"Let's Talk Drugs!": The Role of Medications in People's Lives from a Hospital Pharmacist's Perspective

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OUTLINE:

1. BACKGROUND INFORMATION
   - key definitions
2. POSITIVE IMPACT OF MEDICATIONS IN PEOPLE'S LIVES
   - Drivers of drug development – past and present
   - Principles in regards to efficacy of medications
3. CAVEATS OF MEDICATIONS IN PEOPLE'S LIVES
   - Limitations of medications
   - Adverse drug reactions
   - Risk versus benefit analysis of medications
4. "DARK SIDE" OF MEDICATIONS IN PEOPLE'S LIVES
   - Polypharmacy
   - Pharmaceutical companies

FORMAT:

1. USE CASE EXAMPLES (some from my practice)
2. CLASS DISCUSSION

BACKGROUND INFORMATION:

- Graduated from the Leslie Dan Faculty of Pharmacy at the University of Toronto in 2009
- Description of workplace:
  - Bruyere Continuing Care – Saint Vincent Hospital site (complex continuing care facility), 350 beds
  - Patient population:
    - Specialized complex care (chronic assisted ventilator care, dialysis)
    - Restorative care (post-stroke, wound care, general deconditioning after acute event – ie. fracture)
    - Supportive care (cancer, neurodegenerative diseases)

    **predominantly – elderly population*

SOINS CONTINUS Bruyère CONTINUING CARE

DEFINITIONS:

- **MEDICATION:**
  - Any substance intended for use in the treatment, prevention, diagnosis, or cure of disease
  - Ideal medication:
    - Selective in action ie. Targets

    tissue of disease and not healthy tissue

DEFINITIONS:

- **PHARMACIST is:**

  "Trained and qualified in all aspects of:

  - handling medications, including prescription and non-prescription medications
  - drug therapy and understanding drug interactions and side-effects"

  AND

  "Trained in the principles of good pharmaceutical care including patient counseling and care"

"druggist"
"pill-pusher"
"chemist"

POSITIVE IMPACT OF MEDICATIONS IN PEOPLE'S LIVES

DRIVERS OF DRUG DEVELOPMENT:

1. REDUCING GLOBAL COST – ie. loss of human capital

- death from infectious diseases
  - antiretrovirals (HIV)
  - vaccines (MMR, polio, smallpox)
- wars – treatment for wounded soldiers
  - opioids (codeine, morphine) - pain
  - expansion of antibiotic development

DRIVERS OF DRUG DEVELOPMENT:

2. REDUCING COST TO INDIVIDUALS – ie. condition impacting ability to perform daily activities

- Psychiatric conditions (depression, anxiety) – antidepressants, benzodiazepines
- Pain (osteoarthritis, fracture)

  – NSAIDs, opioids

DRIVERS OF DRUG DEVELOPMENT:

3. UNDERSTANDING OF DISEASE CONDITIONS, BIOCHEMICAL AND PHYSIOLOGICAL PROCESSES OF BODY → targeted drug therapy:

- Diabetes – insulin
- Parkinson's Disease – levo-dopa
- Epilepsy – antiepileptics

DRIVERS OF DRUG DEVELOPMENT:

4. REDUCING DOWNSTREAM HEALTHCARE COSTS

- Reducing costs to treat patient for heart attack in hospital:
  - Smoking cessation therapies – nicotine products
  - Blood pressure lowering medications, cholesterol lowering medications

DRIVERS OF DRUG DEVELOPMENT:

5. NEEDING BETTER MEDICATIONS TO TREAT CONDITIONS:

- More effective – ie. antibiotic resistance
- More safe – ie. Less adverse drug reactions
- Less drug interactions
- More convenient for patient
  - blood work not needed to monitor effectiveness ie. Coumadin - INR
  - Different dosage forms – tablets, injectables, patches
  - Once a day vs. multiple day dosing

WHY DO YOU TAKE MEDICATIONS?

1. Hangover – Advil, Aspirin
2. Allergies – Nasonex
3.

MY ROLE AS A HOSPITAL PHARMACIST IN FACILILATING GOALS OF DRUG THERAPY:

GOALS OF (DRUG) THERAPY:

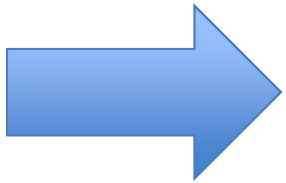
1. Treat signs/symptoms of disease
   (ie. pain)
2. Cure disease
   (ie. infection)
3. Prevent disease
   (ie. Heart attack)

- 1 and 2 often most important for patient – *affects comfort and function*
- 3 – not always important to patient initially – *future event that may not occur*

MY ROLE AS A HOSPITAL PHARMACIST IN FACILILATING GOALS OF DRUG THERAPY:

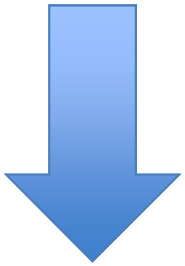
KEY PROCESSESS INVOLVED:

1. Performing an assessment
2. Creating a care plan
3. Monitoring for drug efficacy



WHO IS INVOLVED?

