Saving Money without Compromising Care or Clinical Efficacy

Michael S. Awadalla, PharmD
Disclaimer

• All economic considerations should be used for benchmarking purposes only. Selection of appropriate medication therapy is at the discretion of the prescriber on a case-by-case basis.
Outline

• Cost Background
• Specific Costs by Therapeutic Class
  • Hyperlipidemia
  • Gastroesophageal Reflux Disease
  • Diabetes Mellitus
  • Glaucoma
  • Ophthalmic allergy Drops
  • Topical Analgesics

• Conclusion
• Questions?
• References
How much are we spending?

- Health care spending in the United States totaled nearly $2.6 trillion in 2010.
- Spending in the US for prescription drugs was $234.1 billion in 2008, nearly 6 times the $40.3 billion spent in 1990.
- Almost 80% of FDA-approved drugs have generic counterparts.

Source: Center for Medicare and Medicaid Services

Hyperlipidemia

• Statin medications are considered the most effective options for the treatment of hyperlipidemia. The majority of patients are recommended to use either a high or moderate intensity statin.
  • High intensity statin:
    • Atorvastatin 40-80mg
    • Rosuvastatin 20mg
  • Moderate intensity statin:
    • Atorvastatin 10-20mg
    • Rosuvastatin 10mg
    • Simvastatin 20-40mg
    • Pravastatin 40mg
    • Lovastatin 40mg
    • Fluvastatin 40mg BID

• Pravastatin
  • Not significantly metabolized by cytochrome P450
  • May be less likely to be involved in drug interactions
  • More hydrophilic, not as much crosses the blood brain barrier, which decreases risks of cognitive impairment as well as myopathy/rhabdomyolysis as compared to other statin medications.

2013 ACC/AHA Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults
<table>
<thead>
<tr>
<th>Medication</th>
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<th>Total Daily Dose</th>
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<th>Duration of Therapy</th>
<th>Cost of Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atorvastatin</td>
<td>Tablets 10, 20, 40, 80mg</td>
<td>Qdaily</td>
<td>Hyperlipidemia</td>
<td>10-80mg</td>
<td>$3.85 - $5.77</td>
<td>28 Days</td>
<td>$107.80 - $161.49</td>
</tr>
<tr>
<td>Rosuvastatin</td>
<td>Tablets 5, 10, 20, 40mg</td>
<td>Qdaily</td>
<td>Hyperlipidemia</td>
<td>5-40mg</td>
<td>$8.64</td>
<td>28 Days</td>
<td>$241.99</td>
</tr>
<tr>
<td>Simvastatin</td>
<td>Tablets 5, 10, 20, 40, 80mg</td>
<td>Qdaily</td>
<td>Hyperlipidemia</td>
<td>5-80mg</td>
<td>$2.10 - $4.91</td>
<td>28 Days</td>
<td>$58.80 - $137.55</td>
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<tr>
<td>Pravastatin</td>
<td>Tablets 10, 20, 40, 80mg</td>
<td>Qdaily</td>
<td>Hyperlipidemia</td>
<td>10-80mg</td>
<td>$3.22 - $4.79</td>
<td>28 Days</td>
<td>$90.02 - $134.24</td>
</tr>
<tr>
<td>Lovastatin</td>
<td>Tablets 10, 20, 40mg</td>
<td>Qdaily</td>
<td>Hyperlipidemia</td>
<td>10-80mg</td>
<td>$1.35 - $4.27</td>
<td>28 Days</td>
<td>$37.66 - $239.02</td>
</tr>
<tr>
<td>Fluvastatin</td>
<td>Tablets 20, 40mg</td>
<td>Qdaily</td>
<td>Hyperlipidemia</td>
<td>20-80mg</td>
<td>$4.99</td>
<td>28 Days</td>
<td>$139.94 - $279.88</td>
</tr>
</tbody>
</table>
Gastroesophageal Reflux Disease

• Evaluate the need or therapeutic advantage of long term use of PPI
• Bioavailability may be increased in the elderly (≥65 years of age), however, dosage adjustments are not necessary.
• NOT BENIGN DRUGS!
  • An increased risk of fractures of the hip, spine, or wrist has been observed in epidemiologic studies with proton pump inhibitor (PPI) use, primarily in older adults ≥50 years of age.
  • Hypomagnesemia
  • Clostridium difficile infections.
• Convert brand name meds to generic name
• If long term use is necessary: consider pantoprazole (less drug-drug interactions)
• Can an OTC H2RA be used?
# Gastroesophageal Reflux Disease

