Strategies to Improve Medicine Use—Medicine Use Evaluation

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

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Outline

• Key Definitions
• Introduction
• Need for a DUE
• Stepwise Approach to Implementing a DUE
• When DUEs Go Wrong
• Summary
Key Definition: DUE

• Ongoing, systematic, criteria-based program of medicine evaluations that will ensure appropriate medicine use. Interventions are necessary when inappropriate therapy is identified.

• A DUE will—
  • **Define** appropriate medicine use (by establishing criteria)
  • **Audit** criteria against what is being prescribed
  • **Give feedback** to prescribers on all identified problems
  • **Monitor** to see if criteria are followed and prescribing is improved
Introduction

Strategies to improve medicine use

• Education
• Managerial
  • Standard treatment guidelines
  • Prescribing/dispensing restrictions
  • Clinical pharmacy programs
  • Drug Use Evaluation (DUE)
• Regulatory
Indicators Suggesting Need for DUE

- Overuse or underuse of medications
- Problems indicated from WHO/MSH indicator studies
- High number of adverse drug reactions
- Signs of treatment failures
- Excessive number of non-formulary medications used
- Use of high-cost medicines where less expensive alternatives exist
- Excessive number of medicines within a therapeutic category
- Poor availability of essential medicines
Prescribing Practices in Jordan Indicating a Need for DUE  
(from the Jordan Health Sector Reform Project)

• Over reliance on brand names, prescription by habit, and favoring particular brands without sufficient evidence

• Subject to pressure from patients who want medications; promotional pressure from the pharmaceutical industry to prescribe particular products; & strictures from the government &/or HPTC to stay within the limited drug budget

• Over reliance on pharmaceutical industry to provide information on medicines
  • Face to face meetings
  • Lectures
  • Samples
  • Brochures

Source: Jordan Health Sector Reform Project, November 2004, Study 10: Drug Prescribing
Prescribing Practices in Jordan Indicating a Need for DUE (2)

- In the MOH/FDA/SPS studies of Cesarean Section antimicrobial prophylaxis the following problems were found
  - Multidrug and multiple doses used for CS Surgical Prophylaxis
  - Initial dose was given after the surgical procedure
  - Antibiotic prophylaxis continued after the patient left the hospital

- Jordan Drug Use Study
  - Percentage of prescriptions involving antibiotics: 60.9%
  - Mean time spent on physician-patient consultations: 4 minutes
Prescribing Practices in Jordan Indicating a Need for DUE—Top 5 Medicines by Value

<table>
<thead>
<tr>
<th>Item</th>
<th>Jordan IMS 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMOCLAN</td>
<td>2,000.0</td>
</tr>
<tr>
<td>SUPRAX</td>
<td>1,500.0</td>
</tr>
<tr>
<td>NEXIUM</td>
<td>1,000.0</td>
</tr>
<tr>
<td>AUGMENTIN</td>
<td>500.0</td>
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<tr>
<td>CRESTOR</td>
<td>0.0</td>
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Objectives of a DUE

- Ensure that pharmaceutical therapy meets current standards
- Promote optimal medication therapy
- Prevent medication-related problems
- Identify areas in which further evaluation is needed
- Create criteria for appropriate medicine use
- Define thresholds for quality of medicine use below which corrective action will be undertaken
- Enhance accountability in medicine use
- Control pharmaceutical costs
Stepwise Approach to DUE

1. Establish responsibility.
2. Develop scope of activities.
3. Establish criteria.
4. Define and establish thresholds.
5. Collect data and organize results.
6. Analyze data.
7. Develop recommendations and plan of action.
8. Conduct DUE follow-up.
Step 1. Establish Responsibility

- Drug and Therapeutics Committee (DTC) is logical choice
  - Multidisciplinary committee dealing with all facets of medicine therapy—has the necessary expertise
- Subcommittee of the DTC
  - Must include representation of practitioners whose medicine prescribing will be assessed
Step 2. Develop Scope of Activities

- Identify medicine therapy problems to be addressed
  - Using ABC/VEN analysis, ADR reports, AMR reports
- Concentrate on medicines with highest potential for problems
  - High volume
  - Low therapeutic index
  - High ADR rate
  - Expensive medicines
  - Critically important medicines
  - Antimicrobials
- Injections
  - Medicines undergoing evaluation for addition to the formulary
  - Medicines used for off-label indications
  - Medicines used for high-risk patients
Step 3. Establish Criteria

Criteria to define correct medicine use (using evidence-based medicine)—

- Appropriate medicine for medical condition
- Correct dose and quantity dispensed
- Preparation for administration
- Monitoring is appropriate (e.g., laboratory test)
- Contraindications
- Medicine interactions
- Medicine administration (especially for injections)
- Patient education (written and oral instructions)
- Patient outcomes (e.g., blood glucose, glycosylated hemoglobin)
- Pharmacy administrative indicators (correct cost, billing)
Step 4. Define and Establish Thresholds

• Define and establish **thresholds** or **benchmarks** for quality of medicine use below which corrective action will be undertaken.

