antibiotic Prophylaxis Program in Jordan and Workshop on Rational Medicine Use and Infection Control*), was organized by MOH and SIAPS, and took place in Amman from 25th to 28th of March, 2012.³⁶ Attending were stakeholders from the MOH, the three pilot hospitals, and other stakeholders. The objectives of the workshop were to:

1. Present the achievements of the pilot program thus far including the resulting indicators, including the difference in cost between baseline practices and current practice
2. Provide technical training in the form of updated and additional prophylactic practices in CS and OBGY, infection control principles, and infection control assessment
3. Illustrate the practical application of principles of continuous quality improvement, as exercised in the CS program, onto other areas of care
4. Prepare for the integration between the MOH departments and directorates and the work performed at the hospitals

During the week prior to the workshop, SIAPS conducted hospital field visits in order to assist the hospital teams in getting prepared for the workshop. The review and workshop were designed to be an interactive learning process, where the teams had to perform small exercises based on both the materials presented, and on the preparations completed during the previous week. The opening was performed under the auspices of the Minister of Health, with Dr. Ahmad Alqtaitat, the Director of Hospital Administration, opening on his behalf. Each of the hospitals presented their work and their accomplishments, outlined their weaknesses and gaps, and proposed potential solutions. The hospitals were also able to compare and evaluate the work of one another, and many technical and logistic ideas were exchanged and discussed. Based on this experience, the MOH directorates requested that any further program work proceeded with their support and involvement in a documented and active manner.

MOH Directorates subsequently organized several meetings and also carried out hospital visits. As a team, the MOH Directorates asked each hospital to make a presentation regarding program implementation and the resulting progress. Each hospital in turn prepared presentations that included their up-to-date indicator results in addition to the challenges they faced. These meetings between the MOH and the hospital teams took place on the dates shown in Table 6.

Table 6: Hospital Presentations to MOH Directorates

	P. Faisal	P. Hussein	Totanji
Presentation Date	June 5, 2012	Sept. 12, 2012	July 1, 2012

³⁶ Green, T. and S. Gammouh. 2012. Review of the Cesarean Section Antibiotic Prophylaxis Program in Jordan and Workshop on Rational Medicine Use and Infection Control, Amman, Jordan, March 25 – 28, 2012: Trip Report. Submitted to the U.S. Agency for International Development by the Strengthening Pharmaceutical Systems (SPS) Program. Arlington, VA: Management Sciences for Health.

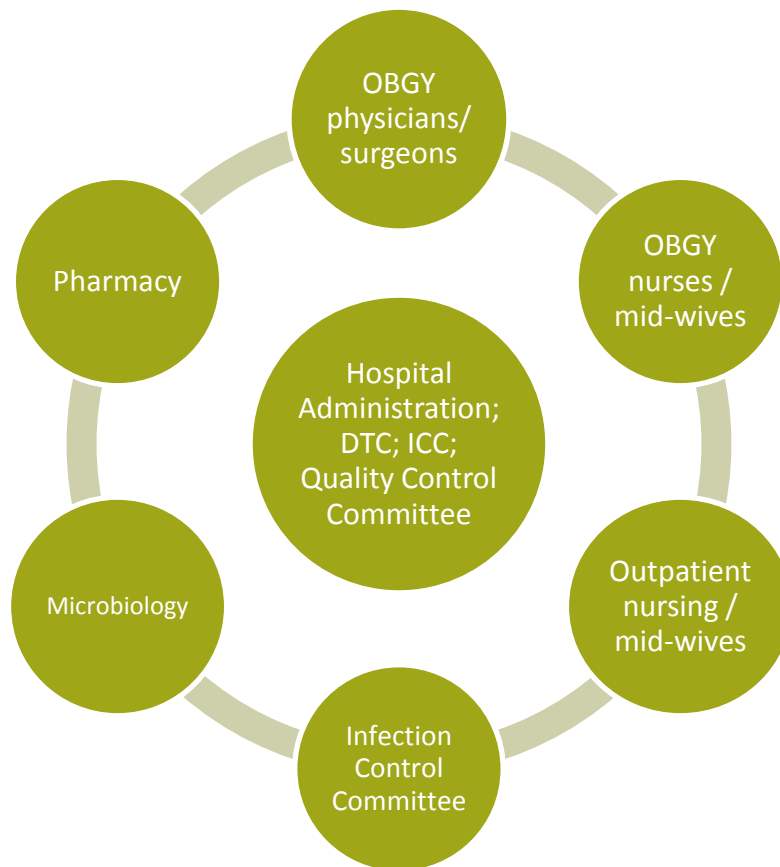
In order to help promote future integration of the CS pilot program into the routine work of the hospitals and the MOH, the involved stakeholders, with support from SIAPS, sought to create linkages with key existing policies and activities. The Ministry of Health, in coordination with the Health Care Accreditation Council (HCAC), is carrying out hospital accreditation work through the Hospital Administration's Quality Directorate. The current National Quality and Safety Goals (NQSG), a requirement in meeting accreditation standards, calls for the availability and implementation of antibiotic prophylaxis protocols for all surgical procedures in MOH hospitals. Concurrently, official MOH memo number 311 outlines and mandates the composition, roles and responsibilities, and mode of action of DTCs in hospitals. The local stakeholders and SIAPS saw a strong opportunity in coupling the new NQSG requirements with the roles and responsibilities of existing DTC.

PROGRAM RESULTS

Overview

The teams working at each hospital are multidisciplinary groups that include OBGY physicians, pharmacists, nurses/mid-wives, laboratory technicians, Drug and Therapeutics Committee, Infection Control Committee, the Quality Control Committee, and the hospital's administration. P&P implementation, monitoring, and CQI are on-going systems that depend on the successful co-functioning of the various dynamic components. Each department has certain responsibilities to meet that in turn feeds into the function of other departments. Therefore, each department and stakeholder in the hospital plays an essential role in the success of program implementation (Figure 2).

Figure 2: Each Department/Stakeholder Plays an Essential Role in Program Implementation



The three MOH hospitals involved in the CS Pilot Program continue to implement the protocol and procedures as well as the monitoring and CQI processes as described in the previous section. Indicator data are being periodically being aggregated and presented through the hospitals' Drug and Therapeutics Committees (DTCs), with the results utilized in an iterative process to achieve

incremental progress. During their meetings, the DTCs are using their mandates to involve relevant departments according to their roles and responsibilities in protocol and procedures implementation. Along with the Quality Control Committee (QCC), the DTC is able to evaluate overall progress based on the monitored indicators. Therefore, by using indicator data, the DTC is able to subsequently report to each department its progress, and to coordinate efforts with department heads, the QCC, and the hospital's administration/Director in further improving performance.

The degree of system integration, however, does vary between hospitals based on several factors affecting the teams at each facility. These factors include the strengths and involvement of the hospital's administration, interdepartmental communication and team dynamics, and the team's overall motivation and commitment. Each hospital has its own strengths and weaknesses in each of these factors resulting in some degrees of different outcomes.

Beyond P&P implementation, monitoring, and CQI at the hospital level, integration and coordination of activities with the MOH Directorates is essential for program sustainability. SIAPS has assisted the MOH to help move toward sustainability by facilitating the engagement of the relevant directorates and the leveraging of existing policies and structures, and to help expansion of the experience and lessons gained in CS to other areas of practice.

Program results and progresses are described below relative to each hospital and the MOH Directorate.

Prince Hussein Hospital

The team at P. Hussien Hospital promptly began P&P implementation after the April 2011 workshop. The Hospital Director was greatly involved from the early stages of the program, actively attended the entire P&P development workshop at his hospital, and made his expectations for implementation from the team very clear. Having been recently opened, the hospital did not yet have a DTC at that time. However, the Hospital Director, also an OBGY physician, was already monitoring the implementation of a *magnesium sulfate protocol for gestational hypertension* with his team. His method for monitoring includes holding the physicians accountable for appropriate use of magnesium sulfate, and tying that responsibility with the physicians' yearly performance reviews. The same was expected of the team for the CS antibiotic prophylaxis protocol and procedures.

The Head of Nursing at the hospital, along with the Head OBGY Nurse, oriented their teams to the P&P and prepared them for implementation. The Pharmacy Department ensured that the appropriate antibiotics were available in the ward and in accordance with already required MOH policies. The physicians began prescribing prophylaxis according to the P&P, but the Department of Anesthesia was not willing to administer the antibiotics for the reasons described in *section IV* above in the 'Program Design and Implementation' Section. The team edited their procedures to accommodate for the administration ABP by the nursing staff with appropriate documentation.

Overall, good involvement is shown from the entire team, including the department of pharmacy. Working with the Hospital Director, the newly opened hospital worked promptly at forming a DTC. On November 29, 2011, the hospital DTC held its first meeting with the physician Head of OBGY acting as the head of committee. This strategic decision was made by the Hospital Director in order to more strongly support the CS program. The other members included those from general surgery, pediatrics, nursing, quality control, infection control, laboratory, and pharmacy. For this meeting, the SIAPS representative was invited to attend, and was given a time-slot for discussing the CS ABP program. SIAPS briefly presented the program, and highlighted the steps being taken by the hospital team, and the capacity being built through program implementation. Time was allowed for the team to discuss their contributions and actions as well. This discussion gained the interest of the physician representing general surgery, who requested that the DTC team work with his department in creating a protocol for ABP in hernia.

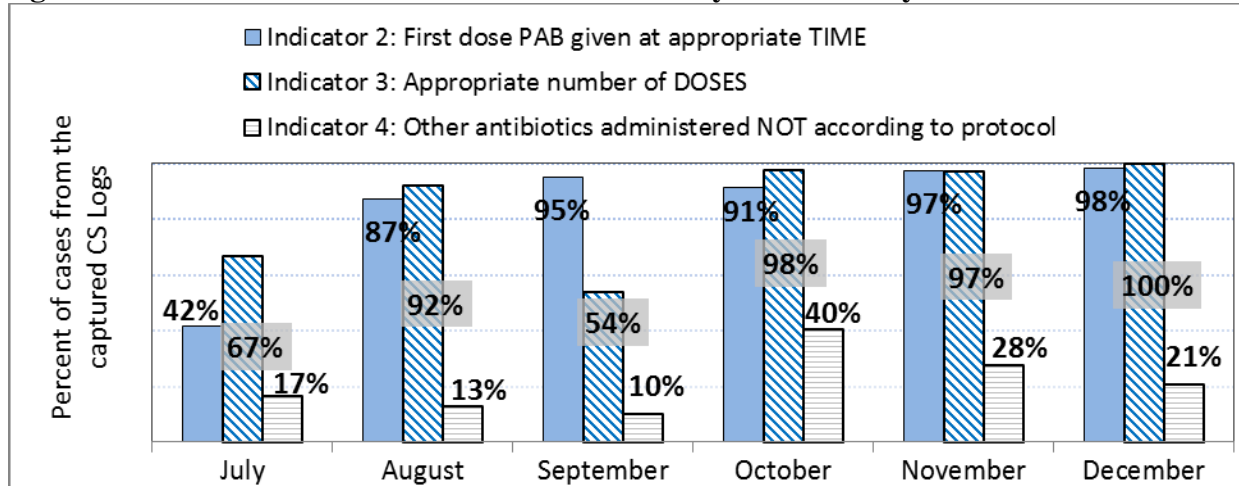
In the time between P&P development and the second major workshop held in March 2012, the hospital was able to capture a very high percentage of the CS cases presenting through the OBGY ward. Their CS Log Capture Rates for July through December of 2011 are shown in Table 7.

Table 7: P. Hussein Initial Indicator Data: CS Log Capture Rates for July to December 2011

	July	Aug	Sep	Oct	Nov	Dec
Cases for which CS Log Completed	12	39	39	47	36	58
Cases for which CS Log NOT Filled	2	21	8	3	0	1
Total Number of CS Cases (July was partial month):	14	60	47	50	36	59
CS Log Capture Rate:	86%	65%	83%	94%	100%	98%

Although the hospital was using cefuroxime, as an alternative in the absence of cefazolin, *Indicator 1* was not recorded in the EMT as the protocol called for cefazolin. Data reflecting *Indicators 2 – 4* are shown in Figure 3:

Figure 3: Prince Hussein Indicators 2 - 4 Preliminary Data for July to December 2011



SIAPS continued working with the hospital team in order to ensure the quality of the data being captured onto the CS Logs and entered into the EMT. Many random reviews of the filled out logs took place with the team, and feedbacks were given to the relevant departments. Of note was the training session given to the OBGY nursing staff during November of 2011 (Table 5). After this training session, the information captured was of much improved quality. The final aggregated data for the program takes information captured by the hospitals during the calendar year 2012, after the nursing training was performed.

The Department of Pharmacy at P. Hussein Hospital was the first to obtain cefazolin for use in ABP in late January 2012. Once the antibiotic was in stock, the pharmacy immediately made it available to the OBGY ward and the physicians began prescribing it.

With the OBGY nursing staff, the Quality Control Committee began utilizing the indicators collected and aggregated with the monitoring tools for the hospitals accreditation requirements. During that time period, the HCAC had a requirement for hospitals seeking accreditation to show a process resulting in measurable indicator, and those produced by the CS program fit those criteria. Participating in the CS ABP Pilot Program assisted the hospital team in meeting the accreditation requirements.

Overall, all the relevant departments are contributing significantly to the P&P implementation and monitoring. In considering the system illustrated in Figure 2 above, the hospital administration has performed very well, and has maintained the involvement of each department.

The team at P. Hussein Hospital was late in aggregating and presenting their initial work to the MOH during the second and third quarter of 2012. While CS Logs were being recorded, and staff was adhering to the protocol and procedures, the team reported that they were behind only in entering the indicator data into the EMT. The delay in data entry was exacerbated by the lack of

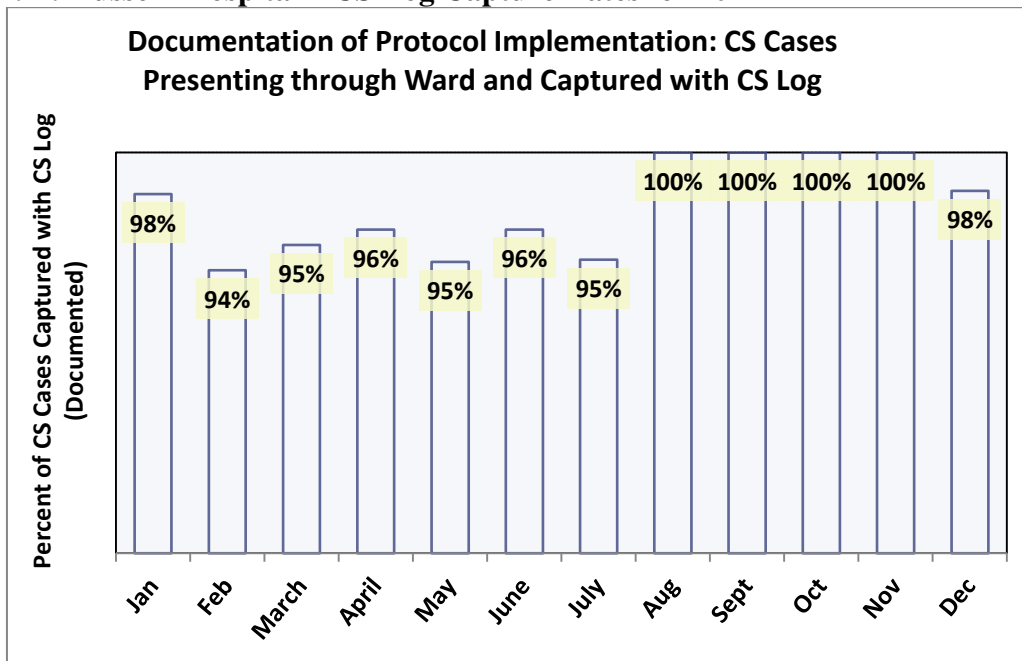
regular Drug and Therapeutics Committee (DTC) meetings, which in turn was reportedly due to the heavy work load resulting from the hospital's intensive involvement in the accreditation process. Of note, the hospital did in fact succeed in obtaining accreditation. Given these delays, SIAPS gathered the team in order to re-organize efforts for monitoring and a meeting was held in late August. The three main outcomes of this meeting were:

1. The ICC needed assistance in the entry of indicator data from CS Logs in order to stay up to date.
2. The Department of Pharmacy, which is the secretariat for the DTC, announced that they would call for regular meetings on the 1st Monday of each month.
3. The Hospital Director requested that he be kept updated with all the resulting data.

Although the team was behind in entering data into the EMT, completion of CS Log had in fact continued uninterrupted. Since the ICC was undertaking data entry alone, additional support from the team was needed and SIAPS encouraged training additional staff in EMT data entry in order to increase efficiency. The departments of nursing, pharmacy and laboratory all volunteered to assist the ICC with data entry, and three additional training sessions were facilitated by SIAPS. Training was performed as a group in order to eliminate any discrepancies resulting from multiple personnel entering the data. SIAPS then continued working with the hospital team to ensure appropriate understanding of the EMT so that indicator data would be correctly captured. The team sought assistance from SIAPS as needed, and also whenever a difference in interpretation regarding the recordings on CS Logs arose among the personnel. During this process training and M&E, some discrepancies were unveiled while performing random checks on EMT data entry relative to the actual CS Logs from January through March. The team discussed the issue and decided that *all* the logs for those months must first be reviewed before being re-entered. Therefore, the EMT data being currently produced show high consistency. Also, the team caught-up with aggregating their data and presented to the MOH in September of 2012.

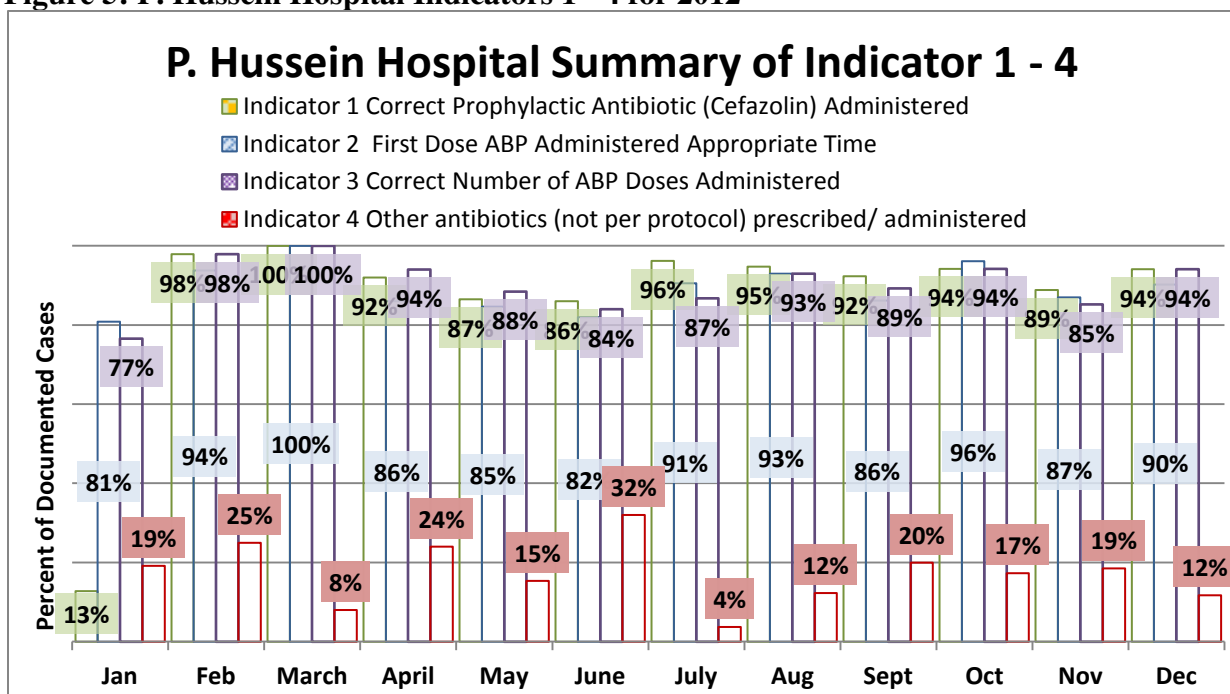
Figure 4 shows the CS Log Capture Rate for January to December 2012:

Figure 4: P. Hussein Hospital – CS Log Capture Rates for 2012



High capture rates throughout the year yield stronger and more descriptive subsequent data for the remainder of the indicators. The hospital team performed well in implementing the protocol and the overall adherence was strong as the values in Figure 5 show.

Figure 5: P. Hussein Hospital Indicators 1 - 4 for 2012



The overall rate of SSI for P. Hussein Hospital is 2.12% for the year 2012. As indicated in *section V* above in the ‘Program Design and Implementation’ Section, a change in the method of recording cases of SSI took place in July based on input from the physicians and the MOH Infection Control Department. The team at the hospital reviewed previous EMT data input in order to correct for this change. Data reflecting rates of surgical site infections are shown in Figure 6.

Figure 6: P. Hussein Hospital, Indicator 5: Rates of Surgical Site Infections for 2012

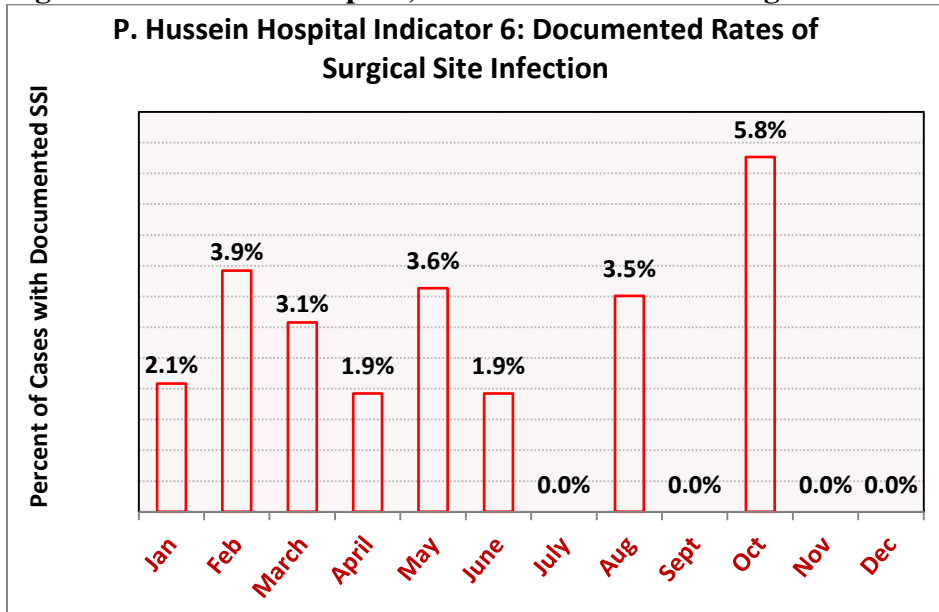


Table 8 provides an overall data summary for Prince Hussein Hospital for the period January to December 2012.

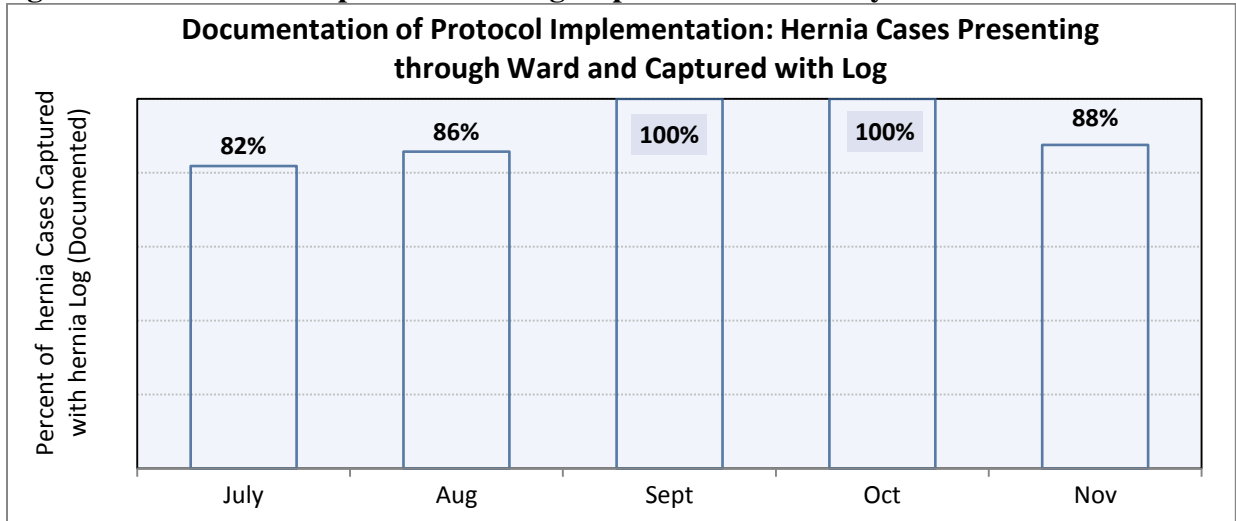
Table 8: Prince Hussein Hospital—Indicator data summary for 2012

		Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total	Yearly Result for Each Indicator Calculated Relative to (1) Number of CS Log-documented cases or to (2) Total Number of CS Cases in OBGY Ward:	
		Number of Cases												Total		
Total Number of CS Prophylaxis Cases Presenting Through OBGY Ward Regardless of Protocol Implementation or CS Log Completion		48	51	65	52	55	52	56	57	65	52	54	52	659		
Number of CS Prophylaxis Cases for which a CS Log was Completed Appropriately Yielding the Numbers Below for Each Indicator:		47	48	62	50	52	50	53	57	65	52	54	51	641	(1) Number of CS Cases Documented with CS Log	(2) Total Number of CS Cases in OBGY Ward
Indicator:	Description:	Number of Cases												Total	Percent	
Indicator 1	Correct Prophylactic Antibiotic (Cefazolin) Administered First Dose ABP	6	47	62	46	45	43	51	54	60	49	48	48	559	87%	85%
Indicator 2	Administered Appropriate Time	38	45	62	43	44	41	48	53	56	50	47	46	573	89%	87%
Indicator 3	Correct Number of ABP Doses Administered	36	47	62	47	46	42	46	53	58	49	46	48	580	90%	88%
Indicator 4	Other antibiotics (not per protocol) prescribed/administered	9	12	5	12	8	16	2	7	13	9	10	6	109	17%	19%
Indicator 5	Followed-Up by Clinic Visit and/or by Telephone	47	47	60	50	52	30	35	49	45	42	52	41	550	86%	83%
Indicator 6*	CS surgical site infection (SSI) cases relative to total number of CS cases per month	1	2	2	1	2	1	0	2	0	3	0	0	14	2.12%	

* Indicator 6 is calculated relative to the "Total Number of CS Prophylaxis Cases in OBGY Ward" as decided by hospital physicians given that cases of infection return to the hospital for treatment.