1. Patient
2. MD
3. Other HCPs – PT, OT, nurses, dieticians



WHEN IS THIS DONE?

1. Patient admitted – medical issues (new and old) undermanaged ie. Pain, BP control
2. Ongoing – new medical issues ie. infection, dying

CASE 1:

Principle: ***Explain the purpose of a drug that is meaningful for patient***

- 55M, dialysis patient, previous history of heart attack
- Has been on Lipitor 20mg daily, asks “why am I on this drug?”

CASE 1:

Principle: *Explain the purpose of a drug that is meaningful for patient*

Possible answers:

1. “reduce cholesterol”
2. “studies have shown that Lipitor reduces risk of cardiovascular disease”
3. “Based on a scoring system that estimates your risk of having another heart attack, you are at high risk – your risk factors are previous heart attack having diabetes. Your risk of having another heart attack is about 20% in 5 years. Lipitor will reduce your risk by about 5% in 5 years”

CASE 2:

Principle: ***Explain the purpose of a drug that is meaningful for patient***

- 83F – Type II Diabetes
- treated with only oral medications, blood glucose levels remain high – symptoms include urinating often, fatigued, therefore confined to room – cannot enjoy doing activities like exercising in physiotherapy, knitting with her friends
- Patient refuses insulin therapy – fear of needles

CASE 2:

Principle: *Explain the purpose of a drug that is meaningful for patient*

Possible approaches to explain the benefits of insulin:

1. “If we start insulin, your blood sugars will decrease”
2. “If we get your sugars to target, your risk of a heart attack will be further decreased by 3 percent in 10 years”
3. “With advanced diabetes, your body is not producing enough insulin. Insulin is a hormone that allows sugar to be taken up tissues/organs like the brain and muscles so that they you have enough energy to do activities. If you start insulin – you will have energy to enjoy the leisure activities you did before.”

CASE 3:

Principle: ***Maximize the efficacy of a drug***

Patient: “Dilaudid not effective for pain during intense physiotherapy”

- Give Dilaudid at least ½ hour prior to appointment (amount of time needed to get high enough drug levels in body)
- Dose too low

CASE 4:

Principle: ***Maximize the efficacy of a drug***

Nurse: “Levofloxacin not effective for treating patient’s pneumonia”

- Drug interaction - taking concurrently with calcium supplement. The two agents will bind together in the gastrointestinal tract and the levofloxacin will not be absorbed into the bloodstream

CASE 5:

Principle: *Appropriate time frame to assess efficacy*

Family member: “Antidepressant not effective”

- Takes 2-3 weeks to reduce physical symptoms of depression – ie. Poor sleep, appetite
- Takes 4-6 weeks to reduce symptoms affecting mood ie. Negative feelings, tearful

CAVEATS OF DRUG THERAPY

CASE 6:

Principle: *"Limitation of drugs in achieving goals of therapy"*

- 88F – admitted to SVH restorative program after had a fall at home, did not make significant gains, now waiting for LTC – typically stays in room, underlying anxiety disorder. Pharmacist speaks to patient who is more anxious because not sleeping well (lies awake during the night), nervous about going to LTC
- Currently on lorazepam (Ativan) 0.5mg twice daily when needed for anxiety attacks

CASE 6:

Principle: ***"Limitation of drugs in achieving goals of therapy"***

Possible solutions:

1. Increase dose of lorazepam
2. Address causes of her anxiety:
    - Sleep – pharmacist can speak to recreational therapist who can find ways to increase activity in the day to reduce daytime napping - participation in group activities, volunteer to spend time one-one time
    - Pharmacist can speak to social worker who can provide reassurance to patient about LTC process

CASE 7:

Principle: *"Limitation of drugs in achieving goals of therapy"*

- 45M – dialysis, amputation of right and left leg,
- Currently has necrotic fingers (patient wants to avoid amputation of fingers – would have significant impact on functioning)
- Factors affecting healing infected fingers - advanced Type II Diabetes on insulin – does not eat prescribed diet, current smoker
- Current medications:
  - Meropenem ("big gun" IV antibiotic to treat bacterial infections)
  - Pentoxyfylline (helps to improve blood flow to infected fingers)

CASE 7:

Principle: ***"Limitation of drugs in achieving goals of therapy"***

- Despite treatment with expensive drugs - eventually needed to have fingers amputated
- Patient: "failure of antibiotic" (no sense of own responsibility)
- Class discussion – prevention versus treatment approach to healthcare – which is more appropriate?

