Pharmacoeconomic considerations

Zulkarnain R., Tri Widyawati

Dept. Pharmacology & Therapeutic School of Medicine Universitas Sumatera Utara
Sakit kepala
Sakit gigi
Bisulan
Rematik
Gout

Sudah keluargaku mati
Uangku pula yang habis

Rp
Rp
Rp
Rp
Rp
Pharmacoeconomic

Definition:
- The general field of determining whether a particular therapy is worth the cost.

*WAJAR apa TIDAK ???*

*PANTAS apa TIDAK ???*
Drug efficacy:
- drug’s effect on a disease under ideal circumstances i.e:
  - controlled clinical trial
  - defined regiment
  - compliance is assured

Drug effectiveness:
- overall outcome prescribing a drug has in actual clinical practice where the efficacy of a drug is modulated by more extraneous factors than occur in a clinical trial.

Ideally, pharmacoeconomic should report on the effectiveness of a drug, not efficacy.
Pharmacoeconomic studies:

• Cost minimization;
  - This study or analysis evaluates only the monetary costs of the therapy.
  - Appropriate when the outcome of the drug and another treatment are the same.
  - In such a case the decision to use one drug or another is related only to cost

Cost-benefit analysis;
  - Outcomes are expressed in monetary terms.
  - The cost of a drug regiment or a health program is compared with nonmedical costs such as a cost to protect the environment, education or defence.
Cost-effectiveness **analysis:**

- Cost are associates with outcomes as measured in physical units such as mmHg reduction in blood pressure, stroke prevented, hospital days prevented or lives saved

**Cost-utility analysis:**

- Variation of cost-effectiveness analysis
- Outcomes are transformed to some measure of utility such as Quality Adjusted Life Years (QALY)
  ---->
  quantity (Mortality) and quality (morbidity)
Pharmaco-economic

- **Adding drugs** to the **formulary** involves careful consideration of:
  - Efficacy
  - Safety
  - Quality
  - **Cost**

- Cost factors are becoming more important
- Science of pharmacoeconomics is emerging
  - **Cost** (total resources consumed in producing a good or service)
  - **Price** (the amount of money required to purchase an item)
Objectives

• Objectives of pharmacoconomics and outcomes research must originate within three dimensions when considering results and value of healthcare
  – Acceptable clinical outcomes
  – Acceptable humanistic outcomes
  – Acceptable economic outcomes
demam

anti-
infeksi

etc, etc, etc

batuk

sesak

cemas

diare

nangis

susah tidur
Pemilihan obat yang rasional

1. **tepat indikasi**, berkaitan dengan efektifitas obat
2. **tepat penderita**, berkaitan dengan keamanan (safety; efek samping) dan kesesuaian (suitability; kontraindikasi) obat
3. **tepat obat** yang dipilih (kelas terapi, jenis obat)
4. **tepat dosis** obat
5. **tepat pemberian** obat (cara, interval waktu dan lama pemberian obat)
- **cost-benefit-risk ratio**
  pemberian obat jangka lama (rematik, hipertensi) polifarmasi (→ interaksi obat yang merugikan)
ANTIBIOTIKA **bukan** ANTIPIRETIKA

- ANTI-TUSIVA
- ANTI-DIARE
- ANTI-ANXIETY

ANTIBIOTIKA **hanya** diberikan bila terbukti atau disangka kuat ada proses INFEKSI (kuman), jamur---→ anti jamur; virus-----→ antivirus, protozoa-----→ antiprotozoa)

ANTIBIOTIKA TUNGGAL lebih baik daripada ANTIBIOTIKA KOMBINASI

Waspada terhadap interaksi ANTIBIOTIKA dengan OBAT LAIN
# Adding drugs to the formulary

<table>
<thead>
<tr>
<th>Clinic</th>
<th>Available</th>
<th>Introduced</th>
</tr>
</thead>
<tbody>
<tr>
<td>GI ulcer</td>
<td>H2-antagonist</td>
<td>PPI</td>
</tr>
<tr>
<td>Arthritis</td>
<td>NSAID</td>
<td>COXIB, anti-TNF agents</td>
</tr>
<tr>
<td>Mental health</td>
<td>TCA</td>
<td>SSRIs, Atypical Anti-Psychotics</td>
</tr>
<tr>
<td>Women's health</td>
<td>- (osteoporosis)</td>
<td>biphosphonate</td>
</tr>
<tr>
<td>AIDS</td>
<td>-</td>
<td>Protease Inhibitors</td>
</tr>
</tbody>
</table>
Characteristics of Formulary Management