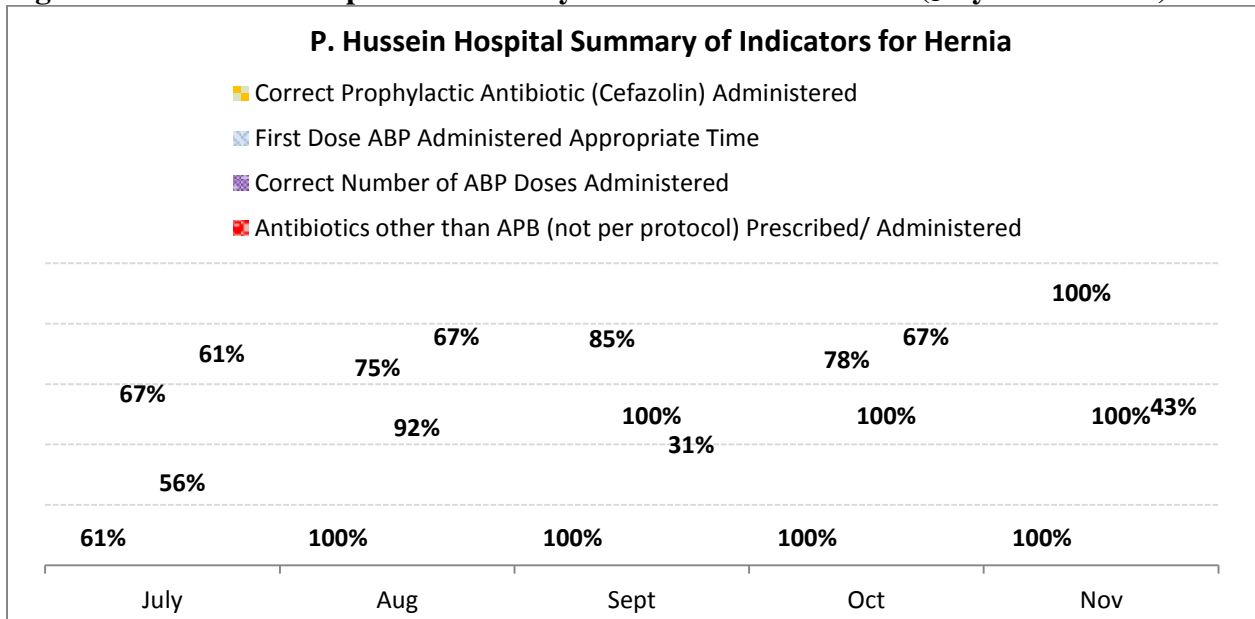
As Figure 5 shows, the team at P. Hussein Hospital has implemented the CS protocol and procedures with a high degree of efficiency and compliance. More importantly, the team was able to apply the principles of the CS Program onto other areas of practice. In July of 2012, the team produced a new protocol for ABP in hernia, and adapted the CS Log to create a new log for cases of hernia. The clinical pharmacist at the hospital re-synthesized the EMT created for CS with SPS/SIAPS assistance in order to make it appropriate for entering data from the hernia logs. In addition, she created a *baseline profile* in a similar manner as that done with SPS assistance for CS at the start of the program. The hernia log capture rate for the months of July through December averaged an 89 percent; the breakdown for the individual months is shown in Figure 7.

Figure 7: P. Hussein Hospital Hernia Log Capture Rates for July to November 2012



Building on the Hernia Log information, the hospital team has produced the same indicator data as those produced for CS (Figure 8), with a SSI rate of zero for the reporting time period.

Figure 8: P. Hussein Hospital—Summary of Indicators for Hernia (July to Nov 2012)



Comparison of the cost of ABP for the current practices at P. Hussein Hospital show significant reductions when compared with the cost for baseline practices at the same hospital, with the average cost per case decreasing by nearly 82% (Figure 9). When extrapolated to the total number of cases documented with protocol implementation, the savings become substantial (Figure 10). For the 641 cases documented with a CS Log, a total of 4,511 Jordanian Dinars (JOD) were saved by the hospital team. Of the three hospitals, P. Hussein has produced the strongest set of indicator data since their capture rate average is over 97%. As such, the potential savings for the MOH would be best estimated using the results from this hospital’s performance.

However, it is worth noting that P. Hussein Hospital also had the highest average cost of ABP at baseline among the three hospitals.

Figure 9

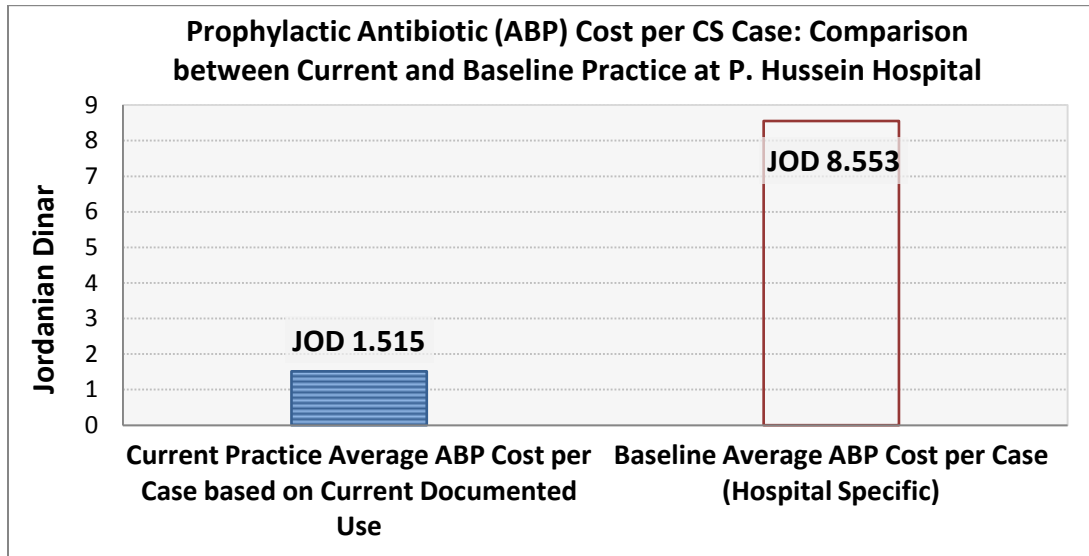
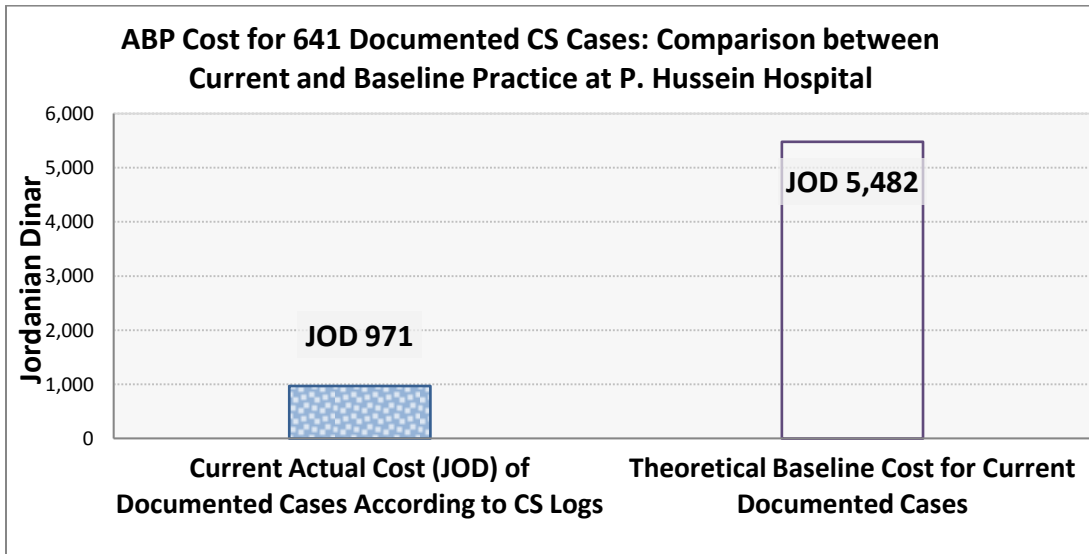


Figure 10



In summary, the team at P. Hussein Hospital is highly motivated and committed to implementing the P&P for CS ABP. The team’s performance was correlated with the style of leadership at the hospital: one that encouraged accountability, performance and results. Whenever one part of the work cycle faltered, the rest of the team either provided the needed support, or the gap was promptly addressed by the hospital’s administration. The skills learned assisted the hospital in gaining accreditation. Capacity gained was applied to other types of surgical procedures, and a sense of achievement and ownership continues to drive the team further.

Prince Faisal Hospital

During the initial visits by the SPS team to P. Faisal Hospital, a significant level of engagement from different departments was observed. The technical assistant to the Hospital Director, and the heads of OBGY, nursing, pharmacy, and anesthesia were strongly involved and committed to the principles of the CS ABP program. In the P&P development workshop, the technical assistant to the Director played a major role in conducting the meeting and in completing the system re-design worksheet along with the Head of OBGY. He engaged his team to an extent that the *procedures* section would be as realistic as possible given the existing hospital realities.

The nursing team for the operating rooms (OR) is under a different section-head than the OBGY nursing, and there were some objections from them to administering the ABP dose with the claim that their time would not permit performing a skin sensitivity test, waiting for any observable allergic reaction, and then administering the dose in time. The OR nursing's objection arose after anesthesia declined to be responsible for the first dose given the reasons discussed in *section IV* above. Here, anesthesia specifically cited the fear of possible medication interactions as the reason for not wanting to administer the first dose. The pharmacy responded with positive evidence supporting the co-administration of cephalosporins with the different types of anesthesia, but the department of anesthesia still refused to participate. The Head of OBGY was greatly in favor of the one dose ABP regimen, and worked extensively with the OBGY nursing department in order to facilitate the administration of the first dose in the ward prior to patient arrival at the OR; this step was essential to progressing through the P&P development workshop.

SPS worked with the hospital team in finalizing the P&P after the development workshop, and a final document was produced in late June 2011. Approval of the final version of the protocol and procedures was given on the 14th of July by the Hospital Director, and was disseminated to the hospital departments, to the Zarqa Health Directorate, and to the Clinical Pharmacy Directorate of the Hospital Administration. In the meantime, the team had begun implementing the protocol and procedures, and this phase of implementation produced the additional necessary editing to the P&P document. Unlike the other two hospitals, the team at P. Faisal did not immediately adopt the CS Log and the EMT for their monitoring and evaluation of program implementation. However, the outpatient clinic was able to produce the data given in Table 9 for the hospital team by reviewing and recording information from the patient charts for those women returning for a follow-up visit.

Table 9: P. Faisal Hospital Initial Indicator Data, 2011

Month	CS cases seen in OBGY ward for surgery			Cases Returning to Outpatient Clinic (CPP) for Follow-up		
	Total number	Cases receiving one dose prior to skin incision	Percent	No. of cases returning to outpatient clinic (CPP)	Infection Cases	Measurable Infection Rate
May	98	56	57%	46	0	0%
June	115	67	58%	65	2	3%
Average:			Total:			
	107	61	57%	111	2	1.8%

Based on these results, and coupled to the P&P approval by the Hospital Director, the hospital team decided to meet as a committee on the 23rd of July 2011 in order to discuss ways of improving adherence and documentation. During this meeting, SPS further discussed the use of the proposed CS Log to facilitate data gathering and monitoring of implementation. The goal was for the hospital team itself to make the decision regarding the need for these tools, and it was the role of SPS to show their utility. The hospital was also given the opportunity to develop their own monitoring methods or tools if they desired. Although the team agreed that data collection is best performed through the use of the two monitoring tools, the OBGY nursing team showed some resistance claiming that completing the forms required too much time. The remainder of the team urged the head of OBGY nursing to adhere to the use of the CS Logs, and explained how doing so would be efficient for the entire team. Part of the discussion included reminding the nursing staff how much time this new protocol had saved from the time required to administer the multiple doses of antibiotics which was in practice prior to the implementation of the new protocol. Finally, the Hospital Director was engaged in the discussions surrounding this issue. Convinced of the need for the monitoring tools, the Hospital Director produced official approvals on the 11th of August 2011 mandating the entire staff to complete the monitoring tools as outlined in the P&P document.

The situation encountered with the OBGY nursing at P. Faisal Hospital was a main driving force for the nursing training outlined in *section V* (Table5). The strategy for SPS/SIAPS and the remainder of the hospital team at P. Faisal Hospital was to improve adherence and commitment among the nursing staff by having direct interaction with them. The training was extensive, with 32 of the OBGY nursing staff trained over a three day period. In order to increase satisfaction and commitment, SPS coordinated with the Nursing Continuing Education Unit at the hospital in producing official, MOH training certificates to the attendees.

In the months after the P&P development workshop, P. Faisal Hospital saw some major changes in staff. The existing Head of OBGY nursing left the post at the hospital just after the P&P development workshop. The clinical pharmacist, who was heavily involved with the entire team, also left the hospital by accepting a position abroad. He had been assigned by the Hospital Director as the main *liaison* for the pilot program, and his departure created a gap in communication among the team. In addition, the technical assistant to the Hospital Director also left the hospital for a position in the United States. Not too long afterwards, the Head of OBGY

also accepted a position abroad and left the country; his departure left the OBGY physicians divided with regards to the protocol. SPS/SIAPS spent a significant amount of time to help orient the new stakeholders and re-establish work flow.

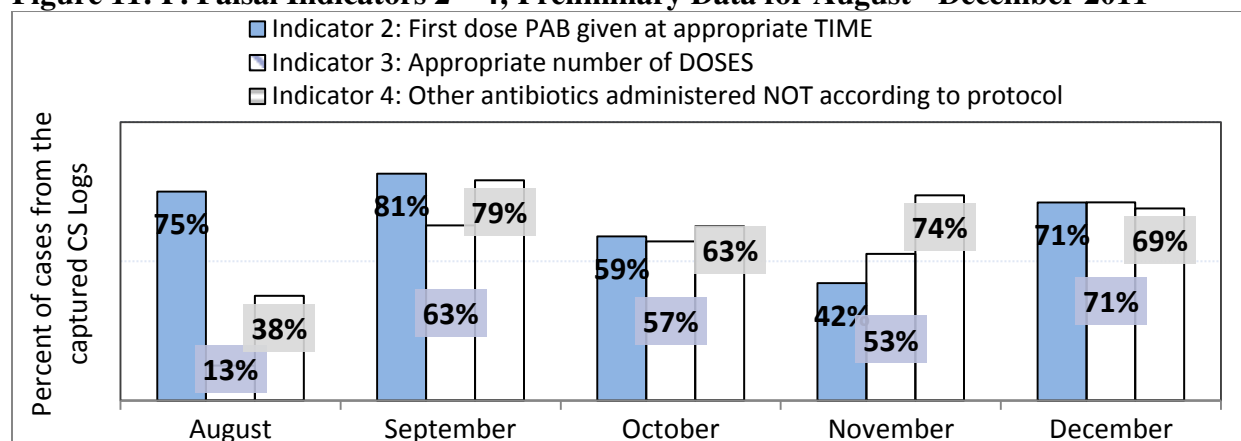
During the first few months of the P&P implementation and monitoring, the hospital team was able to produce indicator data describing their progress for the latter part of 2011. However, as described above, the number of cases captured with a CS Log was very low (Table 10) despite the mandates by the administration and the training sessions with the nursing staff:

Table 10: P. Faisal Initial Indicator Data: CS Log Capture Rates in 2011

	Aug	Sep	Oct	Nov	Dec
Cases for which CS Log Completed:	16	43	56	38	45
Cases for which CS Log NOT Filled	36	53	40	52	58
Total Number of CS Prophylaxis Cases:	52	96	96	90	103
CS Log Capture Rate:	31%	45%	58%	42%	44%

With such low capture rates, the indicators measured would not strongly reflect the true extent of protocol implementation. Figure 11 illustrates the results for *Indicators 2 – 4* for the months corresponding to those shown in Table 10.

Figure 11: P. Faisal Indicators 2 – 4; Preliminary Data for August - December 2011



The results for indicators had declined after the training in October 2011, but this is attributed to more accurate filling of the CS Logs and not necessarily to poorer performance. However, the team’s performance did not improve significantly thereafter. SIAPS continued meeting with the different heads of departments in order to identify the obstacles preventing better outcomes. In February of 2012, the Department of Pharmacy responded by increasing monitoring on the amounts of cefazolin delivered to the OBGY ward, and by limiting the amounts delivered based on actual cases of CS. While this step was effective in preventing additional doses of cefazolin from being prescribed and administered, it did not affect prescribing of other antibiotics or improve the completion of CS Logs. The Pharmacy Department subsequently engaged the administration by reporting the appropriateness of prescribing, and the administration responded

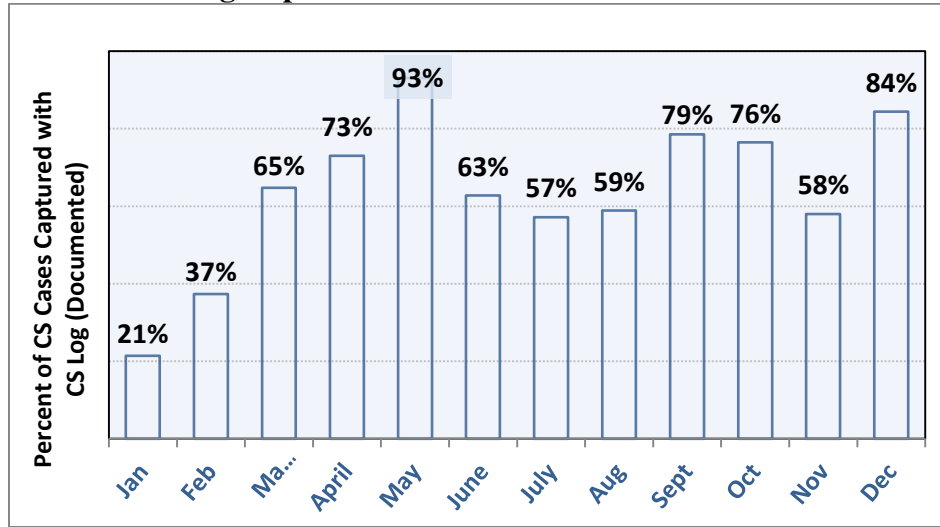
through direct communication with the OBGY ward. In some instances, the new technical assistant to the Hospital Director went to the ward himself and reviewed ABP orders, changing those that were inappropriate.

In order to organize the team effort to a greater extent, SIAPS requested that the Drug and Therapeutics Committee (DTC) be officially engaged. Since the committee had not been active at the hospital an official letter to the hospital was sent in coordination with the MOH Hospital Administration. Based on these activities, the DTC was re-activated and a meeting was held on Saturday, the 3rd of March 2012. The hospital administration mandated the attendance of all relevant departments. The discussions regarding the poor results of protocol implementation generated two main conclusions:

- Insufficient nursing/midwife staffing on some evenings and on Fridays
- Resistance from one of the OBGY physicians, and weak communication among the OBGY team members and the Head of the department

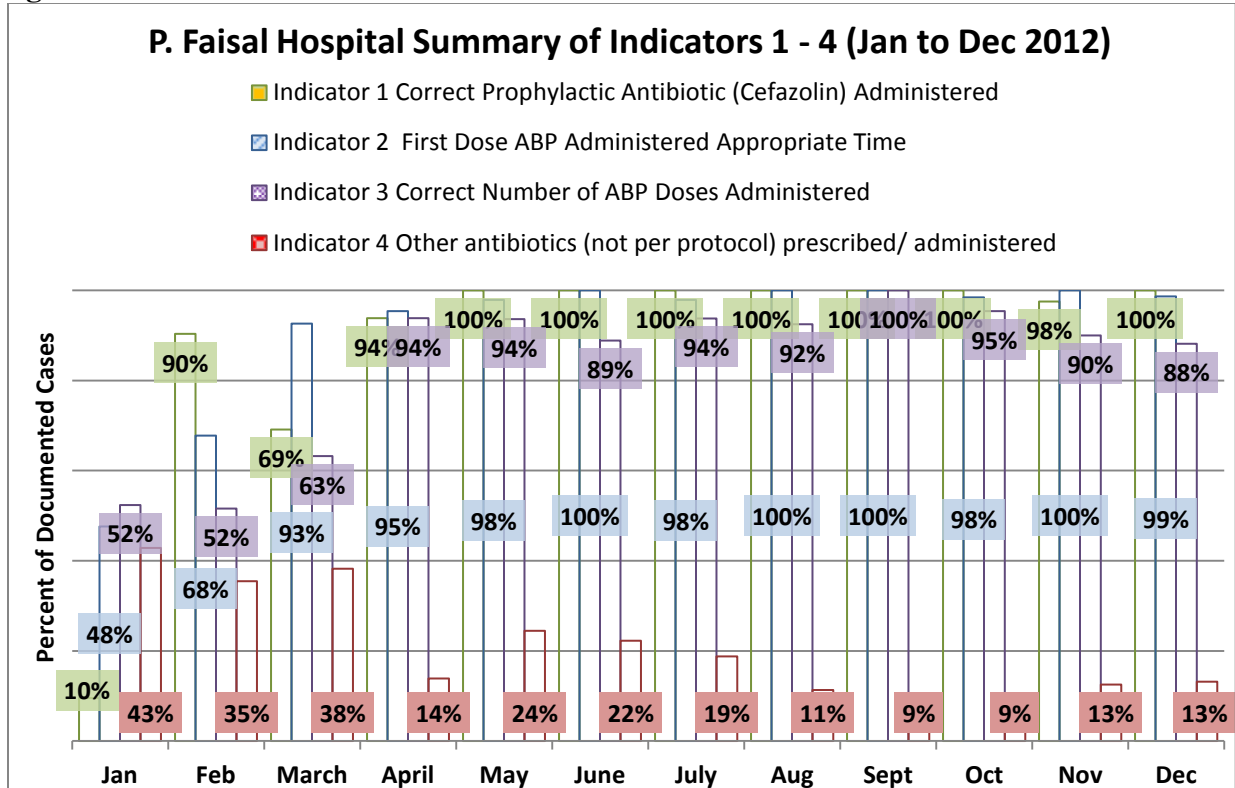
The CS Log capture rates by month for 2012 are shown in Figure 12. The overall acceptance in the OBGY ward of the protocol had shown steady improvement during the first quarter of the year. Many positive changes took place as the second major program workshop on review of implementation took place in March 2012. Immediately before the workshop, the team began to work vigorously to improve their implementation and their resulting numbers for presentation to their colleagues and to the MOH at the workshop. The positive momentum continued past the March Workshop, with CS Log capture rate reaching its peak in May. During this period, the Department of Pharmacy has utilized strategies from the workshop sessions on ‘identifying drug use problems’ and ‘drug use evaluation,’ in order to quantify and control the number and amount of antibiotic prescribing through its outpatient pharmacy. The nursing department has also given positive feedback describing improved communication and cooperation with the OBGY physicians. In addition, the re-activated DTC met once during March, and two additional times between April and July of 2012. During its meetings, the Committee discussed protocol implementation and monitoring at the time, and compared it with the expectations resulting from the March Workshop. Together, the Committee discussed their weaknesses, and each department understood what is required of them in order to improve overall performance. An evaluation of each indicator, including an analysis of any weak performance and the decisions made by the team, were outlined in the Committee’s meeting minutes and submitted to the Hospital Director.

Figure 12: P. Faisal CS Log Capture Rates for 2012



Indicators 1 – 4, with the above capture rates for January through December of 2012 are illustrated in Figure 13. While performance appears to be very good with high percentages of adherence for each of the indicators, the data cannot be confidently extrapolated to typify the overall practice at the hospital for all the CS cases since the CS Log capture rates are still fluctuant.

Figure 13



The yearly average rate of SSI was reported at 1.03%, with the monthly rates presented in Figure 14.

Figure 14

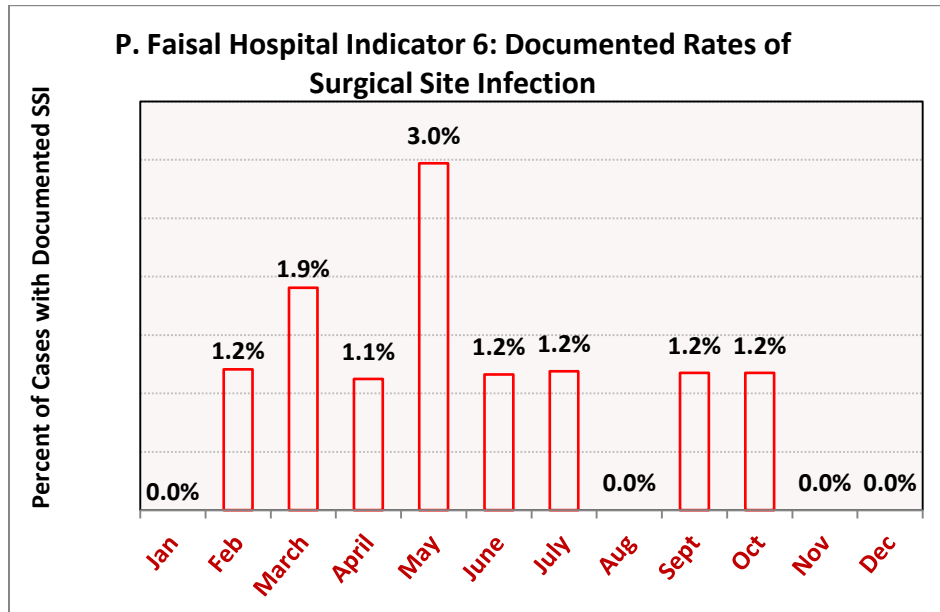


Table 11 provides an overall data summary for Prince Faisal Hospital for the period January to December 2012.