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dosage Forms</th>
<th>Frequency</th>
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<th>Total Daily Dose</th>
<th>Medication Cost</th>
<th>Duration of Therapy</th>
<th>Cost of Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pantoprazole</td>
<td>Tablets EC 40mg</td>
<td>Qdaily</td>
<td>GERD</td>
<td>40 mg</td>
<td>$4.91</td>
<td>28 Days</td>
<td>$114.56</td>
</tr>
<tr>
<td>Omeprazole</td>
<td>Capsule DR 20mg</td>
<td>Qdaily</td>
<td>GERD</td>
<td>20mg</td>
<td>$4.30</td>
<td>28 Days</td>
<td>$120.40</td>
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<tr>
<td>Esomeprazole</td>
<td>Capsule DR 20mg</td>
<td>Qdaily</td>
<td>GERD</td>
<td>20mg</td>
<td>$8.52</td>
<td>28 Days</td>
<td>$238.56</td>
</tr>
<tr>
<td>Lansoprazole</td>
<td>Capsule DR 15mg</td>
<td>Qdaily</td>
<td>GERD</td>
<td>15mg</td>
<td>$5.90</td>
<td>28 Days</td>
<td>$165.13</td>
</tr>
<tr>
<td>Ranitidine</td>
<td>Tablets 75, 150mg</td>
<td>Qdaily-BID</td>
<td>GERD</td>
<td>75 - 300 mg</td>
<td>$0.22 - $1.56</td>
<td>28 Days</td>
<td>$6.16 - $87.48</td>
</tr>
</tbody>
</table>
Diabetes Mellitus

• Based on all of the available literature of metformin in patients with renal dysfunction, many experts suggest that metformin use should be allowed in patients with mild to moderate renal impairment.

• Metformin should **NOT** be used in patients with unstable renal function

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<table>
<thead>
<tr>
<th>eGFR (mL/min)</th>
<th>Maximum Daily Dose</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 60</td>
<td>2550 mg</td>
<td>Monitor renal function at least annually.</td>
</tr>
<tr>
<td>45 to 59</td>
<td>2000 mg</td>
<td>Monitor renal function every 3 to 6 months.</td>
</tr>
<tr>
<td>30 to 44</td>
<td>1000 mg</td>
<td>Monitor renal function every 3 months. Do not initiate metformin therapy, but may be continued in patients already taking it.</td>
</tr>
<tr>
<td>&lt; 30</td>
<td>Do not use</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

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*a. For patients with stable renal function.*
Diabetes Mellitus - Dipeptidyl peptidase-4 (DPP-4) inhibitors

Indication: Adjunct to diet/exercise to improve adult T2DM glycemic control

Januvia:
- Single Agent or Add-on Therapy
- 0.5-0.7% drop in A1c
- Weight Neutral
- Dosage adjustments based upon renal function

Onglyza:
- Single Agent or Add-on Therapy
- 0.4-0.9% drop in A1c
- Weight Neutral
- Dosage adjustments based upon renal function

Tradjenta:
- Single Agent or Add-on Therapy
- 0.4-0.7% drop in A1c
- Weight Neutral
- NO dosage adjustments based upon renal function
## Diabetes Mellitus

<table>
<thead>
<tr>
<th>Medication</th>
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<th>Cost of Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td>Tablet ER</td>
<td>Qdaily</td>
<td>DM</td>
<td>500-2500mg</td>
<td>$0.75 - $3.90</td>
<td>28 Days</td>
<td>$20.86 - $109.20</td>
</tr>
<tr>
<td>Januvia</td>
<td>Tablet 25, 50, 100mg</td>
<td>Qdaily</td>
<td>DM</td>
<td>25 - 100mg</td>
<td>$13.23</td>
<td>28 Days</td>
<td>$370.30</td>
</tr>
<tr>
<td>Onglyza</td>
<td>Tablet 2.5-5mg</td>
<td>Qdaily</td>
<td>DM</td>
<td>2.5-5mg</td>
<td>$12.99</td>
<td>28 Days</td>
<td>$363.89</td>
</tr>
<tr>
<td>Tradjenta</td>
<td>Tablet 5mg</td>
<td>Qdaily</td>
<td>DM</td>
<td>5mg</td>
<td>$13.22</td>
<td>28 Days</td>
<td>$370.32</td>
</tr>
</tbody>
</table>