• Choosing drugs based on:
  • **Clinical considerations**
    – Efficacy
    – Safety
    – Tolerability
  • **Humanistic considerations**
    – Quality of Life
      (Is the gain worth the pain)
  • **Cost considerations**
Medical Outcomes

- Economic
  - Expense
  - Savings
  - Cost Avoidance

- Clinical
  - Cure
  - Comfort
  - Survival

- Humanistic
  - Physical
  - Emotional
  - Social
# Outcome Measures

<table>
<thead>
<tr>
<th>Disease</th>
<th>Indicator</th>
<th>Clinical Outcome</th>
<th>Humanistic Outcome</th>
<th>Economic Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>BP</td>
<td>Renal failure</td>
<td>QOL</td>
<td>Cost/↓ mmHg BP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stroke</td>
<td></td>
<td>Cost/stroke avoided</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MI</td>
<td></td>
<td>Cost/life year saved</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Death</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>LDL levels</td>
<td>Angina</td>
<td>QOL</td>
<td>Cost/MI avoided</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MI</td>
<td></td>
<td>Cost/point ↓ in LDL</td>
</tr>
<tr>
<td>Diabetes</td>
<td>BG levels</td>
<td>Retinopathy</td>
<td>QOL</td>
<td>Cost/kidney transplant avoided</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nephropathy</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Death</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>FEV, peak flow</td>
<td>Exacerbation</td>
<td>QOL</td>
<td>Cost/symptom free day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>event</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Death</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
kasus

- Laki-laki, 54 thn, batuk, sesak berdahak hijau, 240/130 mmHg, 112 x/mnt, RPT: DM type 2
- Dx: bronchitis chronic, acute exacerbation, hipertensi, PJK
- Tx:
  - infus RL 20 gtt/mnt,
  - O2 1-2 L/mnt,
  - aminofilin per infus,
  - inhaler salbutamol,
  - dexamethason 1 amp/8jam,
  - Adalat oros 1x1,
  - ceftriaxon inj,
  - ambroxol syr 3xC
Critical evaluation on selecting medicine

<table>
<thead>
<tr>
<th>Therapeutic effect</th>
<th>Adverse effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal</td>
<td>Yes</td>
</tr>
<tr>
<td>Maximal</td>
<td>?</td>
</tr>
<tr>
<td>Minimal</td>
<td>?</td>
</tr>
<tr>
<td>Maximal</td>
<td>No</td>
</tr>
</tbody>
</table>
Pharmacoeconomics: Why Use It?

- - - New Medications
- -
- -
+++ +
  +
- -
  +++

say NO say YES

Now what? Now what?
do it!

Effectiveness

$$
Generically Equivalent

- Pharmaceutically equivalent
- Therapeutically equivalent
- The *same* drug with the *same* effect, but the product is from a different manufacturer
# Outcome Measures for arthritis management

<table>
<thead>
<tr>
<th>Disease</th>
<th>Indicator</th>
<th>Clinical Outcome</th>
<th>Humanistic Outcome</th>
<th>Economic Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthritis</td>
<td>pain</td>
<td>CV event, GI event, Renal failure</td>
<td>QOL</td>
<td>Cost↓ mmHg BP, Cost/stroke avoided, Cost/life year saved</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NSAID</th>
<th>Indicator</th>
<th>Clinical Outcome</th>
<th>Humanistic Outcome</th>
<th>Economic Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>CELECOXIB</td>
<td>LESS</td>
<td>CV event</td>
<td>QOL</td>
<td>Cost &gt;&gt;</td>
</tr>
<tr>
<td>IBUPROFEN</td>
<td>MORE</td>
<td>GI event</td>
<td>QOL</td>
<td>COST &lt;&lt;</td>
</tr>
</tbody>
</table>
MOST EXPENSIVE THERAPY

THERAPEUTIC FAILURE
Commonly Prescribed Drugs

- Anti-inflammatory agents
- Analgesic agents
- Antimicrobial agents (antibiotics, antifungal, antiviral)
- Corticosteroids
- Antianxiety/sedative agents
**Adjuvant analgesic agents**
Gysling E. Me too's and generics.