Table 11: Prince Faisal Hospital—Indicator data summary for 2012

		Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total	Yearly Result for Each Indicator Calculated Relative to (1) Number of CS Log-documented cases or to (2) Total Number of CS Cases in OBGY Ward:	
		Number of Cases												Total		
Total Number of CS Prophylaxis Cases Presenting Through OBGY Ward Regardless of Protocol Implementation or CS Log Completion		98	83	105	89	101	86	84	90	85	85	69	90	1065		
Number of CS Prophylaxis Cases for which a CS Log was Completed Appropriately Yielding the Numbers Below for Each Indicator:		21	31	68	65	94	54	48	53	67	65	40	76	682	(1) Number of CS Cases Documented with CS Log	(2) Total Number of CS Cases in OBGY Ward
Indicator:	Description:	Number of Cases												Total	Percent	
Indicator 1	Correct Prophylactic Antibiotic (Cefazolin) Administered First Dose ABP	2	28	47	61	94	54	48	53	67	65	39	76	634	93%	60%
Indicator 2	Administered Appropriate Time	10	21	63	62	92	54	47	53	67	64	40	75	648	95%	61%
Indicator 3	Correct Number of ABP Doses Administered	11	16	43	61	88	48	45	49	67	62	36	67	593	87%	56%
Indicator 4	Other antibiotics (not per protocol) prescribed/administered	9	11	26	9	23	12	9	6	6	6	5	10	132	19%	48%
Indicator 5	Followed-Up by Clinic Visit and/or by Telephone	17	28	48	48	74	47	42	43	63	54	35	68	567	83%	53%
Indicator 6*	CS surgical site infection (SSI) cases relative to total number of CS cases per month	0	1	2	1	3	1	1	0	1	1	0	0	11	1.03%	

* Indicator 6 is calculated relative to the "Total Number of CS Prophylaxis Cases in OBGY Ward" as decided by hospital physicians given that cases of infection return to the hospital for treatment.

The hospital team was able to present an update of their progress to the MOH Directorates during a meeting on the 5th of June 2012. Discussions by the team regarding both the resulting indicators, and the mechanisms of work at the hospital took place. The hospital team fully explained their work, the existing gaps and weaknesses in the work-flow, and the steps already taken to correct them. Two main issues received a lot of attention:

1. Continuing with DTC meetings by the hospital team
2. Effective enforcement of protocol prescribing by the administration and the head OBGY physicians

A third factor, the CS Log Capture Rate, had not received enough attention during this presentational meeting since the available data was through May and the rate had been improving and reached a peak of 93 percent (Figure 12). However, the Capture Rate would subsequently become the main obstacle for the team at P. Faisal Hospital.

Although the DTC continued with their meetings, communication gaps still existed among the team such that the resulting data was not shared directly with the entire team. SIAPS continued with both technical and logistic support, both on individual and on group basis, in order to solidify the role of the DTC in implementation, monitoring, and CQI by increasing reporting of data to all relevant members and engaging the hospital administration. The data collected was periodically reviewed by the team with assistance from SIAPS. Both the accuracy of information captured by the CS Log and the entry of data were checked to ensure quality of the resulting data. No errors or inconsistencies were discovered from the information actually captured in the CS Logs.

With the hospital team, SIAPS had been helping to investigate the reasons for the decline in the capture rate, and discussed the issue with the hospital administration on several occasions. For a two-month period, the Head OBGY nurse had been on an extensive leave, and the Head of nursing at the hospital was absent from the DTC meetings. As such, the Department of Nursing and OBGY nursing were not receiving any feedback regarding their work, and were therefore not being held accountable. From the end of August and through September, SIAPS made great emphasis to the team regarding the CS Log capture rate, and made a few visits to the different OBGY wards to communicate with the nursing staff. During those visits, blank copies of the CS Log were always available in the ward despite claims that they were in short supplies. The hospital team working with the CS Pilot Program had also performed ‘orientation-type’ training to nearly 160 hospital staff during June, and this training included information regarding the CS Protocol and Procedures implementation and monitoring. However, this activity had no effect on the CS Log capture rate.

The DTC met again on the 2nd of September 2012, and discussed the issue of the CS Log capture rate. A decision was made to discuss the issue directly with the OBGY nursing staff, but it is unclear what steps the administration had taken based on the DTC’s reports, and only a small improvement in the capture rate was observed for September and October. This brief improvement was followed with a relapse in November, with the capture rate declining again.

During this time period, SIAPS communicated with several nurses in the three OBGY wards in the hospital in order to better understand the reasons for the decreased capture rate, and to characterize those cases for which a CS Log was not completed. Time was spent in the ward in order to observe adherence to the process of completing the logs:

- Blank CS Logs were readily available at the nursing stations.
- All the nurses met were fully aware of the CS protocol and the need to complete the CS Log.
- Some nurses showed dissatisfaction with the adherence to protocol prescribing by a few OBGY physicians.
- The nurses pointed to the step in which the CS Log is to be removed from the patient’s file upon discharge, and postulated that a perhaps some logs were not being removed.
- With the nursing team, SIAPS tried to find a checking-system to ensure that the CS Logs were completed and removed upon discharge. However, this proved challenging as the discharge file is separate from the admission file, and involves routing through other departments in the hospital including finance and pharmacy.

On a random day, the files of five CS cases that were still in the hospital were reviewed with SIAPS assistance. The following was observed:

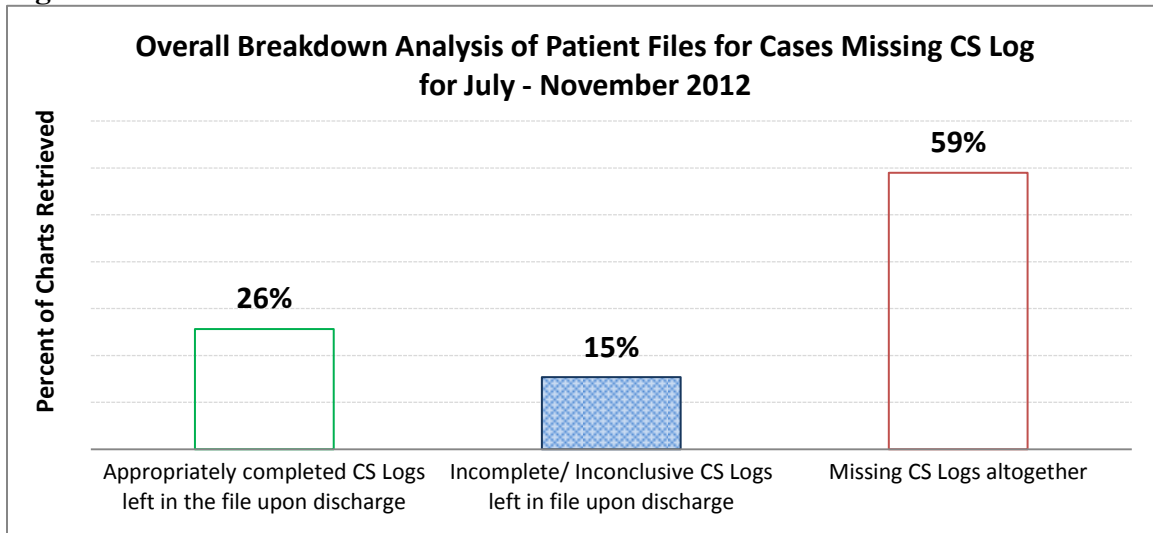
- A CS Log was present in each file.
- Prescribing for two of the cases was in adherence with the CS P&P.
- For the other three cases, cefazolin was ordered as a standing order, every twelve hours, after an initial dose given at appropriate time before incision.
- No proper documentation justifying the need for the antibiotic prescribing was found, and the three cases were managed by the same physician.

In order to reconcile the issue of non-compliant prescribing by the OBGY physician, the three cases encountered were immediately taken to the Head of OBGY for discussion. The Head of OBGY could not find any justification for the multiple doses of ABP prescribed by the OBGY physician, and telephoned him immediately to discuss the reasons for the seemingly deviant prescribing observed.

Given the situation with the team and the repeated efforts to improve the capture rate, a meeting was finally called with the entire team and the Hospital Director. In the meeting, the physician Head of OBGY insisted that all the patients are receiving protocol antibiotic appropriately, and that the problem was only in recording on the CS Logs. And the Head of OBGY nursing claimed that the only issue was the actual withdrawing of the CS Logs from the charts prior to patient discharge, and that a log was in fact being completed for all cases. A decision was made with SIAPS to evaluate the files for the cases for which a CS Log was not received by the ICC for data entry. SIAPS also suggested that a hand-off log book be created, similar to that made successful at Totanji Hospital, in order to ensure that a log is completed for each CS case.

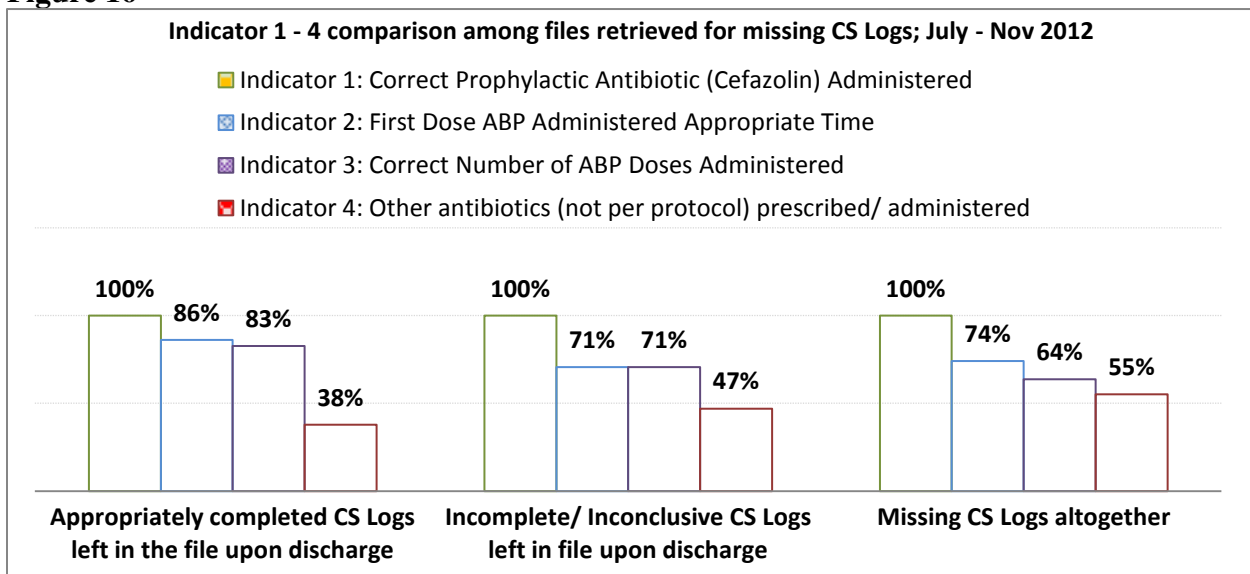
All the cases missing a CS Log from July through November were collected for analysis, and a new sheet in the EMT was developed by SIAPS to accommodate for analyzing the missing information. The analysis showed that the majority of the patient files for cases missing a CS Log in the initial documentation process did not have a CS Log left behind in them as initially thought by the team. Between July and November, there were 140 cases for which a CS Log was not received by the ICC. Of those 140 cases, the patient files for 117 (84%) were retrieved by the hospital team for evaluation. Figure 15 illustrates what the team found in the patient files for those cases missing a CS Log.

Figure 15



The patient files that were retrieved were then analyzed relative to the original indicators being measured by the team. Firstly, for the files in which a complete CS Log was found, the information recorded on the log was checked for accuracy against information documented in the file before being entered into the modified EMT. For the files with incomplete CS Logs in them and/or those missing a CS Log altogether, the team completed a new CS Log according to the information documented in the file and then entered that data into the modified EMT. Figure 16 illustrates the data for *Indicators 1 – 4* for the cases missing an initial CS Log between July and November, 2012. As can be observed, the cases for which a CS Log was missing altogether were those in which the team performed more poorly overall in protocol implementation.

Figure 16



Cost analysis for P. Faisal Hospital yields good savings. When considering the cases actually documented with a CS Log, the hospital sees a reduction of nearly 87% in the average ABP cost per CS case (Figure 17). For the 682 CS cases documented in 2012, a total savings of 3,217 JOD is achieved (Figure 18).

Figure 17

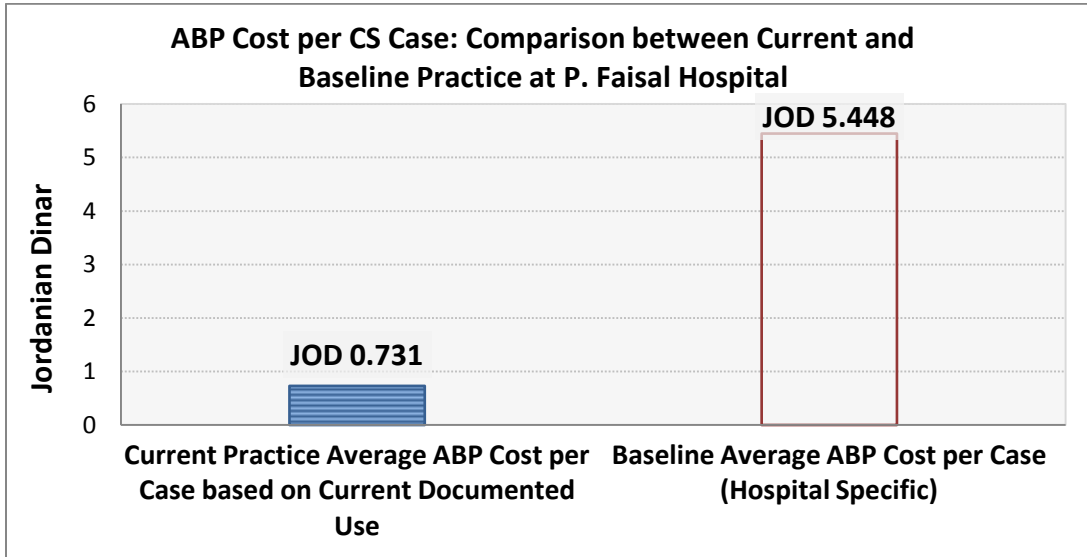
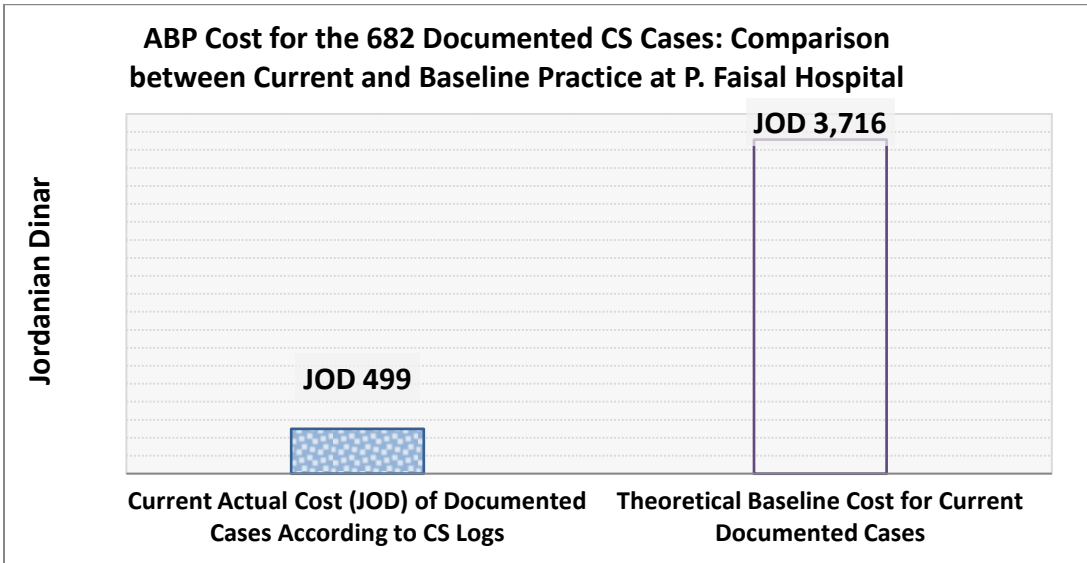


Figure 18



Dr. Jameel Al Totanji Hospital

The team at Totanji Hospital initiated one dose ABP after the first few visits from SPS during the early periods of initiation of the pilot program, and well before the P&P development workshop in April 2011. The preliminary discussions with the hospital stakeholders had influenced their practice, and the Head of OBGY began to shift the prescribing habits of his team towards the international best practices. Following the development workshop, SPS worked with the Head of OBGY and the rest of the team on editing their protocol, and a finalized version was submitted to the Head of the Hospital on the 19th of July 2011. As done at the other hospitals, the team was implementing the protocol using the alternative antibiotic, cefuroxime, for prophylaxis.

Utilizing the draft CS Log presented by MSH/SPS at the P&P development workshop, the team began recording cases of CS and monitoring their implementation. Further edits were performed by the team during meetings facilitated by SPS. The changes made to the CS Log were similar to those done at the other hospitals and a final version was produced on the 24th of July 2011. Present during the P&P-related meetings were representatives from the infection and quality control committees, pharmacy staff, OBGY nurses, OR nurses, the outpatient clinic nurse, and the Head of OBGY along with his deputy.

After the initial positive start, the team began to face some break-downs in their implementation and monitoring. MSH/SIAPS coordinated two inclusive meetings during the fourth quarter of 2011 in order to bring an agreement among the team with respect to their roles and responsibilities. The nursing staff agreed to organize their effort in order to record a CS Log for each CS case, and training sessions with MSH/SIAPS were to be conducted. Prior to the training, SIAPS suggested to first having official approval of both the P&P and the CS Log by the hospital administration. The training was subsequently delayed due to the lack of this hospital mandate, which was delayed due to the hospital undergoing changes in its administration. During this time period, the physicians however did continue to implement the protocol, but no recordkeeping was appropriately available to confirm prescribing and administration habits.

A new Hospital Director was assigned to Al Totanji Hospital in early November 2011, and SIAPS met with him promptly. The progress accomplished with the program and the obstacles encountered were discussed, and the Director agreed on a new plan of action proposed by the hospital team and SIAPS, which included suggested outline of the steps toward re-establishing the implementation and monitoring of P&P, and CQI.

According the proposed plan, the new administration was expected to mandate the protocol, the CS Log, and the EMT through official hospital memos and disseminate to all the relevant hospital departments. After the meeting with the new Director, SIAPS met with the Infection Control Department and reviewed the EMT and its proper use. In order to speed up progress, the improvements and editing resulting from work in the other two hospitals were introduced to the Totanji team and incorporated into their CS Log and EMT.

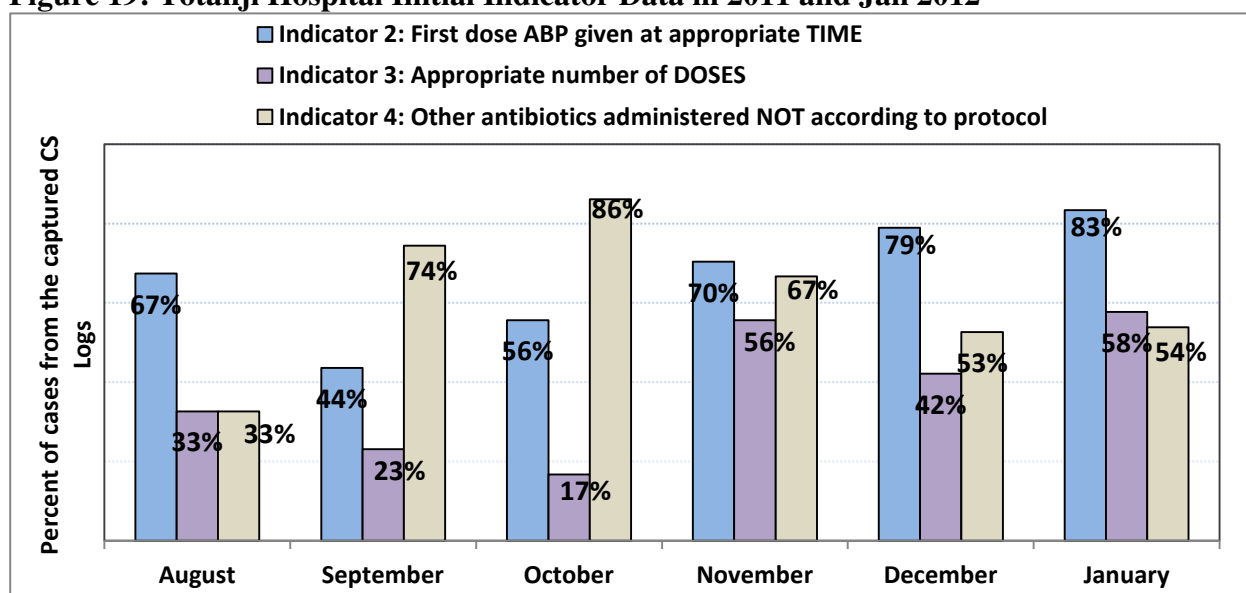
The hospital administration subsequently provided approval to the P&P and monitoring tool, and SIAPS then conducted the planned training for ten OBGY nursing staff on the 24th of January 2012. Working together, the departments were able to catch up with data aggregation.

Meanwhile, the hospital team, led by the administration, met independently of SIAPS in order to discuss program progress and to prepare for their presentation during the March 2012 implementation review workshop. As a result, the team was able to prepare and present the capture rates presented in Table 12 and indicator data in Figure 19.

Table 12: Totanji Hospital Initial Indicator Data: CS Log Capture Rates in 2011 and Jan 2012

	Aug	Sep	Oct	Nov	Dec	Jan
Cases for which CS Log Completed	46	39	36	27	19	78
Cases for which CS Log NOT Filled	33	32	55	52	59	0
Total Number of CS Prophylaxis Cases:	79	71	91	79	78	78
CS Log Capture Rate:	58%	55%	40%	34%	24%	100%

Figure 19: Totanji Hospital Initial Indicator Data in 2011 and Jan 2012



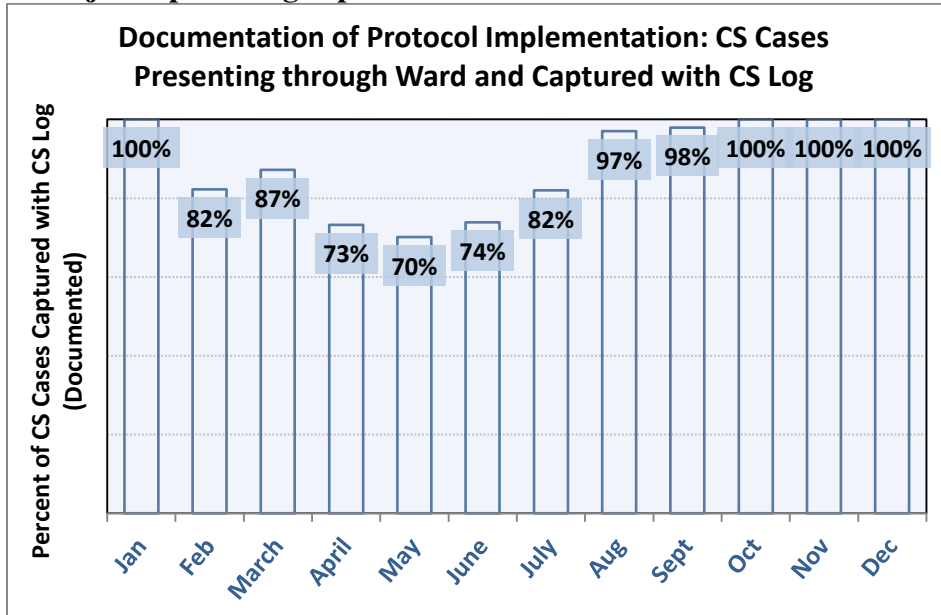
After the March 2012 review workshop, the hospital team continued to implement the protocol, to monitor through the use of the CS Log and to measure indicators through the Excel Monitoring Tool (EMT) with SIAPS technical assistance. The Hospital Director was again changed in March/April 2012; the new Director, third since the program began, was briefed by both his hospital team and by SIAPS.

The Infection Control Committee (ICC), with assistance from SIAPS, reviewed the captured data and their entries without finding any significant errors or discrepancies. At this point of program implementation, the ICC was the most active entity in engaging the rest of the departments. The ICC holds regular monthly meetings, and has discussed CS Protocol progress in each of these meetings. The ICC also delivers results to the hospital's DTC. After the March 2012 workshop,

the DTC held two meetings that included discussions on the CS ABP pilot progress as items in their agenda. The DTC, however, was not engaging all the relevant stakeholders during their meetings and not assuming an active role in monitoring the program implementation.

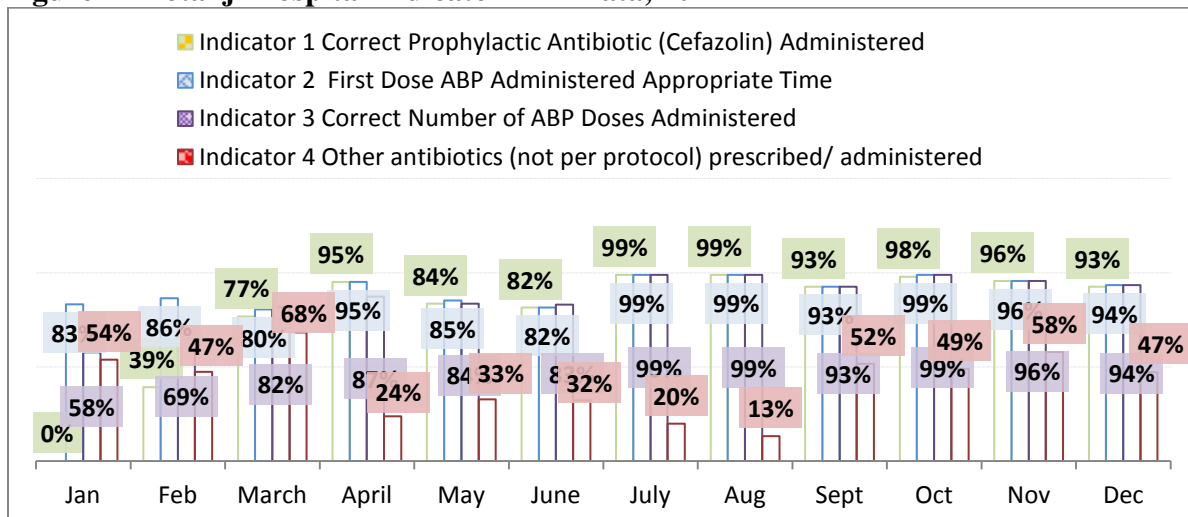
After a good start to the year, the CS Log capture rate somewhat declined as illustrated in Figure 20. The team worked on this issue, and in August 2012, the OBGY Head of Nursing developed a hand-off log that would monitor the delivery of completed CS Logs from the OBGY ward to the outpatient clinic with a signature ensuring receipt. Since this intervention, the hospital team has been able to capture with a log almost all of the CS cases seen through the ward.

Figure 20: Totanji Hospital - log capture rate in 2012



Aggregating the data from the CS Logs in the EMT, the ICC produced results for indicators 1 to 4 as shown in Figure 21.

Figure 21 Totanji Hospital Indicator 1 - 4 Data, 2012



Given the high rates of prescribing additional antibiotics not according to protocol (indicator 4) in the months just before the March workshop, the ICC committee quickly communicated the matter with the OBGY physicians and the administration, which led to immediate action by the Head of OBGY. In the subsequent months, this prescribing declined to a good extent. However, another rise was observed in September and was attributed to the rotation of new OBGY physicians.