• Thresholds define the expectations or goals for complying with the criteria (e.g., 90% of prescriptions for 3rd generation cephalosporins are for predefined serious infections).
# Ciprofloxacin DUE Criteria and Thresholds

## Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Threshold</th>
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</thead>
<tbody>
<tr>
<td>Complicated, chronic, or relapsing UTI</td>
<td>90%</td>
</tr>
<tr>
<td>Gonorrhea</td>
<td></td>
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<tr>
<td>Resistant respiratory tract infections</td>
<td></td>
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<tr>
<td>Bone and joint infections</td>
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<tr>
<td>Prostatitis</td>
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<tr>
<td>GI infections</td>
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</tbody>
</table>

## Dose

- Complicated or recurring infections: 500–750 mg bid 95%
- GI infections: 500 mg bid
- Gonorrhea: 250 mg in 1 dose
- Renal disease – decrease as follows:
  - Creatinine clearance 30–50 ml/min – 250–500 q 12 h
  - 5–29 ml/min – 250–500 q 18 h
  - Hemodialysis – 500 mg q 24 h
# Ciprofloxacin DUE Criteria and Thresholds (2)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Threshold</th>
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<tbody>
<tr>
<td><strong>Duration</strong></td>
<td>95%</td>
</tr>
<tr>
<td>• Complicated UTI: 10–21 days</td>
<td></td>
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<tr>
<td>• Respiratory: 7–14 days</td>
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<tr>
<td>• Osteomyelitis: 4–6 weeks</td>
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<tr>
<td>• GI—5 days</td>
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<tr>
<td><strong>Contraindications</strong></td>
<td>100%</td>
</tr>
<tr>
<td>• Pregnancy</td>
<td></td>
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<tr>
<td>• Children less than 18</td>
<td></td>
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<tr>
<td><strong>Medicine interactions</strong></td>
<td>90%</td>
</tr>
<tr>
<td>• Theophylline, antacids, iron, sucralfate, probenecid</td>
<td></td>
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<tr>
<td>• Food: decreased absorption with milk</td>
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<tr>
<td><strong>Outcome</strong></td>
<td>90%</td>
</tr>
<tr>
<td>• Negative cultures</td>
<td></td>
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<tr>
<td>• Improved symptomatology</td>
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Step 5. Collect Data and Organize Results

- Prospective evaluation
  - Done as medicine is prepared or dispensed to the patient
  - Pharmacist can intervene at the time the medicine is dispensed

- Retrospective evaluation
  - Requires access to medical records

- Data sources
  - Patient charts, medical records, prescriptions, laboratory files
  - Manual systems versus computerized systems
  - Needs minimum of 50–75 records
Step 6. Analyze data

- Tabulate results for each indicator
- Analyze to see what percentage of prescribing episodes comply with the criteria and whether the threshold is met, for example, 70% of patients prescribed 3rd generation cephalosporins were given it for predefined criteria—20% short of threshold
- Determine why thresholds (benchmarks) are not met
- Analyze data quarterly or more frequently
Step 7. Develop Recommendations and Plan of Action

• Recommendations to address—
  • Inappropriate medicine use
  • Unacceptable patient outcomes
  • Interventions to resolve any medicine use problems

• Methods to resolve medicine use problems
  • Education
  • Medicine order forms
  • Prescribing restrictions
  • Formulary manual changes
  • STG changes
Step 8. Conduct DUE Follow-up

• Check to see that recommendations have been implemented.
• Re-evaluate DUE to see if problems with pharmaceutical therapy have been resolved.
When DUEs Go Wrong

- Lack of authority
- Poor prioritization of medicine use problems
- Poor documentation of findings
- Inadequate follow-up
- Overly intrusive data collection and evaluation
- Failure to obtain “buy in” and commitment from medical staff
DUE Example—Surgical Prophylaxis, Jordan (Jordan FDA Study)

Principles (criteria):

• Indications
  • Surgical antibiotic prophylaxis is defined as the use of antibiotics to prevent infections at the surgical field. Prophylaxis has become the standard of care for clean and clean-contaminated surgeries and for surgeries that involve the insertion of artificial devices.