- Generics are pharmaceutical products
  - containing the same active substance as an original branded medication.
  - used in order to reduce the cost of pharmacotherapy.
  - have to be bioequivalent to the original drug-their mean "area under the curve" (AUC) should not deviate from the AUC of the original by more than 20 percent.
- One generic is not necessarily bioequivalent to another generic.
- It is therefore highly questionable whether an original drug should be replaced by a no-name generic.
- Generic drugs should never be used if a better but non-generic medication is available.
<table>
<thead>
<tr>
<th>NO</th>
<th>OBAT GENERIK</th>
<th>Harga/unit</th>
<th>OBAT PATEN</th>
<th>Harga/unit</th>
<th>RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Acyclovir 200 mg</td>
<td>813</td>
<td>Zovirax (Glaxo)</td>
<td>5.940</td>
<td>1:7</td>
</tr>
<tr>
<td></td>
<td>Acyclovir 400 mg</td>
<td>1.217</td>
<td></td>
<td>8.943</td>
<td>1:7</td>
</tr>
<tr>
<td></td>
<td>Acyclovir Cream</td>
<td>3.205</td>
<td></td>
<td>68.500</td>
<td>1:21</td>
</tr>
<tr>
<td>2</td>
<td>Captopril 12,5 mg</td>
<td>175</td>
<td>Capoten (Squibb)</td>
<td>2.055</td>
<td>1:12</td>
</tr>
<tr>
<td></td>
<td>Captopril 25 mg</td>
<td>286</td>
<td></td>
<td>3.296</td>
<td>1:12</td>
</tr>
<tr>
<td></td>
<td>Captopril 50 mg</td>
<td>477</td>
<td></td>
<td>5.586</td>
<td>1:12</td>
</tr>
<tr>
<td>3</td>
<td>Furosemid 40 mg</td>
<td>80</td>
<td>Lasix (Hoechst)</td>
<td>2.217</td>
<td>1:28</td>
</tr>
<tr>
<td></td>
<td>Furosemid Injeksi</td>
<td>1.382</td>
<td></td>
<td>5.339</td>
<td>1:4</td>
</tr>
<tr>
<td>4</td>
<td>Glibenclamide 5 mg</td>
<td>145</td>
<td>Daonil (Hoechst)</td>
<td>1.589</td>
<td>1:11</td>
</tr>
<tr>
<td>5</td>
<td>NA Diklofenak 25 mg</td>
<td>218</td>
<td>Voltaren (Novartis)</td>
<td>1.540</td>
<td>1:7</td>
</tr>
<tr>
<td></td>
<td>NA Diklofenak 50 mg</td>
<td>309</td>
<td></td>
<td>2.683</td>
<td>1:9</td>
</tr>
<tr>
<td>6</td>
<td>Ofloxacinc 200 mg</td>
<td>1.280</td>
<td>Tarivid (Kalbe/Daiichi)</td>
<td>8.349</td>
<td>1:7</td>
</tr>
<tr>
<td></td>
<td>Ofloxacinc 400 mg</td>
<td>2.500</td>
<td></td>
<td>14.557</td>
<td>1:9</td>
</tr>
</tbody>
</table>
The proliferation of "me-too" drugs leads to beneficial cost reductions, but it may also put patients at risk.

Each me-too drug comes to the market with limited clinical experience as compared with compounds already in use.

- Five me-too drugs in the statin and quinolone classes have been withdrawn or restricted because of serious adverse effects that were not recognized until months or years after their approval
  - temafloxacin, grepafloxacin, cerivastatin, sparfloxacin, and trovafloxacin.

Therefore cost–safety issue has no simple answer.
## Original vs "Me-Too" prices
### Friend or Foe?

<table>
<thead>
<tr>
<th>Nimesulide</th>
<th>Pharmaceutical Co.</th>
<th>Price (Rp)/100mg</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Original</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aulin®</td>
<td>Gala</td>
<td><strong>2.950,-</strong></td>
</tr>
<tr>
<td>Nimed®</td>
<td>Schering</td>
<td><strong>2.950,-</strong></td>
</tr>
<tr>
<td><strong>“Me-Too”</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arnid®</td>
<td>Pharos</td>
<td><strong>2.750,-</strong></td>
</tr>
<tr>
<td>Ilusemin®</td>
<td>Phapros</td>
<td><em>( ? )</em></td>
</tr>
<tr>
<td>Ximede®</td>
<td>Combiphar</td>
<td><strong>3.200,-</strong></td>
</tr>
</tbody>
</table>
# Price Comparison Between Generic, Brand Name and 'Me too' Drugs