After several delays in setting-up a presentation for the MOH Departments, the meeting finally took place on July 1st with all the relevant MOH Directorates in attendance. From the Hospital, the entire hospital team, including the new Hospital Director, attended the meeting. The measured indicators up to that time period were discussed, with the following main points being presented:

- The nursing department explained the difficulty they were facing between the ward and the delivery room, indicating that increased coordination was needed in order to cover the CS cases presenting from the delivery ward directly to the OR.
- Regarding the need to increase adherence to protocol prescribing, the physicians explained that communication with the entire OBGY prescribing team, including the residents, had taken place. The result for April showed significant improvements and the head physicians continued to give strict instructions to the junior team.
- The roles and responsibilities of each department were also discussed within the hospital, and with the respective MOH Directorates. Specifically, the role of the Quality Control Department was evaluated, and expectations in parallel to the MOH accreditation process and MOH Quality Directorate were outlined.
- The role of the Hospital Pharmacy Department in both protocol implementation, and through the DTC was also discussed. It was identified that the DTC and the Pharmacy Department needed to take more active roles in organizing meetings and monitoring progress.
- A thorough discussion took place regarding the increase seen in the rate of surgical site infection (SSI) as reported for April 2012. At that period of time, part of the protocol implementation required the hospital team to contact, by telephone, those cases not returning to the clinic for their follow-up visit. During such telephone follow-up, some cases reported having an infection. The team, led by the physicians and Infection Control, discussed which procedures to take before a case would be recorded as an SSI from information gathered directly from the patient/family. The discussion led to the decision that, in case a suspected infection got reported by the patient/family by phone, a follow-up of the case for confirmation of SSI would need to be done with the health center or clinic which that patient went to for treatment. In those cases that would not be accessible, the case would need to be reviewed with the OBGY physicians before a final decision would be taken to count it as SSI.

The yearly average rate of SSI at Totanji Hospital was reported at 1.81%, with the monthly rates presented in Figure 22:

Figure 22

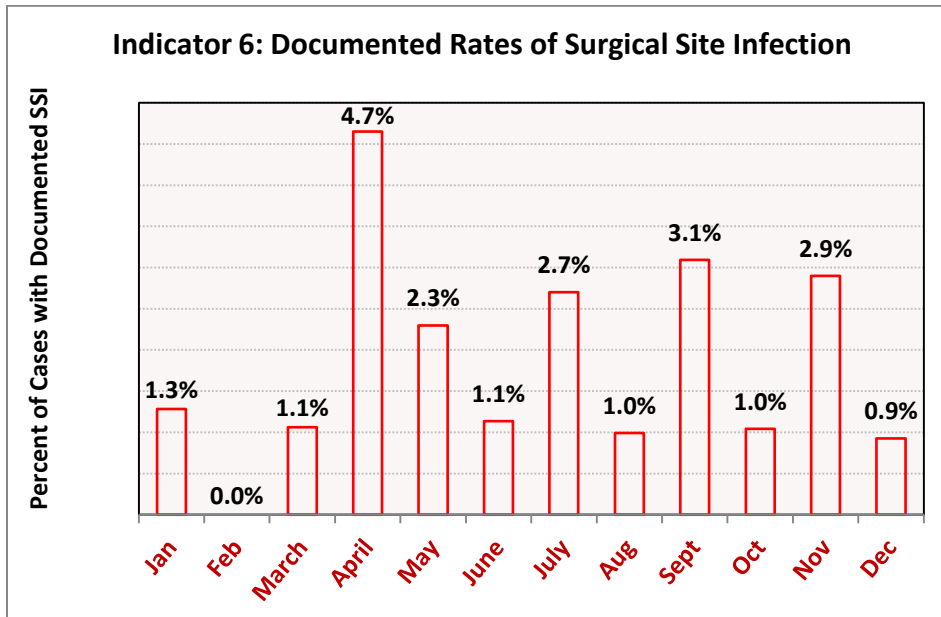


Table 13 provides an overall data summary for Totanji Hospital for the period January to December 2012.

Table 13: Totanji Hospital—Indicator data summary for 2012

		Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total	Yearly Result for Each Indicator Calculated Relative to (1) Number of CS Log-documented cases or to (2) Total Number of CS Cases in OBGY Ward:	
		Number of Cases												Total		
Total Number of CS Prophylaxis Cases Presenting Through OBGY Ward Regardless of Protocol Implementation or CS Log Completion		78	90	94	86	87	88	111	101	97	96	69	108	1105		
Number of CS Prophylaxis Cases for which a CS Log was Completed Appropriately Yielding the Numbers Below for Each Indicator:		78	74	82	63	61	65	91	98	95	96	69	108	980	(1) Number of CS Cases Documented with CS Log	(2) Total Number of CS Cases in OBGY Ward
Indicator:	Description:	Number of Cases												Total	Percent	
Indicator 1	Correct Prophylactic Antibiotic (Cefazolin) Administered	0	29	63	60	51	53	90	97	88	94	66	100	791	81%	72%
Indicator 2	Administered First Dose ABP	65	64	66	60	52	53	90	97	88	95	66	101	897	92%	81%
Indicator 3	Administered Appropriate Time	45	51	67	55	51	54	90	97	88	95	66	101	860	88%	78%
Indicator 4	Correct Number of ABP Doses Administered	42	35	56	15	20	21	18	13	49	47	40	51	407	42%	48%
Indicator 5	Other antibiotics (not per protocol) prescribed/administered	78	74	82	63	59	58	72	95	92	95	56	94	918	94%	83%
Indicator 6*	Followed-Up by Clinic Visit and/or by Telephone	1	0	1	4	2	1	3	1	3	1	2	1	20	1.81%	
Indicator 6*	CS surgical site infection (SSI) cases relative to total number of CS cases per month															

* Indicator 6 is calculated relative to the "Total Number of CS Prophylaxis Cases in OBGY Ward" as decided by hospital physicians given that cases of infection return to the hospital for treatment.

Consistent with the other hospitals, the cost analysis for Totanji Hospital yields very positive results. For the cases documented with a CS Log, the Hospital showed a reduction of nearly 76% in the average ABP cost per CS case (Figure 23). Applying the decrease in average cost to the 980 CS cases documented in 2012, the Hospital achieved total savings of 2,925 JOD (Figure 24).

Figure 23

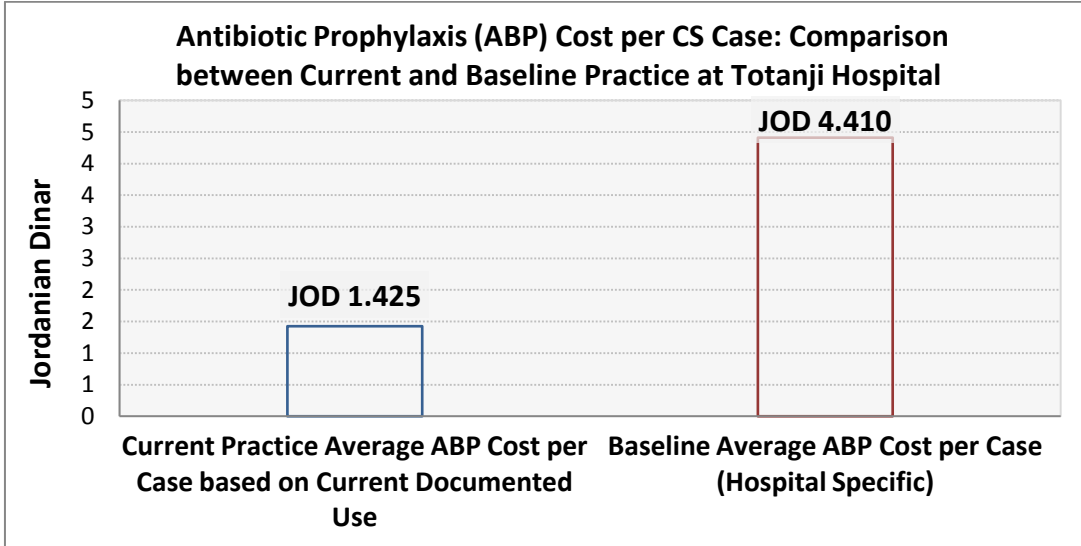
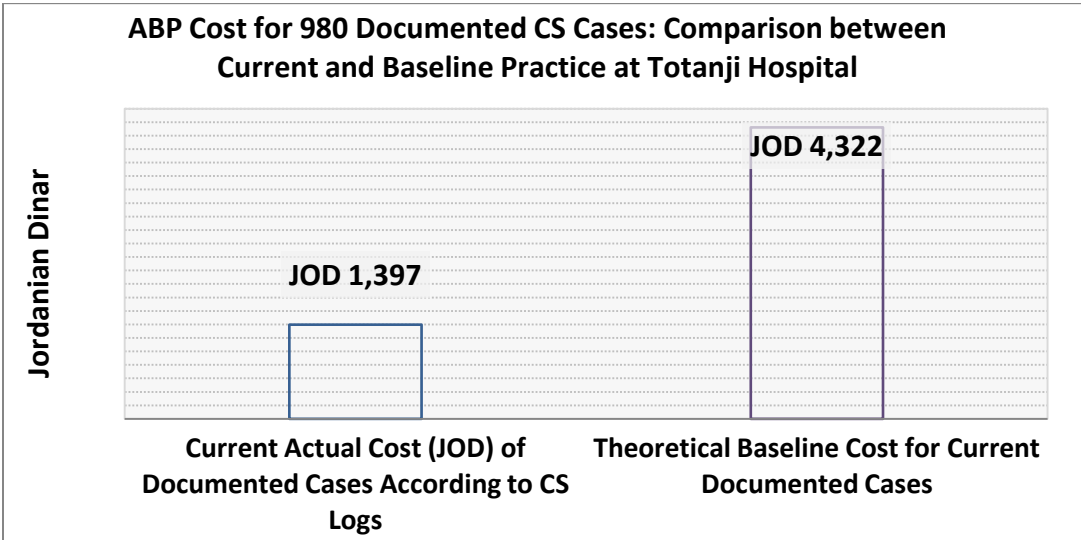


Figure 24



MOH Directorates

As discussed in the *Program Design and Implementation* section of this report, SIAPS sought early on in the program to establish processes that would build the basis for sustainability. The central MOH Administrations and Directorates engaged in the program mirror and complement the stakeholders at the hospitals. Since the beginning, the Clinical Pharmacy Directorate was assigned by the Director of Hospital Administration to act as the direct liaison with SIAPS for the pilot program. Therefore, SIAPS coordinated all efforts at transferring the knowledge and expertise gained through the program hospital work to the central MOH with the Clinical Pharmacy Directorate, but also reached directly to the other directorates by engaging them in meetings, workshops, training sessions, and by creating a group email to encourage closer communication.

After the technical training workshop held in March of 2012, SIAPS concentrated on shifting and solidifying the center of program-lead to the MOH directorates. Meetings were held that brought together the relevant directorates as a committee, with the aim of having each directorate monitor and evaluate the work of its respective hospital department. As such, hierarchical accountability would be established, and sustainability would be strengthened.

Furthermore, SIAPS sought other methods to establishing program accountability and sustainability within the MOH. Working with the team described above, SIAPS assisted in the development of a MOH workplan outlining the following steps and goals:

1. Develop an updated, standardized and unified CS Antibiotic Prophylaxis (ABP) *Protocol and Procedures* based on scientific evidence and on the current CS Protocols
2. Institutionalize the unified CS Protocol and Procedures and Monitoring Tools as official Ministry of Health policy and mandate their implementation in all MOH Hospitals
3. Execute CS ABP Protocols and Procedures in MOH Hospitals and proactively monitor and evaluate implementation through the Monitoring Tools (CS Log and Excel Monitoring Tool)
4. Replicate the CS Pilot Program process in order to create antibiotic prophylaxis for other surgical procedures as outlined by the MOH National Quality and Safety Goals

SIAPS assisted the MOH directorates in setting up a meeting on September 25th, 2012 that included the Head of OBGY specialty at the MOH and the heads of OBGY from six additional MOH hospitals with the aim of unifying the three protocols developed by the hospitals. Program material, including updated medical evidence supporting the protocol, was presented by SIAPS. The heads of OBGY from the three hospitals participating in the pilot program also presented their experience and progress up to that point. A discussion followed in which the physicians debated the evidence and analyzed the protocols produced by the three hospitals. As the debate grew, the MOH Head of OBGY specialty decided to form a subcommittee that included the heads of OBGY from four hospitals other than the pilot hospitals.

The subcommittee held a second meeting at the MOH, in coordination with SIAPS, on October 2nd, 2012. During this second meeting, the subcommittee decided to streamline the procedures section of the P&P in order to make it flexible for all the MOH hospitals given their hospital-

specific needs. However, for the protocol section itself, the subcommittee decided to keep only those criteria supported by direct evidence for the administration of additional doses of ABP. The unified protocol gained official approval by the Minister in February of 2013, and is now mandated at all MOH hospitals providing OBGY care.

In order to further support the MOH Directorates in executing steps 3 and 4 above, SIAPS also conducted a training session on February 5th, 2013 covering the details and use of the program's *monitoring tools*. Both the CS Log and the EMT were thoroughly described and discussed. Sample charts were utilized to exercise the appropriate completion of CS Logs, and the subsequent entry of data into the EMT. With this training, the staff at the MOH has strong command of the tools being used to produce indicator data at the hospitals, and can therefore properly evaluate results and perform further monitoring and evaluation with the hospitals.

The MOH Directorates played an important role in organizing the final results dissemination meeting which was held on March 27th, 2013. The opportunity was taken to engage other MOH hospitals, which are not mandated to implement the unified protocol, and to provide them with a good background of the program and its operating principles. Members from six additional MOH hospitals, in addition to the pilot hospital teams and the MOH Directorates, were present for the meeting as shown in Table 14.

Table 14: Final Results Dissemination Workshop March 27, 2013

Stakeholders	Number of participants
MOH Directorates	11
Prince Hussein Hospital	10
Prince Faisal Hospital	8
Totanji Hospital	13
Al Basheer Hospital	8
Zarqa Hospital	2
Princess Badea' Hospital	7
Kerak Hospital	4
Al Mafraq Hospital	3
Al Hussein, Salt Hospital	1
Total	67

The meeting was held under the auspices of the Minister of Health, and the Director of the Hospital Administration Directorate provided the opening speech. The following presentations were delivered:

1. Program Overview, by SIAPS
2. Accomplishments of the Cesarean Section Antibiotic Prophylaxis Pilot Program, presentations by each pilot hospital team:
 - a. P. Hussein Hospital

- b. Totanji Hospital
- c. P. Faisal Hospital
3. Accumulative Results, Progress Evaluation and Analysis, by SIAPS
4. Ministry of Health Perspective, Work-plan, and Next-Steps, by MOH Hospital Administration/Directorates and SIAPS

During the hospital presentations, each team described their own work and their results (presented above). The meeting included nearly one and a half hours of discussion time, in which each hospital further discussed their work and answered relevant questions. The third presentation named above also encouraged open discussion among all the attendees, including the accomplishments and the relative success achieved among the hospitals. Both obstacles and successes were shared and critical questions regarding motivation and accountability were put forth. In some instances, the discussions were competitive as certain teams showed that most barriers were overcome through the principles of continuous quality improvement and leadership.

Of the newly engaged hospitals, physicians and nurses from Al Basheer, P. Badea', Mafraq, and Al Hussein-Salt revealed that they have already taken significant and positive steps at implementing the newly mandated CS ABP protocol and procedures. In the case of Al Hussein-Salt, the team revealed that with the assistance and encouragement of the Infection Control Department of the MOH, they had utilized the protocol from one of the pilot hospitals and had begun their own implementation nearly one year prior. The Mafraq Hospital team revealed that through their Quality Control Committee (QCC), they had requested program material and the *monitoring tools* from the QCC of P. Hussein Hospital, made certain adjustments to them, and began their application.

PROGRAM ACHIEVEMENTS AND LESSONS LEARNED

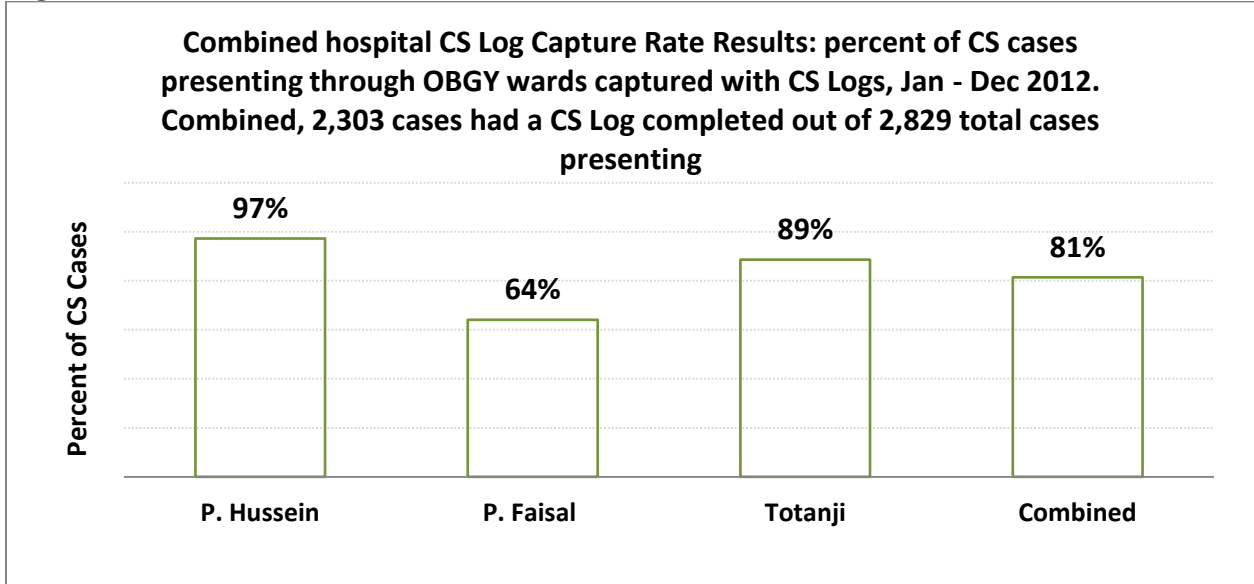
The CS antibiotic prophylaxis pilot program implemented in the three MOH hospitals in Jordan with technical assistance from the USAID-supported SIAPS Program and its predecessor, SPS, brought several positive changes. The program improved pharmaceutical services, built local capacity, and strengthened health systems. Several lessons were also learned during the process of implementing this program. These achievements and lessons learned are summarized below.

Improved Pharmaceutical Services and Cost-Savings

Although the three hospitals performed at different levels of success, positive changes were observed in each of them. Each hospital is now providing better pharmaceutical care for women undergoing CS. Whereas prior to the program intervention none of the women undergoing CS were receiving an ABP dose prior to incision, a good percentage are now in fact receiving the first dose at the appropriate time. International evidence now clearly shows that pre-incision (15 to 60 minutes prior to skin incision) significantly reduces post-CS infectious morbidities in mothers without negative outcomes in the neonates (see Annex B). Additionally, all the three MOH hospitals have demonstrated a decrease in both the number of doses of ABP given and in the prescribing of other, unnecessary antibiotics.

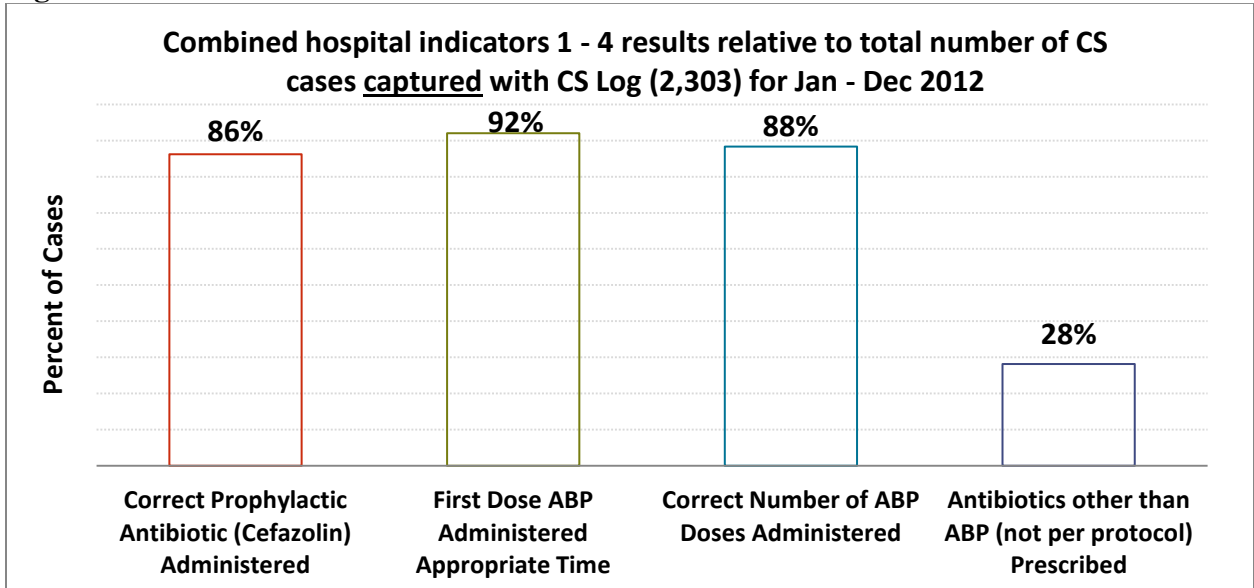
Figure 25 illustrates the CS Log capture rates for each hospital and combined.

Figure 25



Indicators 1 – 4 for the documented cases from each hospital are shown in Figure 26.

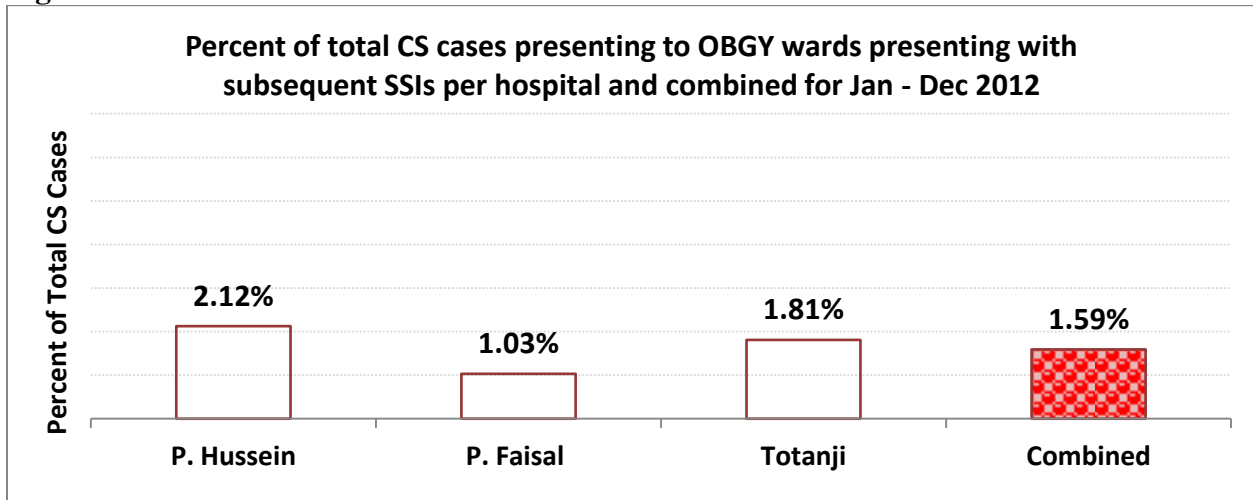
Figure 26



Whereas rates of SSI were not specifically being monitored prior to the initiation of the pilot program, the hospitals now have appropriate documentation of such cases, and are able to monitor their performance in this regard. The ICC in each of the hospitals has gained capacity in monitoring and evaluation of infection rates, and has the experience of understanding the

different factors that affect the rates of infection at their hospitals. Figure 27 illustrates the overall rates of SSI for each hospital, and the combined rate.

Figure 27



Also, when the current cost is compared with the information gathered during the baseline analysis, clear savings become obvious. Figure 28 illustrates the change in the average cost of ABP per case in each of the hospitals, and also combined for the three hospitals with an overall decrease of 79% per case.

Figure 28

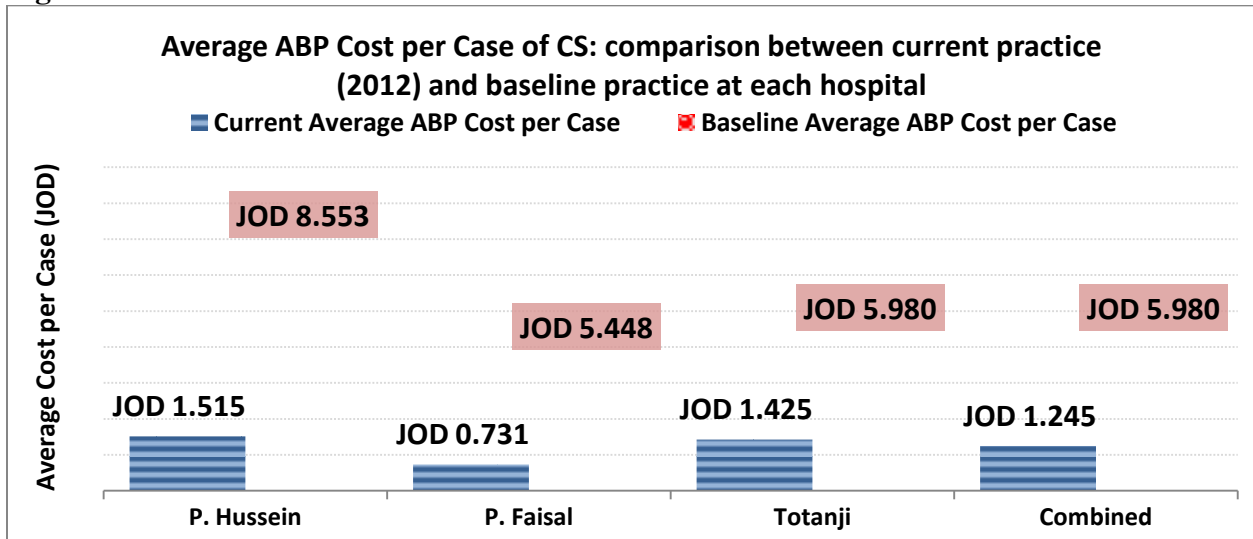


Figure 29 shows the percent decrease in average ABP cost per case (2012) from baseline cost per hospital as well as combined for all the three hospitals. When compared with the baseline costs, the use of new protocols shows a saving of Jordanian Dinars 10,905 (approximately US Dollars 15,397) for the 2,303 CS Log-documented cases in 2012 (Figure 30).