• Drug selection
  • Antimicrobials should be directed against the likely causative organism(s) but need not necessarily include antibiotics that are active against every potential pathogen.

• Administration and timing
  • Usually IV, given immediately after induction of anaesthesia.

• Duration
  • In general, a single dose of a parenteral drug is sufficient. A second dose is suggested if the operation is longer than 4 hours.

Source: Rational Use in Jordan: Auditing Antibiotic Use by Targeting Surgical Prophylaxis at Jordanian Hospitals, Jordan FDA, 2011
Auditing Antibiotic Use by Targeting Surgical Prophylaxis at Jordanian Hospitals

Study setting

- A retrospective study was conducted over 3 months in a government hospital (Prince Hamzah Hospital), a university hospital (King Abdullah University Hospital), and a private hospital (Specialist Hospital) by reviewing medical records.

Surgical procedures selected

- 4 surgical procedures were selected for the study—3 clean surgeries (hernia repair, elective caesarian section, and laparoscopic cholecystectomy) and one clean-contaminated surgery (non-perforated appendectomy).
- Records of appendectomies and hernia repairs were reviewed in all hospitals included in this study; however, because Prince Hamza Hospital does not perform caesarian sections, cholecystectomies were reviewed there instead.
Auditing Antibiotic Use (2)

Guidelines

• The prescription of antibiotics was compared with the guidelines of the American Society of Health - System Pharmacist (ASHP).

Data collected

• Patient age & sex, date of admission, diagnosis, surgical wound class, surgical specialty, operation, duration of surgery, antibiotics used, route and timing of antibiotic administration, duration of antibiotic administration and the cost of them.

Patient characteristics

• The selected patients were non-beta lactam allergic and their ages were between 20-60 years old.
• No statistically significant differences were found between the patients with regard to patients sex, average age, average operation duration, and rate of associated disease.
Results

• A total of 645 patients underwent clean or clean–contaminated surgery; 465 patients underwent clean surgery.
• The main antibiotic use problems identified from the medical records in the 3 hospitals were, to a certain extent, almost the same; however, they varied by percentage of occurrence. The results were—
  • Overuse of antibiotics in the surgeries
  • Predominant use of 2nd and 3rd generation cephalosporin antibiotics in both low-risk clean and clean-contaminated operations
  • High cost of antibiotics used in the surgeries
  • Prolonged use of prophylactic antibiotics
Results (2)

• Prophylactic antibiotics were used in 59% of the procedures.
• In 98% of these cases, antibiotics were given preoperatively, at the induction of anesthesia by IV.
• 2nd & 3rd generation cephalosporin antibiotics were used more frequently in both low-risk clean & clean-contaminated operations.
• The most common 2nd & 3rd generation cephalosporins used were cefuroxime (41%) and ceftriaxone (25%).
• Antibiotic prophylaxis was administered as a single dose in 22% of the cases. Antibiotic prophylaxis was extended for multiple doses in 78% of patients.
Duration of Antibiotics Administration

- 78% Received multiple doses of antibiotics
- 22% Received single dose of antibiotics
Percentage of Appropriate Antibiotics Used

![Graph showing percentage of appropriate antibiotics used in different types of hospitals.]

- Governmental hospital: 70%
- Educational hospital: 100%
- Private hospital: 10%
Conclusions of Jordan DUE

• The study showed that irrational antimicrobial use in the surgical prophylaxis field is excessive and it's more predominant in the private sector than in the public sector.

• The common problems regarding use of antimicrobials in surgery were—
  • Inappropriate choice of antimicrobial
  • Inappropriate duration
  • Using the new generation of antibiotics which are costly
Summary

• DUE is an audit and feedback intervention where medicine use can be reviewed against approved criteria and thresholds

• Requires establishing criteria and thresholds and then reviewing medicine use to determine if therapy is appropriate

• Feedback to prescribers is necessary to improve prescribing (educational, managerial, regulatory interventions may be required)
DUE will help improve medicine use by—

• Ensuring that pharmaceutical therapy meets current standards
• Promoting optimal medication therapy
• Preventing medication-related problems
• Identifying areas in which further evaluation is needed
• Creating criteria for medicine use
• Defining thresholds for quality of medicine use below which corrective action will be undertaken
• Enhancing accountability in medicine use
• Controlling medicine costs