<table>
<thead>
<tr>
<th>Drug Class</th>
<th>Generic Name</th>
<th>ORIGINAL Brand Name</th>
<th>Me-too Brand Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antibiotics</strong></td>
<td><strong>Amoxicillin</strong></td>
<td><strong>Amoxil</strong></td>
<td><strong>Amoxsan</strong></td>
</tr>
<tr>
<td><strong>Analgesic/Antipyretic</strong></td>
<td><strong>Paracetamol</strong></td>
<td><strong>Tempra</strong></td>
<td><strong>Panadol</strong></td>
</tr>
<tr>
<td></td>
<td>Price : Rp. 8.500 / 60 mL syrup</td>
<td>Price : Rp. 10,400 / 60mL syrup</td>
<td>Price : Rp. 11,000 / 60mL syrup</td>
</tr>
<tr>
<td><strong>NSAIDs</strong></td>
<td><strong>Natrium Diclofenac</strong></td>
<td><strong>Voltaren</strong></td>
<td><strong>Voltanex</strong></td>
</tr>
<tr>
<td><strong>Anticonvulsants</strong></td>
<td><strong>Carbamazepine</strong></td>
<td><strong>Tegretol</strong></td>
<td><strong>Trileptal</strong></td>
</tr>
<tr>
<td></td>
<td>Price : Rp. 1,100 / tablet 200 mg</td>
<td>Price : Rp. 2,100 / tablet 200 mg</td>
<td>Price : Rp. 5,200 / tablet 300 mg</td>
</tr>
<tr>
<td><strong>Antihypertensives</strong></td>
<td><strong>Captopril</strong></td>
<td><strong>Capoten</strong></td>
<td><strong>Acepress</strong></td>
</tr>
<tr>
<td></td>
<td>Price : Rp. 3,400 / tablet 50 mg</td>
<td>Price : Rp. 5,100 / tablet 50 mg</td>
<td>Price : Rp. 5,800 / tablet 50 mg</td>
</tr>
</tbody>
</table>
PREScribing CASCADE

Drug 1

adverse drug effect interpreted as a new clinical condition

Drug 2

adverse drug effects

Kaskade peresepean di klinik pribadi

Keadaan awal

Nyeri dengkul

Nyera

terapi

Simtom baru

terapi ikutan

OAINS

Nyera ulu hati

antasida

konstipasi

laksansia

diare

dst
Kaskade pengobatan di masyarakat
The most common events were for

- NSAIDs,
- psychotropic-related fall with fracture,
- digoxin toxicity,
- insulin hypoglycemia

<table>
<thead>
<tr>
<th>hospitalized patients with</th>
<th>number of medications per patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADR</td>
<td>7.9 ± 2.6</td>
</tr>
<tr>
<td>Non-ADR</td>
<td>3.3 ± 1.3</td>
</tr>
</tbody>
</table>

adverse drug reaction (ADR)-related hospitalisations


≥ 5 drugs/patient

ADR non-ADR

number of drugs consumed

admission discharge

0% 20% 40% 60% 80% 100%

0 1 2 3 4 5 6 7 8 9

ADR non-ADR

0% 20% 40% 60% 80% 100%

admission discharge
DRUG RELATED PROBLEMS IN THE ELDERLY

- getting older
- concomitance diseases
- Cardiovascular (CHD, CHF)
- Degenerative (OA)
- Metabolic (DM), etc
- polypharmacy
- ACE-inhibitor
- NSAID
- OAD, etc
- drug interaction
- ADRs . . . . . . . . . . ☠ ☠ ☠ ☠
Health care habits of elderly

- use **over-the-counter** medication regularly including “jamu” containing “steroid”
- get medications from more than one pharmacy, or from **friends**
- visit **several doctors**, each of whom may prescribe different medications
- complain a lot of symptoms

→ **prescribing cascade**
PAIN

CANCER

ALZHEIMER DISEASE

NSAID=Rp

fluid retention

increase BP

PSMBA

heart burn

Rp

Rp

Rp

Rp

iatrogenic Cost
HOW TO AVOID THE CASCADE??

= Listen carefully

= Ask/interview carefully

= Examine carefully
how to minimize the prescribing cascade in hospitalised elderly patients

- consider co-morbid disease, organ function, and concomitant drugs prior to drug therapy selection
- do non-pharmacological approach
- use a simple regimen with the lowest effective dose
- reduce the dose given
- try to administer the alternative drug
- make sure that the new adding drug is really needed and safe
- minimize polypharmacy
Sudah diminum atau belum?

Ini dia, tapi aku lupa bagaimana cara menggunakankannya.

Dimana obatku?

3 x 1 ≠ 1 x 3

Efek terapeutik ≠ Efek samping obat

Hindari pemakaian obat yang berbahaya . . .

. . . . . . . . . . . . . . pilihlah obat yang aman

. . dengan regimen obat yang sederhana
sekitar 90% penderita akan merasa lebih sehat meskipun dokter tidak melakukan sesuatu oleh karena itu pertama sekali jangan bikin celaka! first do no harm!
Thanks for the Attention