Figure 29

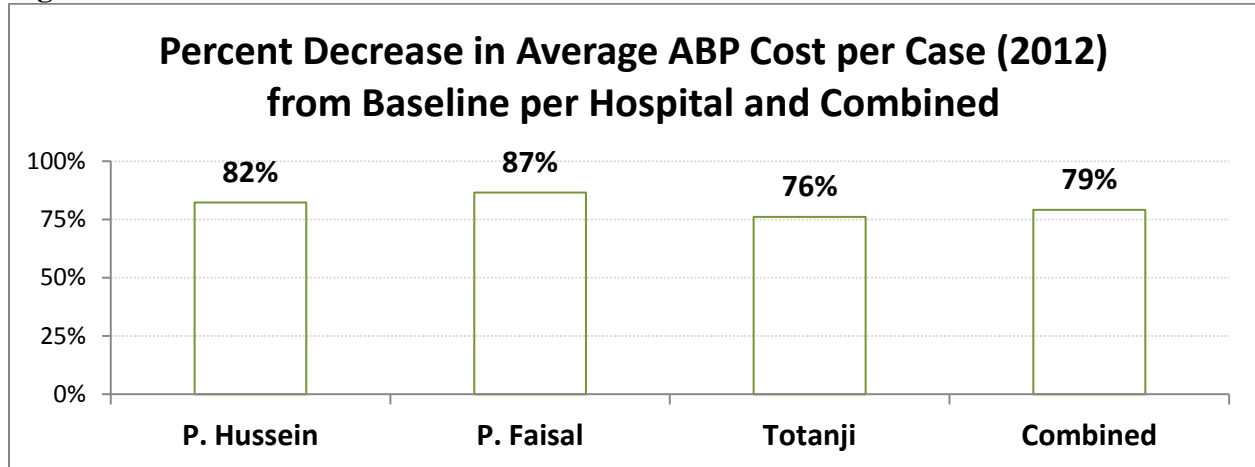
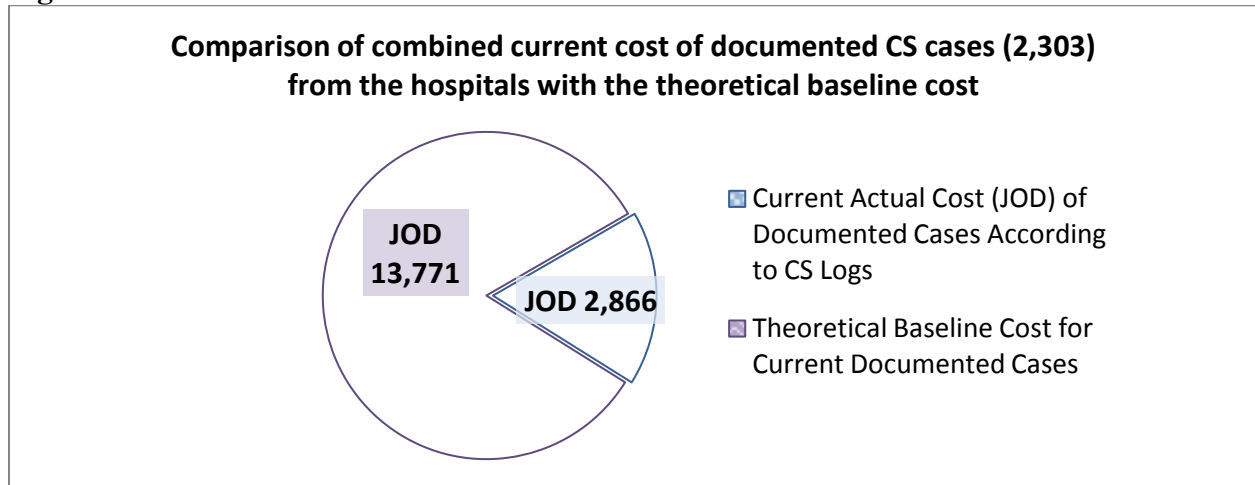
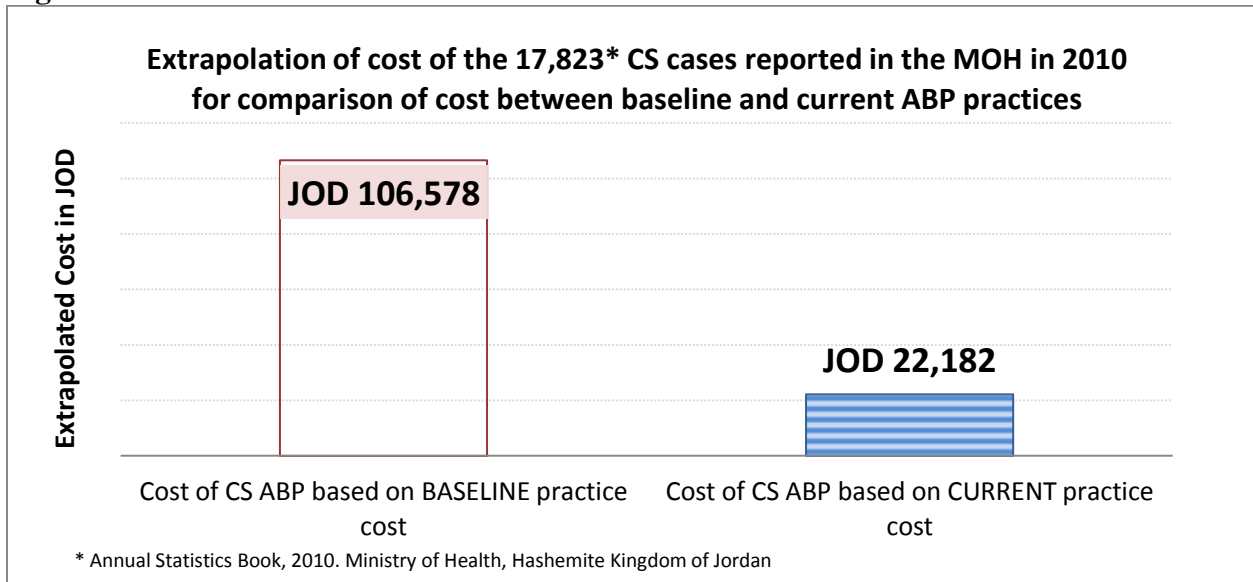


Figure 30



Previous to the CS ABP Pilot Program in Jordan, the MOH did not have any data regarding cost of antibiotics used in any specific area of practice. The baseline analysis and profiling in the three MOH hospitals provided a good point of reference. In its Annual Statistics Book of 2010, the MOH's reported nearly 18 thousand cases of CS in its hospitals. The indicator cost data produced by the CS ABP Pilot Program provides a powerful tool for the MOH, enabling it to create good estimates of potential savings. In extrapolating the numbers observed in the Pilot Program onto the total number of yearly CS cases reported through the MOH, substantial potential savings can be observed (Figure 31).

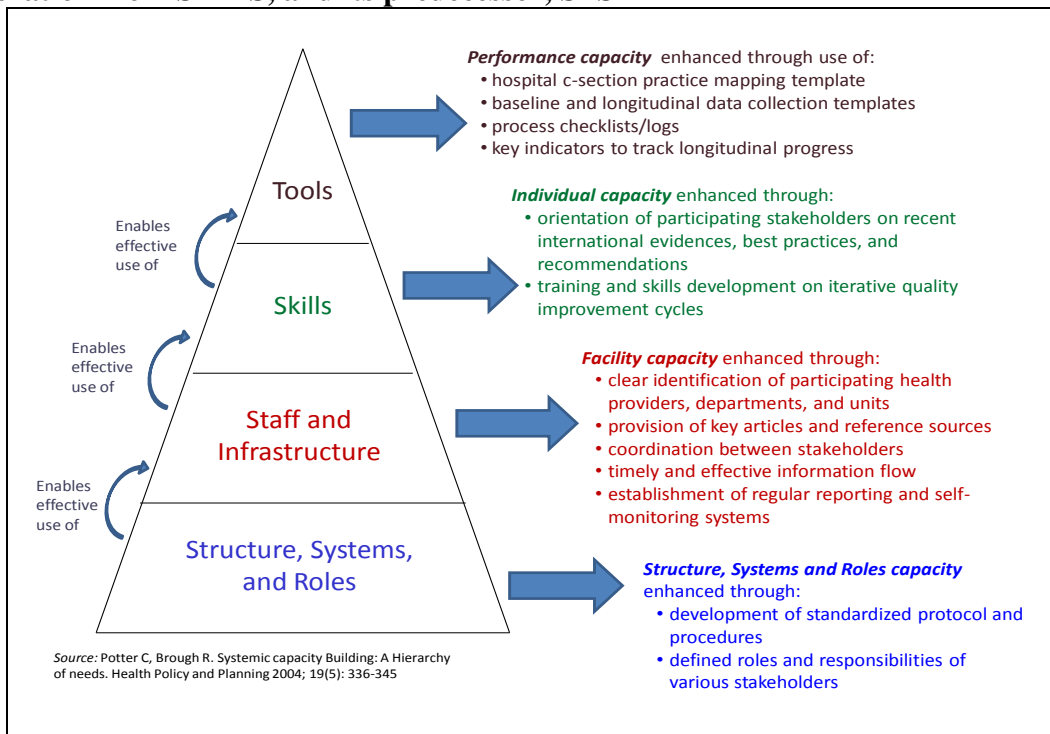
Figure 31



Local Capacity-Building and Health System Strengthening

Through technical assistance for the pilot program on improving ABP in CS, SIAPS and its predecessor SPS were able to build local capacity and lead to health system strengthening (HSS). As Figure 32 shows, the pilot program helped build local capacity by strengthening the various inter-related components of the capacity-building pyramid.

Figure 32: Capacity Building in the MOH, and MOH Hospitals through technical collaboration from SIAPS, and its predecessor, SPS



As SIAPS places special emphasis on ‘systems thinking,’ the program paid attention to the dynamics and interactions between the six building-blocks of health system strengthening—medical products, governance, health workforce, information, financing, and service delivery. Table 15 shows how the pilot program addressed these HSS building blocks through the opportunity provided by this pilot program on improving antibiotic prophylaxis in cesarean section.

Table 15: Addressing HSS Building Blocks while working to improve antibiotic prophylaxis in cesarean section in Jordanian hospitals.

Building Block	Achievements
Service Delivery	<ul style="list-style-type: none"> • Development and institutionalization of standardized protocol and procedures for antibiotic prophylaxis in CS both at the hospital and MOH levels • Interdisciplinary effort, and coordination between various health providers, departments, and units • Reduction in inappropriate prophylactic use of antibiotics in terms of selection, timing of use, and number of doses • Pharmaceutical care, and patient follow-up through telephone call for surgical site infections (SSI) • Contribution to the hospital accreditation process. Supported the Health Care Accreditation Council’s 2012 National Quality & Safety (NQS) Goals, one of which is “appropriate use of prophylactic antibiotic during surgery” • Expansion and application of the approach in other surgical procedures (the approach is now being used for improving antibiotic prophylaxis in hernia surgery)
Human Resources	<ul style="list-style-type: none"> • Orientation of participating stakeholders on recent international evidences, best practices, and recommendations • Staff training and increased capacity • Skills development on continuous quality improvement cycles
Information	<ul style="list-style-type: none"> • Key indicators agreed on and longitudinally tracked • Use of system strengthening worksheet, C-section log, and Excel monitoring tool
Medical Products	<ul style="list-style-type: none"> • Availability of the prophylactic antibiotic of choice (cefazolin) for use at the hospitals (not available when the program started)
Financing	<ul style="list-style-type: none"> • Reduction in cost of antibiotic prophylaxis
Leadership/Stewardship/ Governance	<ul style="list-style-type: none"> • Defined roles of various stakeholders through the protocol/procedures • Activation and engagement of DTCs & Infection Control Committees

Contribution to the Goals and Results Areas of Jordan Government, USAID, and Global Initiatives

The Jordan Program's technical objective contributed to Element 1.6 (MCH) of the U.S. Government's FAR Framework for Health (Investing in People), which represents a priority area for USAID/Jordan. It also supported the Millennium Development Goal #5 in improving maternal health. Further, this program contributed to the 2007 World Health Assembly (WHA) Resolution (A60.24) which urges member states to implement rational medicine use activities to help contain antimicrobial resistance. Additionally, the technical objective complemented several goals of the current Global Health Initiative (GHI), such as contributing to approaches that support women's health, building sustainability through health system strengthening (HSS), improving metrics and monitoring, increasing impact through strategic coordination, and encouraging country ownership.

By taking a deliberate 'systems thinking' approach, the Jordan program contributed to all the SIAPS Intermediate Results (IRs)—IR1 (governance), IR2 (pharmaceutical management capacity), IR3 (information), IR4 (financing), and IR5 (pharmaceutical services).

Lessons Learned

- Local stakeholders get motivated, coordinate and participate to organize and improve practice if they are supported with international and local evidence, clarity of purpose, locally contextualized approaches and tools, and follow-up technical support.
- When developed and implemented strategically adhering to the principles of evidence-based medicine, local relevance and feasibility, transparency, participation, and clarity in the roles and responsibilities of the various involved stakeholders, treatment or prophylaxis guidelines/protocols standardize and improve pharmaceutical services and also save costs without compromising the quality of care.
- CQI is a methodology that encourages and supports incremental changes within the context of the existing environment and is thus highly relevant and practically useful to implement in resource-limited settings.
- Opportunities provided by the implementation of specific and discrete activities can be advantageously used to support wider health systems strengthening if they are designed and implemented with such a system-oriented focus in mind.

CONCLUSION

In conclusion, the pilot program for improving antibiotic prophylaxis in CS in Jordanian hospitals led to local capacity-building, health system strengthening, improved performance and service delivery, and a move toward sustainability. The following evidences support this conclusion:

- *Evidence-based and standardized care* for mothers undergoing CS through high levels of compliance to locally agreed protocol and procedures based on international evidence and best practices, and *cost savings* through avoidance of unnecessary doses of prophylactic antibiotics. These benefits were achieved without increase in surgical site infections.
- *Support for AMR containment* through judiciousness and stewardship in the use of antibiotics for prophylaxis in surgery.
- *Improved pharmaceutical care* as a result of a common context and platform that the program offered for various stakeholders and committees to collaborate and work together.
- *Enhanced capacity and coordination* of various departments (e.g., OBGY, Anesthesia, Nursing, pharmacy) and committees (e.g. Pharmacy and Therapeutics Committee, Infection Control Committee) to develop and implement interventions to improve use of antibiotics.
- Support of the hospital administration and *official approval* of the protocol and procedures
- Implementation of a locally contextualized approach and methodology, including *the use of customized tools*, to support *medicine use review* or practice audit. Institutionalization of the culture of *continuous quality improvement* through a process of periodic reviews and analysis of indicator-based data, and small-scale incremental improvements.
- *Program sustainability* through integration of the approach within the context of the existing routine clinical practice; use of simple and locally customized tools; involvement and capacity enhancement of multi-disciplinary groups of stakeholders; local ownership; improved coordination between the participating hospitals and MOH; and use of a unified CS ABP protocol approved and mandated by MOH for use at all MOH hospitals providing OBGY care.
- *Broader positive system impact beyond the direct objectives of the program for CS* as evidenced by replication or expansion of the model for another surgical procedure (hernia).
- Contribution to the *hospital accreditation* process. Supported the Health Care Accreditation Council's 2012 National Quality & Safety (NQS) Goals, one of which is "appropriate use of prophylactic antibiotic during surgery".
- Improved pharmaceutical services through availability of the prophylactic antibiotic of choice (cefazolin) for use at the hospitals (not available when the program started)
- *Improved quality of MCH care* in hospitals, contributing to national, USAID, and other global initiative goals.

ANNEX A: BASELINE DATA RELATING TO CESAREAN SECTION ANTIBIOTIC PROPHYLAXIS IN THE THREE MOH HOSPITALS

Prince Hussein Hospital: Baseline Data Relating to Cesarean Section Antibiotic Prophylaxis



Current Practices of Cesarean Section Antibiotic Prophylaxis: Prince Hussein Hospital

Salah Gammouh, Terry Green, Mohan P. Joshi, Sheena Patel

Cesarean Section Antibiotic Prophylaxis: Protocol and Procedure Development Workshops Amman, Jordan, April 24-May 2, 2011

Organized by Jordan MOH, RMS and JFDA in collaboration with MSH/SPS

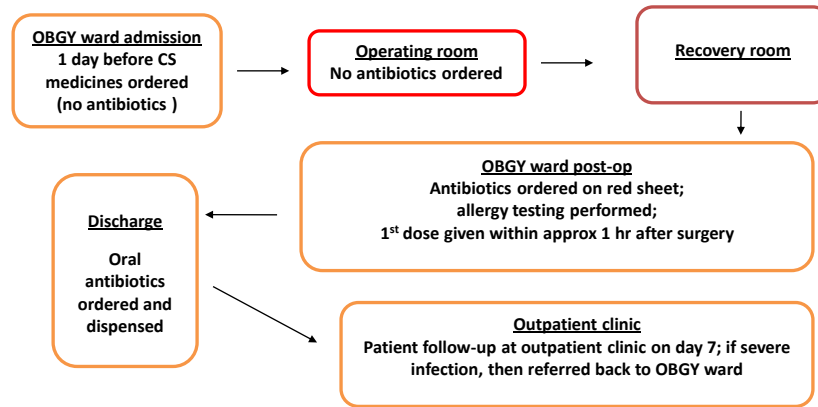
For better health worldwide

Objectives

- Review procedures for providing antibiotic surgical prophylaxis
- Discuss current antibiotic regimens used at Prince Hussein Hospital
- Discuss strengths, weaknesses, potential problems in administering antibiotic prophylaxis



Current Practices of Antibiotic Surgical Prophylaxis: Prince Hussein Hospital



CS – Cesarean section; OBGY – Obstetrics gynecology
CPP – Comprehensive post-partum



Current Practices of Antibiotic Surgical Prophylaxis: Pre-Op Procedures (1)

- Surgical prep sheet is created (checklist)
 - Surgical prep is conducted per procedures
- Surgeon orders pre-op medicines (red sheet)
 - No antibiotics are typically ordered pre-operatively



Current Practices of Antibiotic Surgical Prophylaxis, Pre-Op Procedures (2)

- Medicines orders are transcribed daily onto a pharmacy order sheet
 - Pharmacy orders sent daily
 - No patient specific delivery

- Medication administration record created (green sheet)
 - Utilized by nursing
 - Records and sets time schedule for dose administration



Current Practices of Antibiotic Surgical Prophylaxis: Surgery

- Anesthetist or surgeon records on designated sheet
 - Anesthetist records on yellow sheet
 - Surgeon records on surgical note sheet
 - Surgery “start” and “end” times not consistently recorded
 - Time of incision – not recorded
 - Time of cord clamping – not recorded
 - No antibiotics administered during surgical procedure

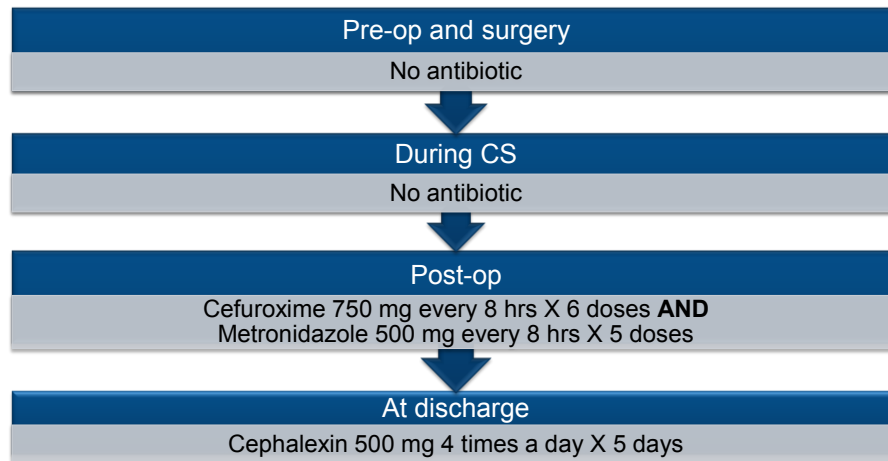


Current Practices of Antibiotic Surgical Prophylaxis: Post-Op

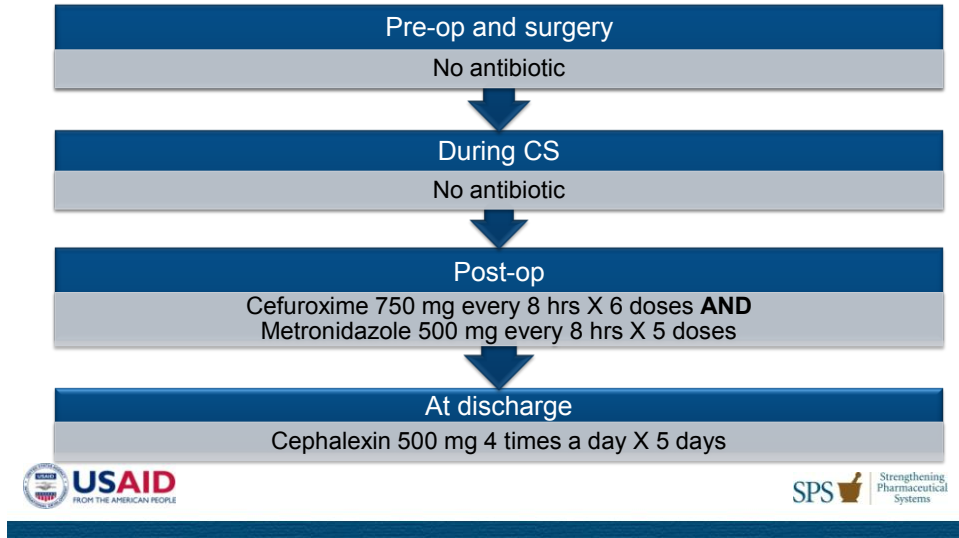
- Surgeon orders antibiotics post-operatively (red sheet)
- Medication order sent to pharmacy and prepared by pharmacist
- Allergy testing performed for all antibiotics ordered prior to any doses administered to patient
- Nursing administers first dose in OBGY ward, usually within 1 hour after the surgical procedure
- Medicines recorded on medication order sheet (green sheet); actual times for medication administration are recorded but not consistently



Current Practices of Antibiotic Surgical Prophylaxis: Most Common Regimen at Prince Hussein (6)



Current Practices of Antibiotic Surgical Prophylaxis: Most Common Regimen at Prince Hussein (6)



Current Practices of Antibiotic Surgical Prophylaxis: Discharge Procedures

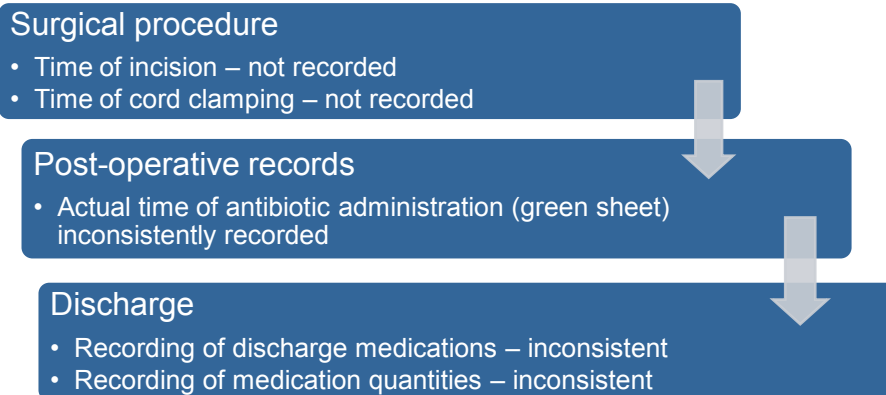
- Discharge medication counseling provided inconsistently
- Follow-up visit scheduled at outpatient clinic for day 7
 - Follow-up visit not recorded in outpatient charts
 - Many patients do not return to hospital for follow up as they are transfer cases

Surveillance of Post-Operative Infections for CS

No surveillance program is available to detect and monitor surgical site infections (SSI) from CS procedures



Summary of Antibiotic Surgical Prophylaxis Documentation Issues/Problems



Baseline Data for Prince Hussein Hospital (Sept 15–Oct 14, 2010)

Record-keeping data	Number	Percentage
Total number of CSs	70	-
Number of elective	40	57%
Number of non-elective	30	43%
Time of incision recorded	12	17%
Time of cord clamping recorded	0	0
Medication administration record available?	70	100%
Anesthesia record available?	51	73%



Baseline Data for Prince Hussein Hospital: Antibiotic Cost* Data

Data	Cefuroxime 750 mg IV	Ampicillin 1 gm IV	Metronidazole 500 mg IV	Cephalexin 500 mg
Total number of cases receiving the drug	70	2	53	2
Total doses	460	5	258	11
Avg. number of doses	6.6	2.5	4.9	5.5
Unit cost – drug	0.699	0.4	0.5	0.047
Total cost – drug	321.54	2	129	0.517
Unit cost – supplies	0.144	0.144	0.2	0
Total cost – supplies	66.240	0.720	51.600	0.000
Total cost	387.780	2.720	180.600	0.517
Average cost/case	5.540	1.360	3.408	0.259

Avg. cost/case for the most common regimen (cefuroxime + metro) = 8.95
 Avg. cost/case for the 2nd most common regimen (Cefuroxime) = 5.54



*All cost listed are JD



Baseline Data for Prince Hussein Hospital – Antibiotic Regimens Used

Antibiotic Regimens	Dose	Avg. number of doses	Cost (drug and supplies to administer)
Cefuroxime Metronidazole	750 mg (IV) 500 mg (IV)	6.0 4.9	8.95 JD per case (avg.) (for 2 drugs)
			626.5 JD for 1 month (if used for all 70 patients)
Cefuroxime	750 mg (IV)	6.6	5.54 JD per case (avg.)
			387.8 JD (if used for all 70 patients)



Baseline cost data – comparison with international regimen

- Cost of prophylaxis using Cefuroxime 750 mg IV every 8 hrs and Metronidazole 500 mg every 8 hrs (most prominent regimen used)
 - = 8.95 JD per patient and
 - = 626.5 JD for 70 patients
- If the most commonly recommended international regimen (cefazolin 1 gm IV x 1 dose) is used, then the cost for prophylaxis would be:
 - = 0.79 JD per patient and
 - = 55.30 JD for 70 patients

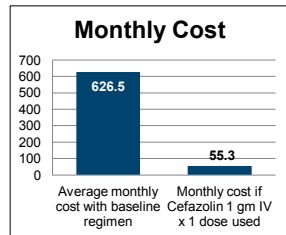
Cost savings for cefazolin regimen = 8.16 JD per patient and 571.2 JD for 70 patients during this 1 month period