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Glaucoma

Prostaglandin analogs are considered the most effective drugs at lowering increased Intra-ocular pressure (IOP)

• Comparing the efficacy of latanoprost (0.005%), bimatoprost (0.03%), travoprost (0.004%), and timolol (0.5%) in the treatment of primary open angle glaucoma by Mishra et al.
  • Bimatoprost produced the largest reduction in IOP, -2.71
  • Travoprost and latanoprost produced similar reductions in IOP, -1.27 and -1.25 respectively
### Glaucoma

<table>
<thead>
<tr>
<th>Medication</th>
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<th>Frequency</th>
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<th>Medication Cost</th>
<th>Duration Of Therapy</th>
<th>Cost of Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bimatoprost</td>
<td>Eye Drop 0.01% 5mL</td>
<td>Qdaily</td>
<td>Glaucoma</td>
<td>1 Drop</td>
<td>$243</td>
<td>100 Days</td>
<td>$243</td>
</tr>
<tr>
<td>Latanoprost</td>
<td>Eye Drop 0.005% 5mL</td>
<td>Qdaily</td>
<td>Glaucoma</td>
<td>1 Drop</td>
<td>$88</td>
<td>100 Days</td>
<td>$88</td>
</tr>
<tr>
<td>Travoprost</td>
<td>Eye Drop 0.004% 2.5mL</td>
<td>Qdaily</td>
<td>Glaucoma</td>
<td>1 Drop</td>
<td>$104.05</td>
<td>100 Days</td>
<td>$210.10</td>
</tr>
</tbody>
</table>

www.Lexicomp.com
## Allergy Eye Drops

<table>
<thead>
<tr>
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<th>Duration of Therapy</th>
<th>Cost of Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ketotifen</td>
<td>Solution 0.025% (5mL)</td>
<td>BID</td>
<td>Allergic Conjunctivitis</td>
<td>2 Drops</td>
<td>$11.70/5mL</td>
<td>N/A</td>
<td>$11.70/5mL</td>
</tr>
<tr>
<td>olopatadine</td>
<td>Solution 0.2% (2.5mL)</td>
<td>Qdaily</td>
<td>Allergic Conjunctivitis</td>
<td>1 Drop</td>
<td>$189.84/2.5mL</td>
<td>N/A</td>
<td>$189.84/2.5mL</td>
</tr>
</tbody>
</table>
Allergy Eye Drops

Comparison of ketotifen and olopatadine for allergic conjunctivitis:

**Inconsistent Data:**
- Hida et al: Significant difference in favor of ketotifen (p<0.05)
  - Both drugs were safe and efficacious.

- Mortemousque et al: Found no statistical difference in improvement between either therapy group
  - Ketotifen showed a patient reported trend of better tolerability at day 7 (p = 0.054)
  - Rapid and comparable improvement in seasonal allergic conjunctivitis was achieved at 28 days in both groups

- Varguez-Rodríguez et al: Olopatadine showed significant improvements compared to ketotifen
  - Itching at 30 mins and 1 week (p<0.05)
  - Burning at 30 mins, 1 and 2 weeks (p<0.05)
  - Tearing at 30 mins (p<0.05)
Keratoconjunctivitis sicca

Calcineurin Inhibitor, (Restasis)
First line of therapy should be Artificial Tears Drops
Unless a clinical production issue
Cost saving opportunity
~$200 vs. $5

<table>
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<th>Cost of Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restasis</td>
<td>Solution 0.05%</td>
<td>Qdaily</td>
<td>Kerato-conjunctivitis Sicca</td>
<td>1 Drop</td>
<td>$7.77/drop</td>
<td>28 Days</td>
<td>$217.56</td>
</tr>
<tr>
<td>Artificial Tears</td>
<td>Solution 1.4% (15mL)</td>
<td>PRN</td>
<td>Kerato-conjunctivitis sicca</td>
<td>1-2 Drop</td>
<td>$9.88/15mL</td>
<td>N/A</td>
<td>$9.88/15mL</td>
</tr>
</tbody>
</table>