For 12 months = 6,854.4 JD cost savings

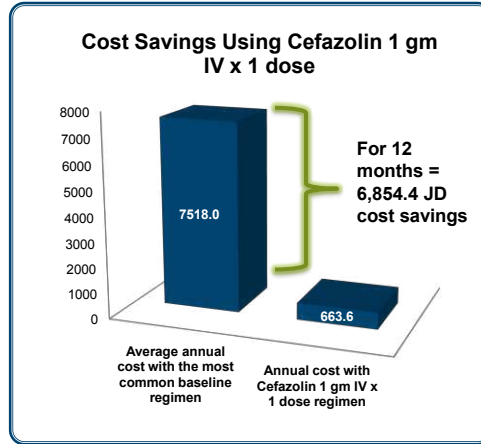
This represents a 11 fold cost difference between the 2 protocols



Baseline cost data – comparison with international regimen



*Cost is for 70 patients/month



Strengths of Current System and Practices

- High-quality surgical and nursing staff
- Committed staff in each department, with good inter-departmental communication
- Hospital infrastructure for surgical procedures including the overall availability of medical supplies, drugs, and equipment



Weaknesses of Current System and Practices

- Unnecessary antibiotics administered
- Unnecessary doses administered
- First dose administered after CS procedure, decreasing effectiveness
- Insufficient documentation of antibiotics ordered, administered, and dispensed
- No surveillance system of SSI



International Evidence and Local Practice

Antibiotic prophylaxis	Does the local practice match with the current best international evidence & recommendations?
Antibiotic choice and dose	No
Timing of administration	No
Duration of prophylaxis	No



Possible Risks of Current Practices

- Increased risk of nosocomial infections secondary to delayed administration of first dose
- Increased risk of adverse drug reactions from multiple drugs and doses
- Increased risk for the development of antimicrobial resistance (AMR)



Waste of Resources with Current Practices

- Increased nursing time to prepare and administer drugs; time could be used for other patient care duties
- High cost of excess antibiotic administration
 - Drug costs
 - Medical supplies
 - Syringe, needle, IV infusion bags/bt, IV admin sets, etc
 - Nursing and pharmacy time



Potential Opportunities to Improve Existing System (1)

Issues

- Multiple antibiotics administered
- Multiple doses administered
- First dose administered after cesarean section procedure decreasing effectiveness

Solutions: Evidence shows that—

- 1 antibiotic is sufficient for prophylaxis
- 1-2 doses is sufficient to provide prophylaxis; giving more than 2 has little additional benefit
- Giving the 1st dose before surgical incision (within 60 minutes) produces much better outcomes



Potential Opportunities to Improve Existing System (2)

Issues

- Insufficient documentation of antibiotics ordered, administered, and dispensed
- Mechanism of SSI surveillance does not exist

Solutions

- Minor changes in policies can help document the process of administering prophylactic antibiotics
- Setting up an SSI surveillance mechanism will help improve CS and other surgical procedures



Summary (1)

- Surgical antibiotic prophylaxis consists of administering multiple antibiotics post-operatively and continuing for 5-6 doses
- Patients receive oral antibiotics at discharge
- Many antibiotics and doses are unnecessary
- More effective regimens could be utilized, rather than administration of 1st dose after surgical procedure

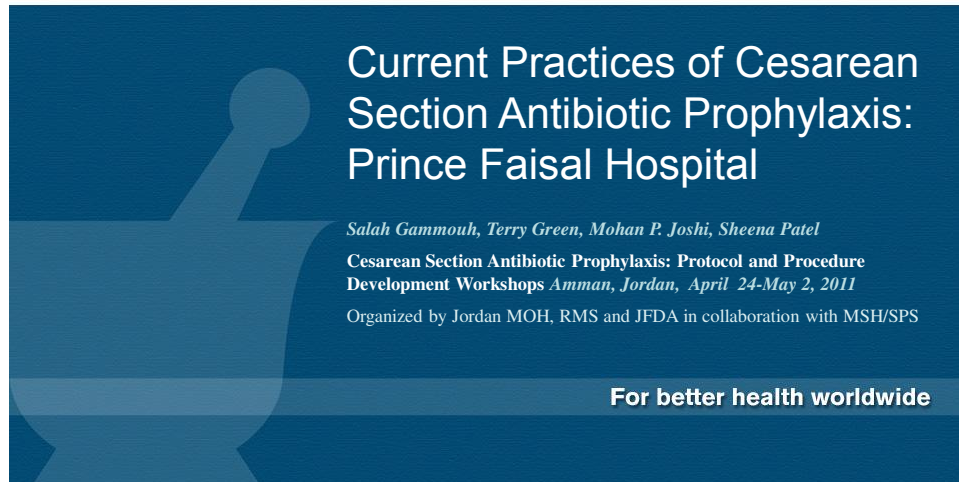


Summary (2)

- Opportunities exist to improve health care
 - Reduce the risk of post-operative infections through development of evidence-based, but locally suitable prophylaxis protocol and procedures
 - Decrease adverse drug reactions (ADRs)
 - Slow the emergence of antimicrobial resistance (AMR)
 - Substantial savings of nursing time that can be used for other OB activities
 - Substantial savings in medicine, medical supply, nursing, and pharmacy cost



Prince Faisal Hospital: Baseline Data Relating to Cesarean Section Antibiotic Prophylaxis

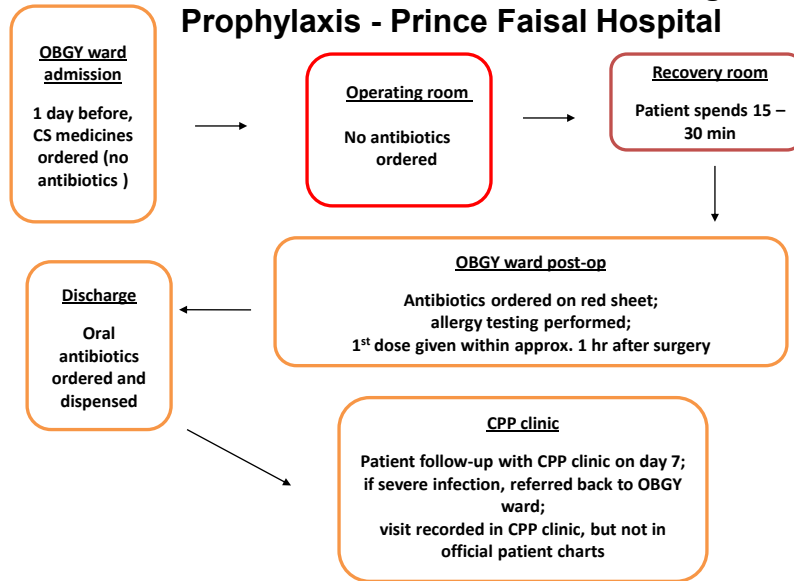


Objectives

- Review procedures for providing antibiotic surgical prophylaxis
- Discuss current antibiotic regimen used at Prince Faisal Hospital
- Discuss strengths, weaknesses, potential problems in administering antibiotic prophylaxis



Current Practices of Antibiotic Surgical Prophylaxis - Prince Faisal Hospital



CS – Cesarean Section OBGY – Obstetrics Gynecology
CPP- Comprehensive Post-partum



Current Practices of Antibiotic Surgical Prophylaxis: Pre-Op Procedures (2)

- Surgical prep sheet is created (checklist)
 - Surgical prep is conducted per procedures
- Surgeon orders pre-op medicines (red sheet)
 - No antibiotics are typically ordered pre-operatively



**Current Practices of Antibiotic Surgical Prophylaxis:
Pre-Op Procedures (3)**

- Medicines orders are transcribed daily onto a pharmacy order sheet
 - Pharmacy orders sent daily
 - No patient specific delivery
- Medication administration record created (green sheet)
 - Utilized by nursing
 - Records and sets time schedule for dose administration



**Current Practices of Antibiotic Surgical Prophylaxis:
Surgery (4)**

Anesthetist or surgeon records on designated sheet

- Anesthetist records on yellow sheet
- Surgeon records on surgical note sheet
 - Surgery “start” and “end” times recorded, but not consistently
 - Time of incision – not recorded
 - Time of cord clamping – not recorded
- No antibiotics administered during surgical procedures



Current Practices of Antibiotic Surgical Prophylaxis: Post-Op (5)

- Surgeon orders antibiotics post-operatively (red sheet)
- Medication order sent to pharmacy and prepared by pharmacist
- Allergy testing performed for all antibiotics ordered prior to any doses administered to patient
- Nursing administers first dose in OBGY ward, usually within 1 hour after the surgical procedure
- Medicines recorded on medication order sheet (green sheet) - actual times for medication administration are recorded but not consistently



Current Practices of Antibiotic Surgical Prophylaxis: Post-Op (5)

- Surgeon orders antibiotics post-operatively (red sheet)
- Medication order sent to pharmacy and prepared by pharmacist
- Allergy testing performed for all antibiotics ordered prior to any doses administered to patient
- Nursing administers first dose in OBGY ward, usually within 1 hour after the surgical procedure
- Medicines recorded on medication order sheet (green sheet) - actual times for medication administration are recorded but not consistently



Current Practices of Antibiotic Surgical Prophylaxis: Discharge Procedures (7)

- Patients are discharged from hospital, typically 2 days after CS
- Discharge antibiotics are ordered for most patients for a total of 7 days
 - Not all discharge medicines are recorded in medical record
 - Quantities of discharge medicines are not consistently recorded



Current Practices Of Antibiotic Surgical Prophylaxis: Discharge Procedures (8)

- Discharge medication counseling is provided inconsistently
- Follow-up visit is scheduled at CPP clinic for day 7
- Patient keeps copy of discharge summary
- Follow-up visit recorded, but not in patients' records

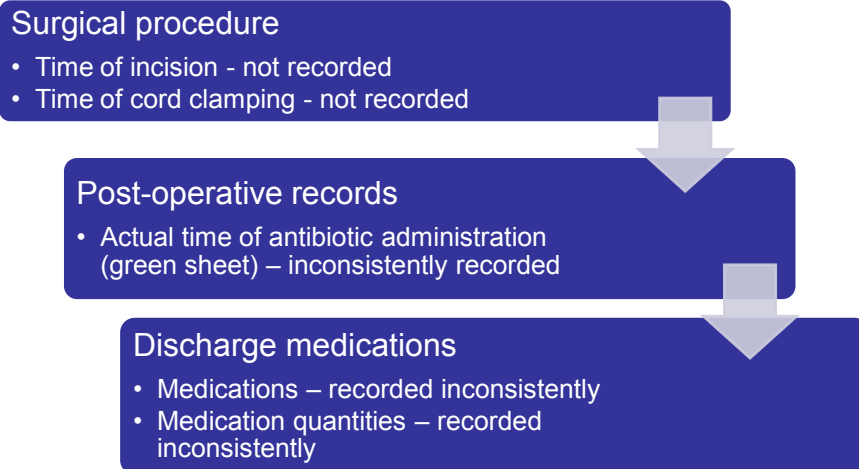


Surveillance of Post-Operative Infections for CS

No surveillance program is available to detect and monitor surgical site infections (SSI) from CS procedures



Summary of Antibiotic Surgical Prophylaxis Documentation Issues/Problems



Baseline Data for Prince Faisal Hospital Sept 15-Oct 14, 2010

Record-keeping data	Number	Percentage
Total number of CSs	76	-
Number of elective	52	68%
Number of non-elective	24	32%
Time of incision recorded	20	26%
Time of cord clamping recorded	0	0
Time of admin of 1 st dose of prophylactic antibiotic recorded	64	84%
Medication Administration Record available	76	100%
Anesthesia Record available	50	66%



Baseline Data for Prince Faisal Hospital: Antibiotic Cost* Data

Data	Cefuroxime 750 mg IV	Cefuroxime 1.5 gm IV	Ampicillin 1 gm IV	Gentamicin 80 mg IV	Metronidazole 500 g IV	Metronidazole 500 mg PO	Cephalexin 500 mg
Total # of cases receiving the drug	25	4	50	5	67	1	26
Total doses	91	11	290	16	231	3	105
Avg. # of doses	3.6	2.8	5.8	3.2	3.4	3.0	4.0
Unit cost-drug	0.65	1.048	0.29	0.115	0.484	0.025	0.037
Total cost-drug	59.15	11.528	84.1	1.84	111.804	0.075	3.885
Unit cost supplies	0.144	0.144	0.144	0.144	.200	-	-
Total cost-supplies	13.104	1.584	41.760	2.304	46.200	-	-
Total cost	72.25	13.112	125.86	4.144	158.00	0.075	3.885
Average cost/case	2.89	3.28	2.52	0.829	2.36	0.075	0.15

Avg. cost/case for the most common regimen (Amp + Metro.) = 4.88 JD
Avg. cost/case for the 2nd most common regimen (Cefuroxime + Metro.) = 5.25 JD



* All cost listed are in JD



Baseline Data for Prince Faisal Hospital: Antibiotic Regimens Used

Antibiotic Regimens	Dose	Avg. number of doses	Cost (drug and supplies to administer)
Ampicillin Metronidazole	1 gm IV every 8 hrs 500 mg IV every 8 hrs	5.8 3.4	4.88 JD per case (avg.) (for 2 drugs) 370.88 JD for 1 month (if used for all 76 cases)
Cefuroxime Metronidazole	750 mg IV every 8 hrs 500 mg IV every 8 hrs	3.6 3.4	5.25 JD per case (avg.) (for 2 drugs) 399.0 JD for 1 month (if used for all 76 patients)



Baseline cost data – comparison with international regimen

- Cost of prophylaxis using Ampicillin 1 gm every 6 hrs and Metronidazole 500 mg every 8 hrs (most prominent regimen used)
 - = 4.88 JD per patient and
 - = 370.88 JD for 76 patients
- If the most commonly recommended international regimen (cefazolin 1 gm IV x 1 dose) is used, then the cost for prophylaxis would be:
 - = 0.79 JD per patient and
 - = 60 JD for 76 patients

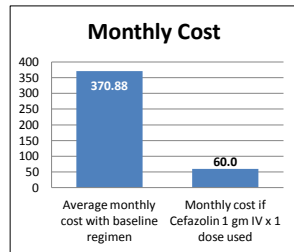
Cost savings for cefazolin regimen = 4.09 JD per patient and 310.84 JD for 76 patients during this 1 month period

For 12 months = 3,730.56 JD cost savings

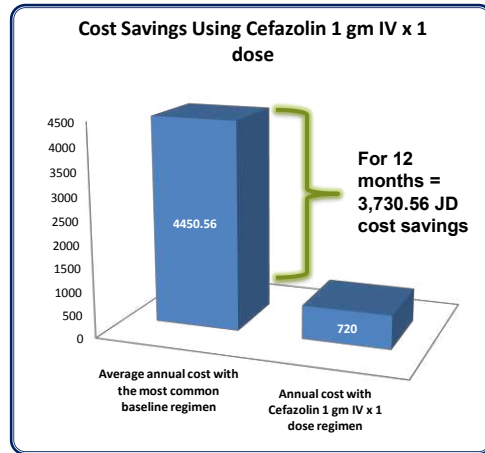
This represents a 6 fold cost difference between the 2 protocols



Baseline cost data – comparison with international regimen



*Cost is for 76 patients per month



Strengths of Current System and Practices

- High-quality surgical and nursing staff
- Committed staff in each department, with good inter-departmental communication
- Hospital infrastructure for surgical procedures including the overall availability of medical supplies, drugs, and equipment



Weaknesses of Current System and Practices

- Multiple antibiotics administered
- Unnecessary doses administered
- First dose administered after CS procedure, decreasing effectiveness
- Insufficient documentation of antibiotics ordered, administered, and dispensed
- No surveillance system of SSI



International evidence and local practice

Antibiotic prophylaxis	Does the local practice match with the current best international evidence & recommendations?
Antibiotic choice and dose	No
Timing of administration	No
Duration of prophylaxis	No



Possible Risks of Current Practices

- Increased risk of nosocomial infections secondary to delayed administration of first dose
- Increased risk of adverse drug reactions from multiple drugs and doses
- Increased risk for the development of AMR



Waste of Resources with Current Practices

- Increased nursing time to prepare and administer drugs; time could be used for other patient care duties
- High cost of excess antibiotic administration
 - Drug costs
 - Medical supplies
 - Syringe, needle, IV infusion bags/bt, IV admin sets, etc
 - Nursing and Pharmacy time



Potential Opportunities to Improve Existing System

Issues

- Multiple antibiotics administered
- Multiple doses administered
- First dose administered after CS procedure, decreasing effectiveness

Solutions: evidence shows that—

- 1 antibiotic is sufficient for prophylaxis
- 1-2 doses is all that is needed to provide prophylaxis; multiple doses has little additional benefit
- Recent high level evidence shows that giving the 1st dose before surgical incision (within 60 minutes) produces much better outcomes



Potential Opportunities to Improve Existing System (2)

Issues

- Insufficient documentation of antibiotics ordered, administered, and dispensed
- Surveillance of Surgical Site infections does not exist

Solutions

- Minor changes in policies can improve documentation
- Setting up a SSI surveillance mechanism will help improve CS and other surgical practices



Summary

- Surgical antibiotic prophylaxis consists of administering multiple antibiotics post-operatively and continuing for 3-6 doses
- Patients receive oral antibiotics at discharge
- Many antibiotics and doses are unnecessary
- Administration of 1st dose is after surgical procedure, more effective regimens could be utilized

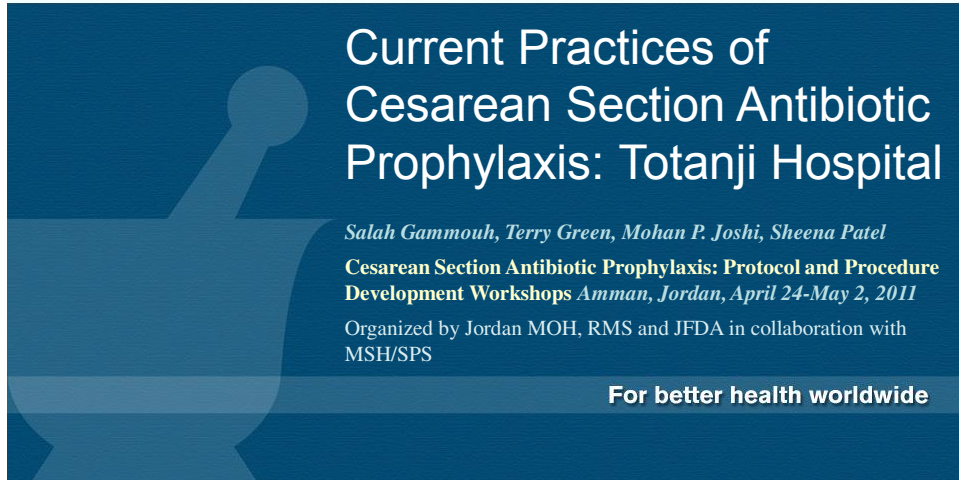


Summary (2): Opportunities Exist to Improve Health Care

- Reduce the risk of post-operative infections through development of evidence-based, but locally suitable, prophylaxis protocol and procedures
- Decrease adverse drug reactions (ADRs)
- Slow the emergence of antimicrobial resistance (AMR)
- Substantial savings of nursing time can be used for other OB activities
- Substantial savings in medicine, medical supply, nursing, and pharmacy costs



Totanji Hospital: Baseline Data Relating to Cesarean Section Antibiotic Prophylaxis

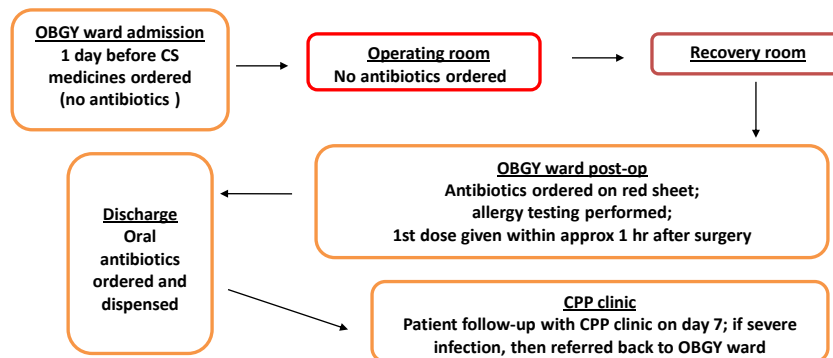


Objectives

- Review procedures for providing antibiotic surgical prophylaxis
- Discuss current antibiotic regimens used at Totanji Hospital
- Discuss strengths, weaknesses, potential problems in administering antibiotic prophylaxis



Current Practices of Antibiotic Surgical Prophylaxis – Totanji Hospital



CS – Cesarean section; OBGY – Obstetrics gynecology
CPP – Comprehensive post-partum



Current Practices of Antibiotic Surgical Prophylaxis: Pre-Op Procedures

- Surgical prep sheet is created (checklist)
 - Surgical prep is conducted per procedures
- Surgeon orders pre-op medicines - red sheet
 - No antibiotics are typically ordered pre-operatively



Current Practices of Antibiotic Surgical Prophylaxis: Pre-Op Procedures

- Medicines orders are transcribed daily onto a pharmacy order sheet
 - Pharmacy orders sent daily
 - No patient specific delivery
- Medication administration record created (green sheet)
 - Utilized by nursing
 - Records and sets time schedule for dose administration



Current Practices of Antibiotic Surgical Prophylaxis: Surgery

- Anesthetist or surgeon records on designated sheet
 - Anesthetist records on yellow sheet
 - Surgeon records on surgical note sheet
 - Surgery “start” and “end” times not consistently recorded
 - Time of incision – not recorded
 - Time of cord clamping – not recorded
- No antibiotics administered during surgical procedure

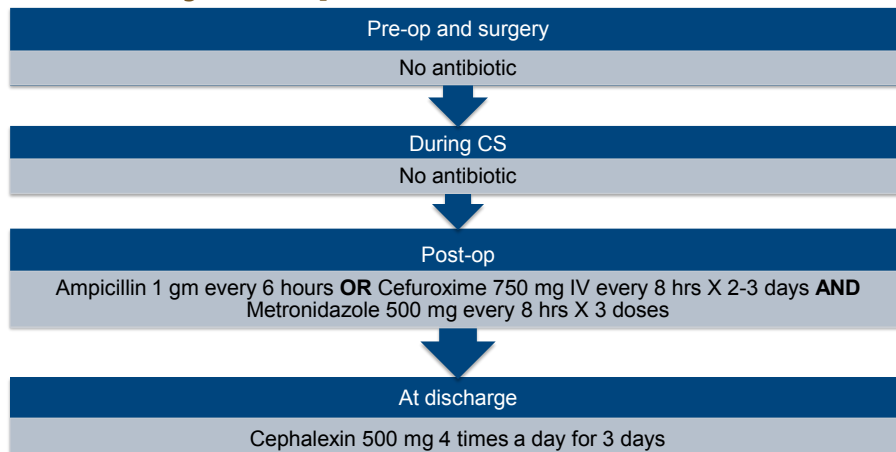


Current Practices of Antibiotic Surgical Prophylaxis: Post-Op

- Surgeon orders antibiotics post-operatively (red sheet)
- Medication order sent to pharmacy and prepared by pharmacist
- Allergy testing performed for all antibiotics ordered prior to any doses administered to patient
- Nursing administers first antibiotic dose in OBGY ward, usually within 1 hour after the surgical procedure
- Medicines recorded on medication order sheet (green sheet) - actual times for medication administration are recorded but not consistently



Current Practices of Antibiotic Surgical Prophylaxis- Most Common Regimen at Totanji Hospital



Current Practices of Antibiotic Surgical Prophylaxis: Discharge Procedures

- Patients are discharged from hospital, typically 2 days after CS
- Discharge antibiotics are ordered for most patients for 3 days
 - Not all discharge medicines are recorded in medical record
 - Quantities of discharge medicines not consistently recorded
 - Discharge medication counseling not provided consistently
- Follow-up visit is scheduled at CPP clinic for day 7

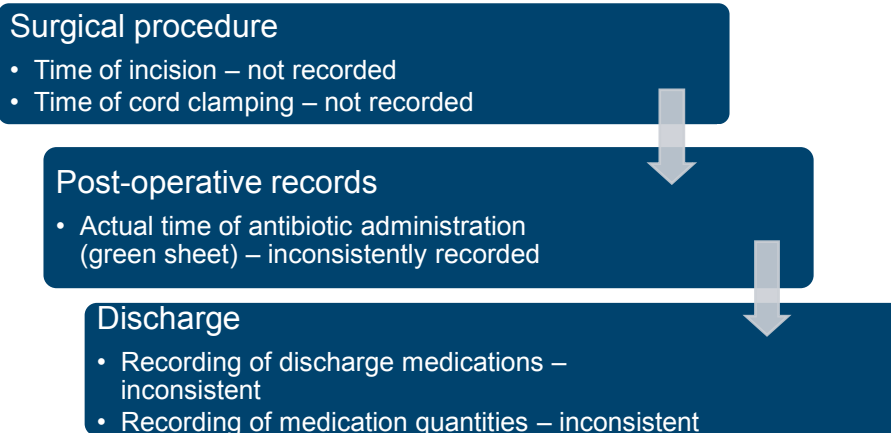


Surveillance of Post-Operative Infections for CS

- Totanji Hospital has a surveillance program that tracks surgical site infections (SSI)
- SSI surveillance not connected directly with outpatient clinic at follow-up
- Patients are monitored as follows:
 - During hospital admission
 - Follow up visit at CPP checks
 - Phone call to patient 1 month after discharge to check for signs and symptoms



Summary of Antibiotic Surgical Prophylaxis Documentation Issues/Problems



Baseline Data for Totanji Hospital (Sept 15–Oct 14, 2010)

Record-keeping data	Number	Percentage
Total number of CSs	89	-
Number of elective	43	48%
Number of non-elective	46	52%
Time of incision recorded	19	21%
Time of cord clamping recorded	0	0
Medication administration record available?	89	100%
Anesthesia record available?	1	1%



Baseline Data for Totanji Hospital: Antibiotic Cost* Data

Data	Cefuroxime 750 mg IV	Ampicillin 1 gm IV	Gentamicin 80 mg IV	Metronidazole 500 mg IV	Cephalexin 500 mg
Total number of cases receiving the drug	1	87	4	89	63
Total doses	2	361	20	249	244
Avg. number of doses	2.0	4.1	5.0	2.8	3.9
Unit cost –drug	0.699	0.406	0.115	0.495	0.037
Total cost –drug	1.398	146.566	2.3	123.255	9.028
Unit cost– supplies	0.144	0.144	0.144	0.2	0
Total cost–supplies	0.288	51.984	2.880	49.800	0.000
Total cost	1.686	198.550	5.180	173.055	9.028
Average cost/case	1.686	2.282	1.295	1.944	0.143

Avg. cost/case for the most common regimen (ampi + metro) = 4.22

Avg. cost/case for the 2nd most common regimen (ampi + metro + genta) = 5.52



*All cost listed are JD



Baseline Data for Totanji Hospital – Antibiotic Regimens Used

Antibiotic Regimens	Dose	Avg. number of doses	Cost (drug and supplies to administer)
Ampicillin Metronidazole	1 gm IV every 6 hrs 500 mg IV every 8 hrs	4.1 2.8	4.22 JD per case (avg.) 375.58 JD for 1 month (if used for all 89 cases)
Ampicillin Metronidazole Gentamicin	1 gm IV every 6 hrs 500 mg IV every 8 hrs 80 mg IV	4.1 2.8 5.0	5.52 JD per case (avg.) 491.28 JD for 1 month (if used for all 89 cases)



Baseline cost data – comparison with international regimen

- Cost of prophylaxis using Ampicillin 1 gm IV every 6 hrs and Metronidazole 500 mg every 8 hrs (most prominent regimen used)
 - = 4.22 JD per patient and
 - = 375.58 JD for 89 patients
- If the most commonly recommended international regimen (cefazolin 1 gm IV x 1 dose) is used, then the cost for prophylaxis would be:
 - = 0.79 JD per patient and
 - = 70.31 JD for 89 patients

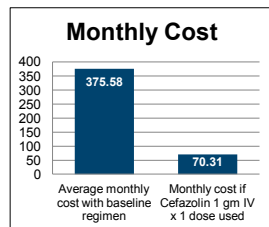
Cost savings for cefazolin regimen = 3.43 JD per patient and 305.27 JD for 89 patients during this 1 month period

For 12 months = 3,663.24 JD cost savings

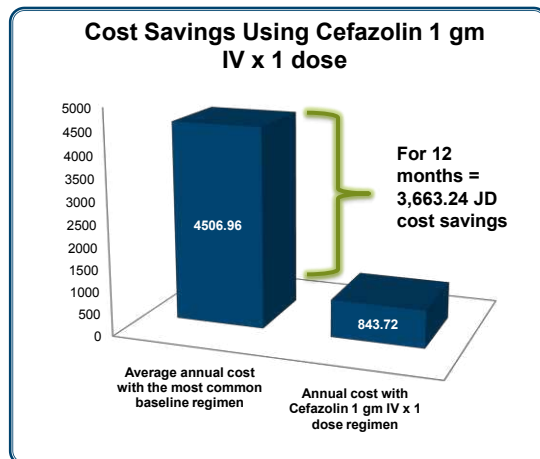
This represents a 5 fold cost difference between the 2 protocols



Baseline cost data – comparison with international regimen



*Cost is for 89 patients/month



Strengths of Current System and Practices

- High-quality surgical and nursing staff
- Hospital infrastructure for surgical procedures including the overall availability of medical supplies, drugs, and equipment
- SSI surveillance system in place
- Committed staff in each department, with good inter-departmental communication



Weakness in the Current Prophylactic Antibiotic Use Practice

- Unnecessary antibiotics administered
- Unnecessary doses administered
- First dose administered after CS procedure, decreasing effectiveness
- Insufficient documentation of antibiotics ordered, administered and dispensed
- Insufficient follow-up determining infection rates and analyzing sensitivity data



International Evidence and Local Practice

Antibiotic prophylaxis	Does the local practice match with the current best international evidence & recommendations?
Antibiotic choice and dose	No
Timing of administration	No
Duration of prophylaxis	No



Possible Risks of Current Practices

- Increased risk of nosocomial infections secondary to delayed administration of first dose
- Increased risk of adverse drug reactions from multiple drugs and doses
- Increase risk for the development of antimicrobial resistance (AMR)



Waste of Resources with Current Practices

- Increased nursing time to prepare and administer drugs; time could be used for other patient care duties

- High cost of excess antibiotic administration
 - Drug costs
 - Medical supplies
 - Syringe, needle, IV infusion bags/bt, IV admin sets, etc
 - Nursing and pharmacy time



Potential Opportunities to Improve Existing System (1)

Issues

- Multiple antibiotics administered

- Multiple doses administered

Solutions

- Evidence clearly states that 1 antibiotic is sufficient for prophylaxis

- Evidence shows that 1-2 doses is all that is necessary to provide prophylaxis; giving more than 2 has little additional benefit



Potential Opportunities to Improve Existing System (2)

Issues

- First dose administered after CS procedure decreasing effectiveness
- Insufficient documentation of antibiotics ordered, administered and dispensed

Solutions

- High-level evidence shows that giving the 1st dose before surgical incision (within 60 minutes) produces much better outcomes
- Minor changes in policies can help document the process of administering prophylactic antibiotics



Summary (1)

- Surgical antibiotic prophylaxis consists of administering multiple antibiotics post-operatively and continuing for 2-3 days
- Patients receive oral antibiotics at discharge
- Many antibiotics and doses are unnecessary
- First dose is administered after surgical procedure, more effective regimens could be utilized



Summary (2)

- Opportunities exist to improve health care
 - Reduce the risk of post-operative infections through development of evidence-based, but locally suitable prophylaxis protocol and procedures
 - Decrease adverse drug reactions (ADRs)
 - Slow the emergence of antimicrobial resistance (AMR)
 - Substantial savings of nursing time that can be used for other OB activities
 - Substantial savings in medicine, medical supply, nursing, and pharmacy costs



ANNEX B: SUMMARY MATRIX OF CURRENT INTERNATIONAL EVIDENCE AND RECOMMENDATIONS ON ANTIBIOTIC PROPHYLAXIS IN CESAREAN SECTION

Antibiotic Prophylaxis in C-Section Synthesized Summary Matrix of Current International Evidence and Recommendations

Related to	Item	Evidence/Recommendation	Key References	Comment
Protocol	Benefit of ABP	Highly beneficial in both elective and non-elective cases in reducing post-CS febrile morbidities, endometritis, wound infections, and serious maternal infectious complications, so highly recommended	<ul style="list-style-type: none"> • Smaill FM and Gyte GML. Cochrane Database of Systematic Reviews 2010, Issue 1. Art. No.: CD007482 • Schalkwyk et al. JOGC, September 2010, No. 247 • SIGN Guideline 104 (antibiotic prophylaxis in surgery), July 2008 	High grade evidence (from meta-analysis or RCT)
Protocol	Antibiotic choice and dose	First generation cephalosporin. Most commonly recommended is cefazolin 1-2 gram IV.	<ul style="list-style-type: none"> • Schalkwyk et al. JOGC, September 2010, No. 247 • ASHP. Draft therapeutic guideline on antimicrobial prophylaxis in surgery, 2010 • Medical Letter. Antibiotic prophylaxis for surgery. June 2009, Vol. 7 (Issue 82) • 	High level evidence (from meta-analysis or RCT)
		ACOG specifically recommends cefazolin over ampicillin as the regimen of choice. Reason – increasing microbial resistance to ampicillin.	<ul style="list-style-type: none"> • ACOG. Obstet Gynecol 2003;102:875-82; • Tita et al. Obstet Gynecol 2009;113:675-82 	
Protocol	Timing of administration	Historically, recommended immediately after cord-clamping. But, based on new findings that show significantly less post-CS infectious morbidities in mothers without negative outcomes in the neonates with pre-incision prophylaxis, recent guidelines have started recommending pre-incision use (15 to 60 minutes prior to skin incision).	<ul style="list-style-type: none"> • Costantine et al. Am J Obstet Gynecol 2008;199:301.e1-6; • Tita et al. Obstet Gynecol 2009;113:675-82 • Schalkwyk et al. JOGC, September 2010, No. 247 • ASHP. Draft therapeutic guideline on antimicrobial prophylaxis in surgery, 2010 • Medical Letter. Antibiotic prophylaxis for surgery. June 2009, Vol. 7 (Issue 82) 	High level evidence (from meta-analysis or RCT)
Protocol	Duration of prophylaxis	<p>A single dose is recommended. No added benefit obtained from multiple doses.</p> <p>An additional dose recommended 3 to 4 hours after the 1st dose if the procedure gets extended beyond 3 hours or blood loss is more than 1500 ml.</p>	<ul style="list-style-type: none"> • Schalkwyk et al. JOGC, September 2010, No. 247 • SIGN Guideline 104 (antibiotic prophylaxis in surgery), July 2008 • Medical Letter. Antibiotic prophylaxis for surgery. June 2009, Vol. 7 (Issue 82) • Fonseca et al. Arch Surg 2006;141:1109-1113 • Hopkins & Smaill. Cochrane database of systematic reviews, 1999, Issue 2. Art. No.: CD001136 	High level evidence (from meta-analysis or RCT)

Abbreviations: ABP – antibiotic prophylaxis; ACOG – American Congress of Obstetricians and Gynecologists; CS – Cesarean section; RCT – randomized control trial

ANNEX C: CURRENT INTERNATIONAL EVIDENCE AND RECOMMENDATIONS ON ANTIBIOTIC PROPHYLAXIS FOR CESAREAN SECTION: POWERPOINT PRESENTATION



Current International Evidence and Recommendations on Antibiotic Prophylaxis for Cesarean Section

Mohan P. Joshi, Salah Gammouh, Terry Green, Sheena Patel

Cesarean Section Antibiotic Prophylaxis: Protocol and Procedure Development Workshops, Amman, Jordan, April 24 to May 2, 2011

Organized by Jordan Ministry of Health, Royal Medical Services, and Jordan Food and Drug Administration in collaboration with SPS

For better health worldwide

Outline

- Provide a brief review of international evidence on antibiotic prophylaxis in cesarean section (CS) with regard to—
 - Selection and dose of the antibiotic
 - Timing of administration
 - Duration of prophylaxis
- Summarize some relevant studies
- Summarize the current international recommendations



Prophylactic Antibiotics Widely Used, Often Inappropriately

- Antimicrobials can account for up to 30% of hospital medicine expenses
- 30 to 50% of antibiotic use in hospitals is for surgical prophylaxis
- 30 to 90% of this prophylaxis is inappropriate
- Most common problems
 - Given at wrong time
 - Continued for too long

Consequences of inappropriate prophylactic antibiotic use:

- Poor outcome
- Increased adverse events
- Increased cost
- Increased drug resistance



Source: Ruttimann et al *CID* 2004;38:348-356.
Munckhof. *Aust Prescr* 2005;28:38-40.
Gagliardi et al. *Can J Surg* 2009;52(6):481-489



Major Opportunities Exist to Improve Surgical Antibiotic Prophylaxis

- Studies have shown poor adherence to antibiotic prophylaxis in surgery, including CS
- A large scope exists for improvement, especially in view of high-level evidence and clearly established guidelines



surgery1 www.fotosearch.com

<http://www.fotosearch.com/LIF142/surgery1/>



Kasteren et al. *Journal of Antimicrobial Chemotherapy* 2003;51:1389-1396
Fonseca et al. *Rev. Inst. Med. trop. S. Paulo* 2008; 50(2):79-82
Harbarth. Presentation made at ICIUM 2004
Tourmousoglou et al. *Journal of Antimicrobial Chemotherapy* doi:10.1093/jac/dkm406 (2007)
Festin et al. *BMC Pregnancy and Childbirth* 2009, 9:17 doi:10.1186/1471-2393-9-17
Gagliardi et al. *Can J Surg* 2009;52(6):481-489



Surgical Site Infections Common and Costly, but often Preventable

- Second commonest cause of nosocomial infections (accounting for 14 to 16%)
- Commonest nosocomial infections among surgical patients (40% of all such infections)
- Compared with cases without surgical site infections (SSIs), cases with SSI involve an increase in:
 - Hospital stay (approx. 7–10 additional post-op hospital days)
 - Risk of mortality (2–11 times higher risk)
 - Cost (estimates ranging from \$3,000 to \$29,000)
- Estimated 40 to 60% preventable



Failure mode and effects analysis – SSI: antibiotic prophylaxis. Partnership for Patient Care, 2006
Bratzler et al. *Clinical Infectious Diseases* 2004; 38:1706–15
Mannien. *Infect Control Hosp Epidemiol* 2006; 27:1340-1346
Mangram et al. *Infection Control and Hospital Epidemiology* 1999;20(4):247-278
R. Lawrence Reed. SSI new solutions (PPT). Loyola University Medical Center, Maywood, IL
Anderson et al. *Infection Control and Hospital Epidemiology* 2008;29 (Suppl 1): S51-S61



CS Common Surgery with High Infection Rates (1)

- CS is one of the commonest surgeries
- Carries major risk of post-surgical infections
- Single most important factor for postpartum maternal infection



lc03_birrh_c fotosearch.com

http://www.fotosearch.com/ARP124/lc03_birrh_c/



WHO Guidelines for Safe Surgery 2009
Small & Gyte. Cochrane Database of Systematic Reviews 2010, Issue 1. Art. No.: CD007482



CS Common Surgery with High Infection Rates (2)

- Risk of infections up to 20 times higher when compared with vaginal delivery
- Infection occurs in 7 to 20% of women after CS
- Common post-CS infections—
 - Endometritis
 - Wound infection
 - Urinary tract infection



Smalli & Gyte. Cochrane Database of Systematic Reviews 2010, Issue 1. Art. No.: CD007482
Tita et al. *Obstet Gynecol* 2009;113:675-82



Antibiotic prophylaxis Helps Prevent post-CS infections

- Many studies and meta-analyses show high efficacy
- A recent Cochrane meta-analysis reconfirmed significant benefit from antibiotic prophylaxis (ABP)
- Efficacy shown in both elective and non-elective cases
- ABP is routinely recommended in all cases of CS



Smalli FM and Gyte GML. Cochrane Database of Systematic Reviews 2010, Issue 1. Art. No.: CD007482
Schalkwyk et al. *JOGC*, September 2010, No. 247
SIGN Guideline 104 (antibiotic prophylaxis in surgery), July 2008



Cochrane Review 2010 Showed High-Level Evidence of Efficacy

- Reviewed 86 randomized control trials (RCTs) and quasi-RCTs involving >13,000 women
- Concluded that giving ABP in CS reduces endometritis by two-thirds and wound infection by three-fourths

ABP significantly reduces post-CS infections	
Variable	Average RR (95% Confidence Interval [CI])
Febrile morbidity	.45 (0.39 to 0.51)
Endometritis	.38 (0.34 to 0.42)
Wound infection	.39 (0.32 to 0.48)
Other serious infections	.31 (0.19 to 0.48)

CS = Cesarean section
 RCT = Randomized control trial
 RR = Relative risk
 ABP = Antibiotic prophylaxis



Small & Gyte. Cochrane Database of Systematic Reviews 2010, Issue 1. Art. No.: CD007482



What Are General Principles of Prophylaxis?

- Aim is to augment host defenses by reducing intra-operative bacterial contamination
- Should be directed against the most likely pathogens
- No need to cover all possible organisms
- Avoid antibiotics used for therapy
- Give narrow-spectrum agent and give short term

Characteristics of a good prophylactic agent—

- Safe
- Inexpensive
- Bactericidal
- Good tissue penetration
- IV route possible

Do not depend on ABP to overcome poor surgical technique



The Medical Letter. Antibiotic prophylaxis for surgery. June 2009, Vol. 7 (Issue 82)
 Munchhof. *Aust Prescr* 2005;28:38-40
 Failure mode and effects analysis – SSI: antibiotic prophylaxis. Partnership for Patient Care, 2006



Which Antibiotic?

- Various antibiotics given
- First-generation cephalosporins and ampicillin commonly used in the past
- But the American College of Obstetricians and Gynecologists (ACOG) no longer recommends ampicillin because of increasing resistance
- Cefazolin is the most commonly recommended agent
 - Relatively inexpensive, IV possible, good quick tissue penetration, narrow spectrum, good gram-positive coverage with modest gram-negative coverage, pregnancy B category



Medical Letter. Antibiotic prophylaxis for surgery. June 2009, Vol. 7 (Issue 82)
ACOG. *Obstet Gynecol* 2003;102:875-82;
Tita et al. *Obstet Gynecol* 2009;113:675-82
Schalkwyk et al. *JOGC*, September 2010, No. 247



Microbiology of Post-CS Infections

- Post-CS infections are polymicrobial—organisms involved can be aerobes, anaerobes, and *ureaplasma* or *mycoplasma*

In a Jordanian study,* 112 organisms were isolated from 93 culture positive abdominal incision infections in post-CS women at Queen Alia Military Hospital. Most were aerobic gram-positive cocci and aerobic gram-negative bacilli.

Organism	Number (%)
<i>Staphylococcus aureus</i>	47 (42.0)
<i>Escherichia coli</i>	31 (27.7)
<i>Klebsiella</i> sp.	23 (20.5)
<i>Pseudomonas</i> sp.	6 (5.3)
<i>Enterococcus</i> sp	3 (2.7)
Anaerobes	2 (1.8)



- Tita et al. *Obstet Gynecol* 2009;113:675-82;
- *Kaplan et al. *Eastern Mediterranean Health Journal* 2003;9:1068-74
- Medical Letter. Antibiotic prophylaxis for surgery. June 2009, Vol. 7 (Issue 82)



How Many Doses?

- One dose of prophylactic antibiotic is much better than none
- But multiple doses not necessarily better than one
- High-level evidence exists that multiple doses do not provide added benefit
- A second dose is recommended when blood loss is heavy or surgery is prolonged

Multiple doses can increase—

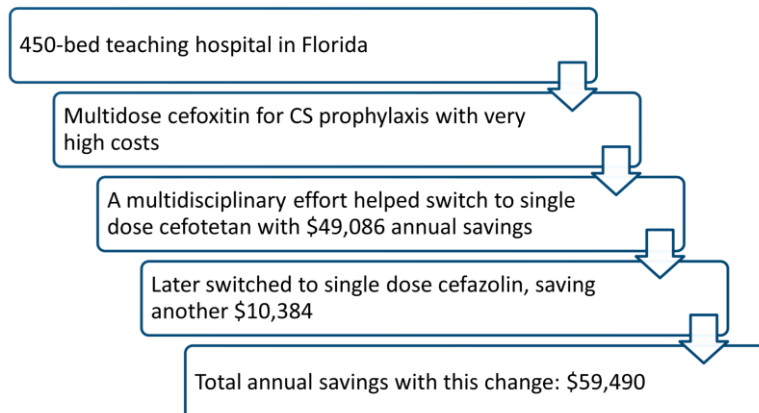
- Cost
- Adverse effects
- Antimicrobial resistance
- Infection with *C. difficile*



Schalkwyk et al. *JOGC*, September 2010, No. 247
SIGN Guideline 104 (antibiotic prophylaxis in surgery), July 2008
Medical Letter. Antibiotic prophylaxis for surgery. June 2009, Vol. 7 (Issue 82)
Fonseca et al. *Arch Surg* 2006;141:1109-1113
Hopkins & Small. Cochrane database of systematic reviews, 1999, Issue 2. Art. No.: CD001136



Huge Cost Saving by Changing from Multidose Cefoxitin to Single Dose Cefazolin



Todd & Benrubi. *Hosp Formul* 1990;25(4):446-8



Brazilian Hospital Switches from a 24-hr Prophylaxis to Single Dose— Reduced Costs without Increased SSI

Variable	Period 1 (24-hr cefazolin prophylaxis regimen)	Period 2 (1-dose cefazolin prophylaxis regimen)
Time period	Feb to Oct 2002	Dec 2002 to Aug 2003
# women with surgery	6,140	6,159
# cefazolin vials (1 gm) purchased/month	1259	467
Cost of cefazolin/month	\$ 3,147	\$ 1,167
Surgical site infections	127 (2%)	133 (2.1%)

63% decline in the monthly number of cefazolin vials purchased saving \$1980 per month on drug cost alone



Fonseca et al. *Arch Surg* 2006;141:1109-1113



What Should Be the Dose of Cefazolin?

- Recommended dose is 1 to 2 gm IV
- A well-cited RCT conducted by Sullivan et al used 1 gm IV
- Fonseca et al in Brazil showed that 1 gm dose brought similar results as a 2 gm dose, but led to an annual saving of >\$4,000
- A single IV dose of 1 gm maintains therapeutic levels over 3 to 4 hours
- Weight-based dose recommendation is 20 to 30 mg/kg (1 gm if <80 kg; 2 gm, if >80 kg)



<http://healthsciencetechnology.wikispaces.com/Yesenia+G>.



ACOG Committee Opinion. *Obstet Gynecol.* 2010 Sep;116(3):791-2.
Sullivan et al. *Am J Obstet Gynecol* 2007;196:455.e1-455.e5
Fonseca et al. *Rev. Inst. Med. trop. S. Paulo* 2008;50(2):79-82
Bratzler et al. *Clinical Infectious Diseases* 2004; 38:1706-15



Surgical Antibiotic Prophylaxis Indicators as Quality Measures

The US National Surgical Infection Prevention Project uses the following performance measures for national surveillance and quality improvement

Proportion of patients who receive parenteral antibiotic prophylaxis within 1 hour before surgical incision	Proportion of patients who receive prophylactic antibiotic consistent with current recommendations	Proportion of patients whose prophylactic antibiotics are discontinued within 24 hours after the end of surgery
-------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------



Bratzler et al. *Clinical Infectious Diseases* 2004;38:1706-15



Classen Report Showed Value of Giving Prophylaxis Just Before Surgery

Prophylaxis in 2,847 patients undergoing surgery*	Antibiotic prophylaxis timing	Rate of infection
	Early (2-24 hr before surgery)	3.8%
	Pre-operative (0-2 hr before surgery)	0.6%
	Peri-operative (0-3 hr after surgery)	1.4%
	Post-operative (3-24 hr after surgery)	3.3%



*Classen et al. *NEJM* 1992;326(5):282-286



What Should Timing Be for CS Prophylaxis?

- Pre-incision prophylaxis is recommended for almost all surgeries
- However, past practice for CS was to give after cord-clamping to reduce theoretical risk to the neonate
- However, recent RCTs and a meta-analysis have shown that pre-incision prophylaxis reduces post-CS infections in mother without negatively impacting the neonate (see next 2 slides)
- So several reputed bodies, including ACOG, have recently recommend pre-op prophylaxis (within 1 hr before skin incision)



Recent RCT Showed Better Results with Pre-Incision Prophylaxis

Post-CS infectious morbidity in the mother			
Variable	Study (pre-op) group (n = 175)	Control (at cord-clamp) group (n = 182)	Adjusted OR (95% CI)
Endomyometritis	1%	5%	0.22 (0.05 to 0.9)
Wound infection	3%	5%	0.4 (0.1 to 1.3)
Total infectious morbidity	4.5%	11.5%	0.35 (0.14 to 0.82)
Neonatal outcomes			
Variable	Study group (n = 185)	Control group (n = 194)	P value
Sepsis	3%	3.6%	.99
Septic workup	19%	18.5%	.96
NICU admission	13.5%	17%	.40
NICU days	14.2 ± 15.8	19.7 ± 24.9	.01



Sullivan et al. *Am J Obstet Gynecol* 2007;196:455.e1-455.e5



A recent meta-analysis also showed better results with pre-incision prophylaxis

Post-CS infectious morbidity in the mother		
Variable	RR	95% CI
Endomyometritis	0.47	0.26-0.85
Wound infection	0.60	0.30-1.21
Total infectious morbidity	0.50	0.33-0.78

Neonatal outcomes		
Variable	RR	95% CI
Suspected sepsis requiring workup	1	0.70-1.42
Proven sepsis	0.93	0.45-1.96
NICU admission	1.07	0.51-2.24



Costantine et al. *Am J Obstet Gynecol* 2008;199:301.e1-6



Summary: Benefit of Prophylaxis

- Highly beneficial in both elective and non-elective cases in reducing post-CS febrile morbidities, endometritis, wound infections, and serious maternal infectious complications, so highly recommended
 - High-level evidence (from meta-analysis or RCT)



Small FM and Gyte GML. *Cochrane Database of Systematic Reviews* 2010, Issue 1. Art. No.: CD007482
Schalkwyk et al. *JOGC*, September 2010, No. 247
SIGN Guideline 104 (antibiotic prophylaxis in surgery), July 2008



Summary: Choice and Dose

- First generation cephalosporin—most commonly recommended is cefazolin 1-2 gram IV
 - High-level evidence (from meta-analysis or RCT)
- ACOG specifically recommends cefazolin over ampicillin as the regimen of choice. Reason—increasing microbial resistance to ampicillin



Schalkwyk et al. *JOGC*, September 2010, No. 247
ASHP. Draft therapeutic guideline on antimicrobial prophylaxis in surgery, 2010
Medical Letter. Antibiotic prophylaxis for surgery. June 2009, Vol. 7 (Issue 82)
ACOG. *Obstet Gynecol* 2003;102:875-82;
Tita et al. *Obstet Gynecol* 2009;113:675-82



Summary: Alternative in Cases of Beta Lactam Allergy

- In women allergic to beta lactams, a reasonable alternative is clindamycin with gentamicin
- Dose
 - Clindamycin—600 to 900 mg IV
 - Gentamicin—1.5 mg/kg IV



Schalkwyk et al. *JOGC*, September 2010, No. 247
ASHP. Draft therapeutic guideline on antimicrobial prophylaxis in surgery, 2010
Medical Letter. Antibiotic prophylaxis for surgery. June 2009, Vol. 7 (Issue 82)
Tita et al. *Obstet Gynecol* 2009;113:675-82
Bratzler et al. *Clinical Infectious Diseases* 2004;38:1706-15



Summary: Timing of Administration

- Earlier, recommended immediately after cord-clamping
- However, based on new findings that show significantly less post-CS infectious morbidities in mothers without negative outcomes in the neonates with pre-incision prophylaxis, recent guidelines have started recommending pre-incision use (15 to 60 minutes prior to skin incision).
 - High-level evidence (from meta-analysis or RCT)

Costantine et al. *Am J Obstet Gynecol* 2008;199:301.e1-6
Tita et al. *Obstet Gynecol* 2009;113:675-82
Schalkwyk et al. *JOGC*, September 2010, No. 247
ASHP. Draft therapeutic guideline on antimicrobial prophylaxis in surgery, 2010
Medical Letter. Antibiotic prophylaxis for surgery. June 2009, Vol. 7 (Issue 82)



Summary: Duration of Prophylaxis

- A single dose is recommended. No added benefit obtained from multiple doses.
 - High-level evidence (from meta-analysis or RCT)
- An additional dose recommended 3 to 4 hours after the first dose if the procedure gets extended beyond 3 hours or blood loss is >1,500 mL

Schalkwyk et al. *JOGC*, September 2010, No. 247
SIGN Guideline 104 (antibiotic prophylaxis in surgery), July 2008
Medical Letter. Antibiotic prophylaxis for surgery. June 2009, Vol. 7 (Issue 82)
Fonseca et al. *Arch Surg* 2006;141:1109-1113
Hopkins & Small. Cochrane database of systematic reviews, 1999, Issue 2. Art. No.: CD001136



Conclusion: **Antibiotic Prophylaxis in CS**

- Well-established international recommendations exist backed by high-grade evidence
- Using or adapting these recommendations in local settings have potential to significantly improve outcomes for the mothers, save costs, reduce adverse events, and contain drug resistance



lc03_birth fotosearch.com
Source: www.fotosearch.com/ARP124/lc03_birth/



ANNEX D: CONTINUOUS QUALITY IMPROVEMENT METHOD TO IMPROVE ANTIBIOTIC PROPHYLAXIS IN CESAREAN SECTION: POWERPOINT PRESENTATION



Continuous quality improvement method to improve antibiotic prophylaxis in cesarean section

Mohan P. Joshi, Salah Gammouh, Terry Green, Sheena Patel

Cesarean Section Antibiotic Prophylaxis: Protocol and Procedure Development Workshops, Amman, Jordan, April 24 to May 2, 2011

Organized by Jordan Ministry of Health, Royal Medical Services, and Jordan Food and Drug Administration in collaboration with MSH/SPS

For better health worldwide

Outline

- Discuss briefly the key principles of continuous quality improvement (CQI)
- Describe the key steps of CQI
- State the key elements of the proposed CQI framework to improve antibiotic prophylaxis in cesarean section (c-section) in Jordanian hospitals



CQI—A Highly Suitable Approach for Resource-Limited Environments

- Increasing recognition of CQI in industrialized countries in business and health care fields
- CQI offers a potential to improve systems of patient care and outcomes in the context of existing resources
- So rationale for applying CQI in resource-limited settings is compelling

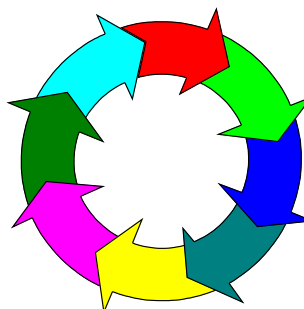


Weinberg et al. *Arch Intern Med* 2001;161:2357-2365



Why Implement CQI ?