If there’s ever a scenario where restasis needs to be used (resistant dry eye), you should automatically question the patient’s ACB load.
## Analgesics for Mild-Mod Acute Pain

<table>
<thead>
<tr>
<th>Medications</th>
<th>Dosage Forms</th>
<th>Frequency</th>
<th>Indication</th>
<th>Total Daily Dose</th>
<th>Medication cost</th>
<th>Duration of therapy</th>
<th>Cost of Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flector Transdermal</td>
<td>Patch 1.3%</td>
<td>BID</td>
<td>Acute Pain</td>
<td>2 patches</td>
<td>$10.69</td>
<td>28 Days</td>
<td>$598.86</td>
</tr>
<tr>
<td>Lidoderm</td>
<td>Patch 5%</td>
<td>Qdaily – 12h on /12h off</td>
<td>Acute Pain</td>
<td>1 patch</td>
<td>$10.27</td>
<td>28 Days</td>
<td>$287.72</td>
</tr>
<tr>
<td>Icy Hot</td>
<td>Patch</td>
<td>BID</td>
<td>Acute Pain</td>
<td>2 patches</td>
<td>$1.07</td>
<td>28 Days</td>
<td>$59.73</td>
</tr>
<tr>
<td>Voltaren</td>
<td>Gel 1%, 100g</td>
<td>QID</td>
<td>Acute Pain</td>
<td>16g</td>
<td>$54.43</td>
<td>7 Days Max</td>
<td>$54.43</td>
</tr>
</tbody>
</table>
Antispasmodics/Anticholinergic Agent

Muscarinic Receptor binding affinity and selectivity of antispasmodics

• Lower M2:M3 ratio is associated with increased risk of dry mouth and constipation (oxybutynin and darifenacin)

• Lower M3:M1 ratios have greater theoretical risk of CNS adverse events (oxybutynin and tolteradine)

• Ability to cross the Blood Brain Barrier:
  Dari > Oxyb > Soli > Tolt > Feso > Tros
## Antispasmodics/Anticholinergic Agent

- Can a generic medication such as oxybutynin or oxybutynin ER be used?

<table>
<thead>
<tr>
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<th>Cost of Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detrol LA</td>
<td>Capsule ER 2, 4mg</td>
<td>Qdaily</td>
<td>Overactive Bladder</td>
<td>2-4mg</td>
<td>$8.03</td>
<td>28 Days</td>
<td>$225</td>
</tr>
<tr>
<td>Enablex</td>
<td>Tablet 7.5, 15mg</td>
<td>Qdaily</td>
<td>Overactive Bladder</td>
<td>7.5-15mg</td>
<td>$11.18</td>
<td>28 Days</td>
<td>$313.04</td>
</tr>
<tr>
<td>Vesicare</td>
<td>Tablets 5, 10mg</td>
<td>Qdaily</td>
<td>Overactive Bladder</td>
<td>5-10mg</td>
<td>$9.72</td>
<td>28 Days</td>
<td>$272.23</td>
</tr>
<tr>
<td>Oxybutynin ER</td>
<td>Tablet ER 5, 10, 15mg</td>
<td>Qdaily</td>
<td>Overactive Bladder</td>
<td>5-30mg</td>
<td>$3.28 - $3.36</td>
<td>28 Days</td>
<td>$91.95 - $188.16</td>
</tr>
<tr>
<td>Oxybutynin IR</td>
<td>Tablets 5mg</td>
<td>BID-QID</td>
<td>Overactive Bladder</td>
<td>10-20mg</td>
<td>$0.62</td>
<td>28 Days</td>
<td>$34.70-$69.40</td>
</tr>
</tbody>
</table>

[www.Lexicomp.com](http://www.Lexicomp.com)
Questions?

http://saphanatutorial.com/hadoop-interview-questions-and-answers-hadoop-mapreduce-hdfs/
References

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• 2013 ACC/AHA Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults

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References

Allergy Eye Drops:


- Hida WT, Nogueira DC, Schaefer A, Dantas PE, Dantas MC. [Comparative study between 0.025% ketotifen fumarate and 0.1% olopatadinehydrochloride in the treatment of vernal keratoconjunctivitis]. Arq Bras Oftalmol. 2006 Nov-Dec;69(6):851-6.

Topical Patches:


- Antispasmotics/Anticholinergics


Pricing:

- www.LexiComp.com
References

Pain