- To improve quality through continual reviews and small-scale changes that do not overwhelm the staff or the system
- To implement self-determined changes, NOT the ones thrust in from outside
- To help reduce variations in practice (which are common and often have no clear reason or basis)
- To identify opportunities for cost containment in the current environment of escalating health care costs



Successful Change Requires Focus on System

- Evidence not getting translated into clinical practice is a common problem
- Efforts often focus on individual health workers to make this happen
- However, individuals work with other health workers within a larger system
- So improvement requires looking at the system, and not remaining preoccupied with individuals



Pronovost et al. *BMJ* 2008;337:963-5.



Successful Change Requires a Focus on Design

- Improvement does not occur without change
- The better the system design, the greater the ability to achieve the desired results
- Focus not just on efforts but on design
- Doing more of the same may not bring results
- We need a method for improvement; it doesn't happen just like that



Berwick. *BMJ* 1996;312:619-22



Successful Change Requires Focus on Process

- All of us want to improve our work
- Work involves process in a system
- We need to focus on work process; not just on the end product or service
- A process involves a series of steps that lead to an output
- Output will improve only by reviewing, changing, and standardizing these various steps in the process



PDSA is Well-Known Method to Achieve Successful Changes

- Small but well-planned changes can bring many improvements
- But every change is not improvement
- Measurement is a way to know whether a change was an improvement
- Plan, Do, Study, and Act (PDSA) is a well-known and well-tested approach to CQI
- This approach helps to continually review and bring small-scale changes through informative cycles



Berwick. *BMJ* 1996;312:619-22



Recipes for Success (1)

- Involve all stakeholders (keep interdisciplinary spirit)
- Keep each other motivated and catalyze the spirit of teamwork to reach the common goal
- Allow all members to provide ideas/inputs/concerns
- Collaborate and develop skills for CQI meetings
- Value even “small” change or improvement
- Manage the whole process based on facts and evidences
- If something is not broken, don't fix it



Recipes for Success (2)

- Show measurement results for learning purposes, not for judging somebody's or some unit's performance
- Don't get bogged down with the idea of a perfect measurement—focus on getting enough information that will allow you to go to the next step in the CQI cycle
- Identify and eliminate step or work that is wasteful
- Start now, don't wait for everything to be perfectly in place. Small scale PDSA cycles can start without much preparation. Lessons and information come along the way as cyclical meetings are held.



Recipes for Success (3)

- Focus on problem solving rather than faultfinding
- Get support of top management
- Show how it's saving money or improving health care, patient/mother outcome
- Periodically share and celebrate even small advances in hospital, departmental or committee meetings



PDSA for Jordan (1)



A multidisciplinary team conducts CQI through PDSA cycles

▪ PLAN



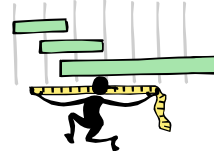
- Study the existing practice (collect data and current process)
- Identify issues/problems
- Develop action plan for change, including plan for measuring success

▪ DO

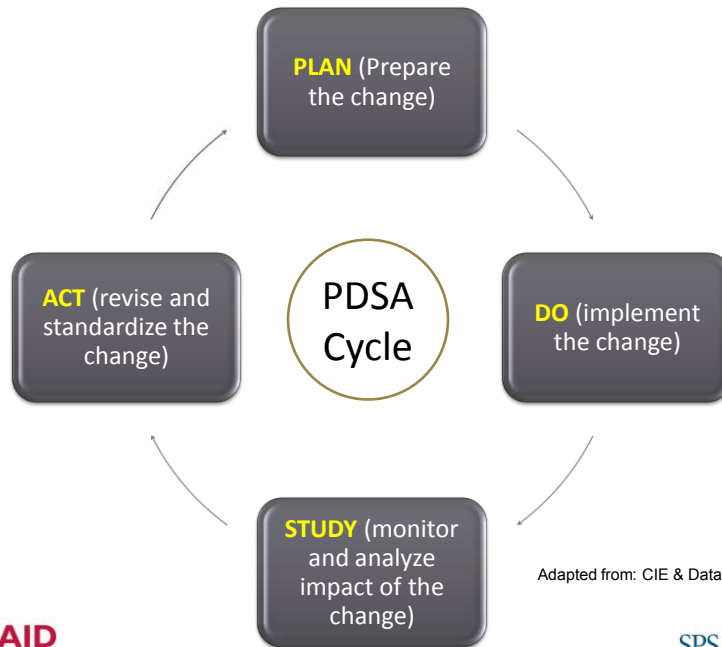
- Undertake the planned activities on a small scale



PDSA for Jordan (2)



- **STUDY**
 - Examine or check the result of the action before waiting too long
 - Look for signs of progress, constraints, or unexpected outcomes
 - Look for any lessons brought by this small scale action
- **ACT**
 - Use the findings (and lessons learned) from the study to identify and make any necessary mid-course modifications or adjustment
- Then continue the PDSA process with the next cycle, going from P to D to S to A (in an iterative manner)



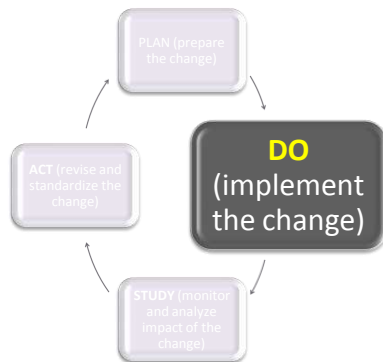
PDSA for Jordan C-Section Prophylaxis —PLAN



- Share baseline hospital data on the regimens
- Present the current procedures for giving the prophylaxis
- Identify points of strengths, weaknesses, and opportunities
- Form a multidisciplinary CQI group
- Use the data and facts to self-design a CQI action plan



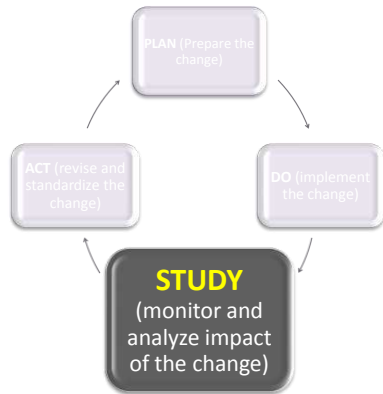
PDSA for Jordan C-Section Prophylaxis —DO



- Do test run of the protocol and the procedure (based on what was agreed to “test out”) relating to—
 - *What* prophylaxis to give
 - *How* to obtain
 - *When* to give
 - *How* to give
 - *Where (at which location)* to give
 - *Who* would give
 - *How* to document
- Pre-identified member(s) compile data to present in the next meeting



PDSA for Jordan C-Section Prophylaxis —STUDY

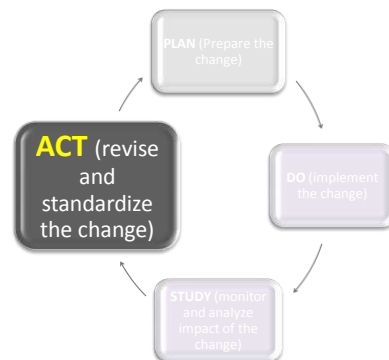


- The multidisciplinary group meets periodically (e.g., monthly) to review progress during the preceding period
- Assesses adherence to the protocol and procedures
- Analyzes issues and constraints



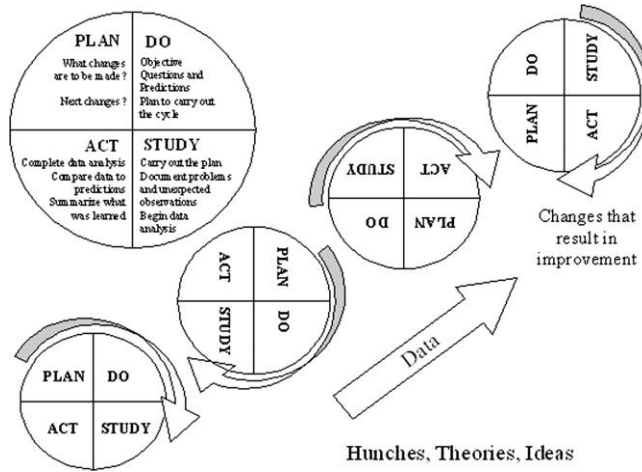
PDSA for Jordan C-Section Prophylaxis —ACT

- Based on the findings and issues, the group makes any necessary adjustments in the antibiotic prophylaxis plan being tested



Continually Moving Upward with CQI Culture

The multidisciplinary group continues the small PDSA approach cycles to continually improve the quality within the existing context of the hospital system



Lok. *CJASN* 2007;2:1043-1053

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Example of Successfully Using CQI to Improve Prophylaxis in C-Sections

- CQI method (PDSA) implemented by multidisciplinary teams in two Columbian hospitals
- System improvement effort included—
 - Implementing protocol to give prophylactic antibiotic to all women
 - Increasing antibiotic availability in the operating room
- The effort led to—
 - Significant improvement in the overall and timely administration of prophylactic antibiotics
 - $p < .001$ in both hospitals
 - Decrease in surgical site infections
 - $p < .001$ in hospital A
 - In hospital B, SSI began a downward trend before the CQI effort, but this trend continued after the effort was implemented



Weinberg et al. *Arch Intern Med* 2001;161:2357-2365

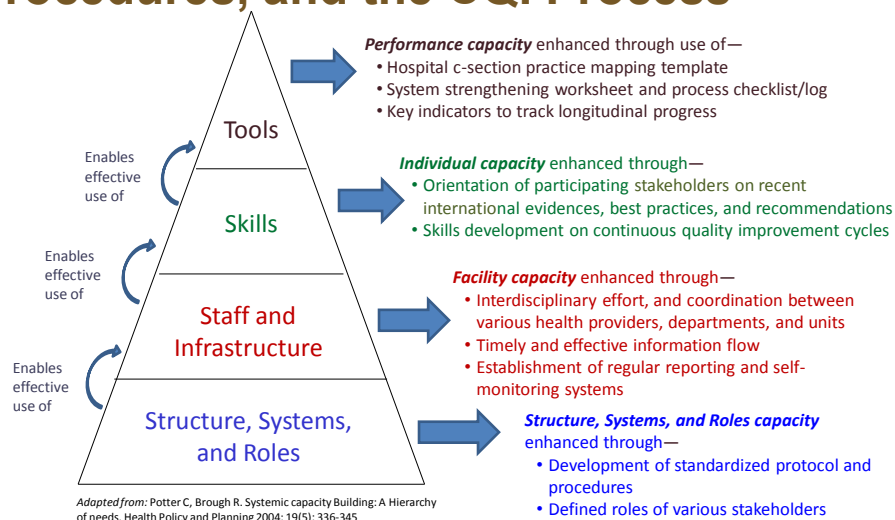


Suggested Indicators That Can Be Tracked in Participating Jordanian Hospitals through CQI

- % of cesarean section cases in which the appropriate prophylactic antibiotic was administered
- % of cesarean section cases in which the first dose of the prophylactic antibiotic was given at the appropriate time
- % of cesarean section cases in which the appropriate number of doses of the prophylactic antibiotic was given
- Estimated value of avoided unnecessary antibiotic doses



Expected Capacity Building in Jordanian Hospitals as Result of Protocol, Procedures, and the CQI Process



CQI for Antibiotic Prophylaxis in C-section: Conclusion

- The CQI framework has a strong potential to—
 - Standardize processes
 - Strengthen systems
 - Progressively improve antibiotic prophylaxis in c-section
- The framework can easily be expanded later to improve prophylaxis for other surgeries



Source: vzimbel.com



“Continual improvement is an unending journey.”

- Lloyd Dobens and Clare Crawford-Mason,
Thinking About Quality



ANNEX E: SYSTEM REDESIGN WORKSHEET

Cesarean Section (CS) Antibiotic Prophylaxis: Protocol and Procedure Workshops

Amman, Jordan, April 24-May 2, 2011

_____ Hospital, Jordan

System Redesign Worksheet

Steps in the process of CS antibiotic prophylaxis	System change, redesign or strengthening and monitoring agreed by the hospital stakeholders
Who records the type of CS (elective or non-elective)?	
Where is this information recorded?	
Which antibiotic(s) is recommended for prophylaxis?	
What is the recommended dose?	
Which is the recommended route?	
What is the recommended timing of the 1 st dose?	
How many doses are recommended – single dose, two doses, or multiple doses?	
If multiple, what's the duration of use?	
In case of allergy or contraindication to the recommended antibiotic, what is the recommended alternative (name of the antibiotic[s] along with dose, route, timing of the 1 st dose, and duration of prophylaxis)?	
Who orders (prescribes) the prophylactic antibiotic for the women planned for CS?	
Where is the order documented?	
Who transmits the order for the supply of the antibiotic?	
What document is used to transmit the supply request?	
How is the antibiotic supplied by the Hospital Pharmacy?	
What is done if the antibiotic is not available in the Hospital Pharmacy?	
When is the antibiotic supplied, e.g. how long before CS (along with recommendation on how and how quickly the antibiotic can be made available for timely administration in cases of <i>emergency CS</i>)?	

**Annex D: Continuous Quality Improvement Method to Improve Antibiotic Prophylaxis in Cesarean Section:
PowerPoint Presentation**

Steps in the process of CS antibiotic prophylaxis	System change, redesign or strengthening and monitoring agreed by the hospital stakeholders
Who brings the antibiotic to the woman's location?	
Where is it documented that the antibiotic has been supplied?	
Who checks for patient allergy to the prescribed antibiotic?	
Where is it documented that patient allergy to the prescribed antibiotic has been checked?	
Where is the 1 st dose of the prophylactic antibiotic administered (e.g. OBGY ward, pre-operative preparation room, OT)?	
Is the time of the 1 st dose administration recorded?	
Who gives the 1 st dose of the prophylactic antibiotic?	
Who records the time, dose and route of administration of the 1 st dose of the prophylactic antibiotic?	
Where is it recorded?	
Who records if the woman undergoing CS develops surgical site infection (SSI)?	
Where is this SSI information recorded?	

ANNEX F: CS LOG FOR RECORDING ANTIBIOTIC PROPHYLAXIS AND SURGICAL SITE INFECTION

_____ Hospital, Jordan

Cesarean Section (CS)

"Log" for Recording Antibiotic Prophylaxis and Surgical Site Infection (SSI)

OBGY nurse to fill out
Name of the woman undergoing CS: _____
ID or File number: _____
Admission Date: _____
Discharge Date: _____

Timing of the 1st dose of PAB:

1 st dose of the antibiotic given	Tick appropriate box below	OBGY or OT nurse signature
Within 1 hour before skin incision		
Earlier than 1 hr before skin incision		
After skin incision		
At cord-clamping		
After CS in the operation room		
After CS in the recovery room		
After CS in the ward		

Type of CS:

Type of CS	Tick appropriate box below	OBGY surgeon signature
Elective		
Non-elective		

Beta-lactam allergy:

Beta-lactam allergy	Tick appropriate box below	OBGY nurse signature
Yes		
No		

Subsequent doses of the prophylactic antibiotic (if any) during hospital stay (if more than one antibiotic given, mention the # of doses for each):

Antibiotic	Route	Amount per dose	Number of doses	OBGY nurse signature
Cefazolin				
Others (specify)				

In case any antibiotic(s) were given at the hospital before CS for any preexisting infection, please write down the names(s) of the antibiotic(s):

Name(s) of antibiotic(s)	OBGY surgeon signature

Name and doses of antibiotics prescribed at discharge (if any):

Name of antibiotic	Route	# of doses per day	Duration	OBGY nurse signature

Prophylactic antibiotic given for CS: name, route and amount of the first dose:

Name of the antibiotic	Route	Dose	OBGY or OT nurse signature
Cefazolin			
Others (specify)			

CS surgical site infection (SSI):

Period when detected	Yes	No	OBGY surgeon signature
During hospital stay after CS			
At the 7 th day follow-up visit after discharge			
At subsequent follow up (within 1 month of CS)			
Wound infection sample sent for culture & sensitivity test			

ANNEX G: PROTOCOLS AND PROCEDURES FOR ANTIBIOTIC PROPHYLAXIS IN CESAREAN SECTION – DEVELOPED BY THE PARTICIPATING MOH HOSPITALS

Ministry of Health: Prince Hussein Hospital Protocol and Procedures for Antibiotic Prophylaxis in Cesarean Section (CS)

Protocol

Prophylactic Antibiotic: Cefazolin

Dose: **Single dose:** 1 gram if woman's weight < 80 Kg; 2 grams if > 80 Kg

Route: Intravenous: direct injection into vein or via running intravenous fluids (over 3-5 minutes)

Time Administration: Within 60 minutes prior to skin incision

Criteria for Additional Doses:

- I. Give a **second** dose cefazolin 8 hours after the first dose in the following cases:
 1. Presence of full adhesions
 2. Failure to progress in labor **with no** ruptured membrane and decision for CS is made
 3. Pendular (obese) abdomen
 4. Woman is diabetic
 5. History of infection post previous CS
 6. Prolonged surgery (>3 hours) or if blood loss > 1500 mL (**2nd dose 3-4 hours after 1st dose**)
- II. Give total of **3** doses of cefazolin at 8 hour intervals in the following cases:
 1. Woman presents with ruptured membrane > 24 hours
 2. Failure to progress in labor **with** ruptured membrane and decision for CS is made

If Beta Lactam Allergy: Clindamycin 600 mg intravenous single dose **AND**, gentamicin 1.5 mg/Kg intravenous single dose **BOTH immediately after cord clamping**

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Procedures

- OBGY physician orders prophylactic antibiotic (PAB) on red *Doctor Order Sheet* on admission (Pre-Op).
- Nurse/mid-wife transcribes order onto *Pharmacy Order Sheet*.
- Nurse/mid-wife performs skin sensitivity (allergy) test (SST) in ward prior to transport to Operation Reception Room (ORR):
 - OBGY physician evaluates test site for allergy result.
 - OBGY Nurse/mid-wife or physician records results of skin test (negative or positive) on red *Doctor Order Sheet* and in Nursing Notes. If positive allergy, also records on front cover of patient chart.
 - Nurse/mid-wife administers PAB in the ORR once a signal is given from anesthetist to bring woman into the Operating Room (OR), and records time of administration and dose in *Medication Administration Record*.
- Anesthetist records time of induction in *Anesthesia Notes*, and surgeon records time of incision in the *Operation Notes*.
- Physician records presence of any infection during hospitalization in the *Progress Notes*.
- During discharge, physician performs dressing, records in notes, and counsels the woman to return after one week for follow-up visit.
- Physician or nurse records outpatient follow-up visit including any treatment and presence of infection in *patient chart*.
- Physician or nurse/mid-wife reports presence of any surgical site infection to Infection Control Committee and to Laboratory for cultures.

- If an emergency occurs in Labor Room where a decision to perform CS is made, PAB dose is obtained from OBGY ward and administered as described above if possible. In top emergency, the anesthetist may administer PAB on induction of anesthesia and records in Anesthesia Notes time and dose.
 - All entries of the *CS Log* must be filled in at each step accordingly by the responsible personnel.
-

Ministry of Health: Prince Faisal Hospital
Protocol and Procedures for Antibiotic Prophylaxis in Cesarean Section (CS)

Protocol

Prophylactic Antibiotic: Cefazolin

Dose: **Single dose:** 1 gram if woman's weight < 80 Kg; 2 grams if > 80 Kg

Route: Intravenous: direct injection into vein or via running intravenous fluids (over 3-5 minutes)

Time Administration: Within 60 minutes prior to skin incision; preferably 30 min before

Criteria for Additional Doses: Give additional doses of cefazolin in the following cases as described:

1. Emergency CS surgery in diabetic woman with no time to control blood sugar, give 2nd dose 8 hours after the first dose.
2. Excessive blood loss (>1500 mL) or long procedure (greater than 3 hours), give 2nd dose 4 to 5 hours after the first dose.
3. If woman presents with ruptured membrane, give an additional dose 8 hours after first dose (if first dose is given pre-incision) for a total of 2 doses.
4. If woman presents with ruptured membrane, with no time to administer 1st dose pre-incision, then give 1st dose as soon as possible followed by 2 additional doses at 8-hour intervals for a total of 3 doses.

If Beta Lactam Allergy: Clindamycin 600 mg intravenous single dose prior to skin incision AND, gentamicin 1.5 mg/Kg intravenous single dose immediately after cord clamping

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Procedures

- OBGY physician orders prophylactic antibiotic on red *Doctor Order* sheet on admission.
- Nurse or mid-wife transcribes order onto *Pharmacy Order* sheet.
- Nurse or mid-wife performs skin sensitivity (allergy) test (SST) in ward prior to antibiotic administration and prior to transport to Operating Room:
 - OBGY physician evaluates test site for allergy result
 - Nurse/mid-wife or physician records results of SST (negative or positive) on red Doctor Order Sheet. If positive allergy, also records on front cover of patient chart
- Ward nurse administers prophylactic antibiotic upon call to transfer to Operating Room, and records in *Nursing Medication Administration Record*. **Antibiotic must be administered within 60 minutes prior to skin incision.** Nurse communicates antibiotic administration time with surgeon.
- For non-elective (emergency) cases, the physician may give a verbal order to administer prophylaxis cefazolin; the verbal order must be written down as soon as possible after the procedure is over.

Annex G: Protocols and Procedures for Antibiotic Prophylaxis in Cesarean Section – Developed by the Participating MOH Hospitals

- For non-elective (emergency) surgeries, nurse/mid-wife obtains cefazolin from stock supply and performs SST, communicates results to surgeon, then administers the antibiotic prior to skin incision as time permits and records both the results of SST and the administration time and dose as appropriate.
 - Physician or nurse/mid-wife records presence of **any infection** during hospitalization on *Progress Notes*.
 - At the follow-up (CPP) visit, physician records in *CPP Clinic File* the visit date, presence or absence of infection, and course of treatment if any. If woman is new to the clinic, nurse/mid-wife creates a new file.
 - OBGY ward nurses and CPP nurse/mid-wife to inform Infection Control Committee of any cases of infection.
 - Physician must record ALL antibiotics ordered during hospitalization on *Doctor Order* sheet, on *Discharge Summary*, and in outpatient record as appropriate.
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Ministry of Health: Dr. Jamil Al Totanji Hospital
Protocol and Procedures for Antibiotic Prophylaxis in Cesarean Section (CS)

Protocol

Prophylactic Antibiotic: Cefazolin

Dose: **Single dose:** 1 gram if woman's weight < 80 Kg; 2 grams if > 80 Kg

Route: Injected direct intravenous over 3-5 minutes after skin sensitivity (allergy) test

Time Administration: 15 to 60 minutes prior to skin incision

Criteria for Additional Doses:

1. Blood loss >1500mL and/or presence of full adhesions; give 2nd dose 3 to 5 hours after first dose
2. Ruptured membrane (>12 hours) with no signs/symptoms of infection, then give 3 doses of cefazolin in total at 8-hour intervals.
3. If surgical complications (surgical injury to adjacent organs) consider the protocols and practices currently followed for such complications, and **document in the chart**.

If Beta Lactam Allergy: Clindamycin 600 mg single IV dose, AND gentamicin 1.5 mg/Kg single IV dose BOTH immediately after cord clamping

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Procedures

- OBGY physician orders prophylactic antibiotic on red *Doctor Order* sheet on admission, pre-operatively.
 - Nurse transcribes order onto *Pharmacy Order* sheet.
 - Nurse performs skin sensitivity (allergy) test (SST) in ward prior to antibiotic administration and prior to transport to Operating Room (OR):
 - OBGY physician evaluates test site for allergy result.
 - Nurse/physician records results of skin test (negative or positive) on red *Doctor Order* sheet. If positive allergy, also records on front cover of patient chart.
 - Ward nurse administers prophylactic antibiotic upon transfer to OR, and records in nursing *Medication Administration Record*. **Antibiotic must be administered 15 to 60 minutes prior to skin incision.** Nurse communicates antibiotic administration time with surgeon.
-

- Surgeon records time operation begins (incision) and ends on *Operation Sheet*.
- **For emergency surgeries**, surgeon obtains the antibiotic from OR stock supply. Surgeon/nurse performs SST, and then administers the antibiotic prior to skin incision.
 - Surgeon records antibiotic administration and time in *Operation Notes*.
 - Surgeon records use of stock antibiotic with patient name on the OR stock-supply register.
- Physician or nurse records presence of any infection during hospitalization in the *Progress Notes* or at outpatient clinic follow-up in the patient chart.
- Physician must record ALL antibiotics ordered during hospitalization on *Doctor Order Sheet*, on *Discharge Summary*, and in outpatient record as appropriate.
- Physician or nurse reports presence of any infection to Infection Control Committee.
- All entries of the *CS Log* must be filled in at each step accordingly by the responsible personnel.