DEFINITIONS:

- **ADVERSE DRUG REACTION**
  - Describes noxious or unintended or undesired effect of a drug that is administered at normal doses

  **Frequency and severity of side effects*

Expression to Describe Frequency of ADR	Incidence
Common	More than 10% of population
Frequent	1-10%
Uncommon	0.1-1%
Rare	0.01-0.1%
Very Rare	Less than 0.01%

"I read on the internet that Drug A causes arrithymias – I don't want to take this medication"

Advertisement on television: "Drug A can cause drowsiness, increase blood glucose levels, can worsen vision etc…"

Severity of Adverse Drug Reactions	Examples of Adverse Drug Reactions	Impact on Patient	Case example
Mild	Nausea Headache Fatigue	Patient A can tolerate ADR	Patient on only analgesic that is effective for pain – accepts mild nausea
Moderate	Same as above Muscle tremor Changes in mood Sleep disturbances	Patient B cannot tolerate ADR Distressing, annoying	Patient on antiseizure medication – so drowsy that cannot function
Severe (rare, very rare)	Gastro-intestinal bleeding Liver failure	Life threatening	Vioxx – removed from market – increased heart attack risk

Principle: *"Drug A may be safe in Patient A, but not in Patient B"*

INCIDENT OF ADR - INTERINDIVIDUAL VARIABILITY
Drug interactions - cumulative effect of ADR of two or more drugs (drug stacking) ie. Excess drowsiness - In liver, drug B inhibits the metabolism of Drug A to inactive form – accumulation of drug
Genetics - more susceptible to ADR (cannot always predict, genetic screening available)
Age - elderly more susceptible to ADR of drugs – physiological changes ie. Kidney and liver disease – affects metabolism and elimination of drug from body - polypharmacy* - More diseases – drug-disease interaction (see below)
Disease: - ADR of drug may worsen existing symptoms of disease that drug not being used to treat ie. Patient more likely to experience heart arrhythmia if have underlying heart disease

Principle: *"Risk versus Benefit of Drugs"*

- Pharmacists involved in discussing the possible risks against the expected benefits of starting a drug with patient
  - Can risk be managed?
    - Start at low dose, and increase dose slowly
    - Timing of doses – ie, with meals to minimize nausea, in the morning to avoid insomnia
    - Remove unnecessary drugs that could potentiate effect of new drug
    - Other drugs may be used to control the side effect ie. Laxatives to relieve constipation
    - Vigilant monitoring –ie. liver enzymes, blood cell count
  - Other alternatives – may be less effective, but safer
    - Warfarin may more effective to prevent clots in the heart, but Aspirin less likely to cause gastrointestinal bleeding
  - Typically do not recommend starting a drug if the risks outweigh the benefits
    - Patient may accept risks ie. Cancer treatment

"DARK SIDE" OF DRUGS – POLYPHARMACY AND PHARMACEUTICAL COMPANIES

POLYPHARMACY IN THE ELDERLY

Background information:

- Definition of **POLYPHARMACY:**
  - "Using or administrating 5 or more drugs daily" (Health Canada Report, 2009)
    - 53% of elderly patients (>65 years) in health care institutions, not 10-20 drugs daily not uncommon
  - In some cases:
    - All drugs used justified ie. All may be needed
  - In other cases:
    - All drugs used not justified

NEGATIVE IMPACT OF POLYPHARMACY IN THE ELDERLY

1. ADVERSE DRUG REACTIONS:

- Common examples of adverse drug reactions:
  - confusion
  - drowsiness
  - lightheadedness
- Drug-drug interactions, drug-disease interactions, physiological changes (Refer to slide 30)

NEGATIVE IMPACT OF POLYPHARMACY IN THE ELDERLY

2. COSTS TO HEALTHCARE SYSTEM:

- Costs of **DRUGS** (10% of public healthcare spending in 2011)
- Costs of **MANAGING ADR**
  - 25% of hospital admissions in the elderly related to ADR
  - Ie. Excess drowsiness → fall → fracture
    - hip fractures consume more hospital bed days than stroke, diabetes, or heart attack combined
    - Many cases could have been prevented – "drugectomy"

NEGATIVE IMPACT OF POLYPHARMACY IN THE ELDERLY

3. PATIENT PERSPECTIVE:

- Consequences of ADR – ie. Fracture – limited mobility, pain – negative impact on mental health
- More drugs, more “sick”

NEGATIVE IMPACT OF POLYPHARMACY IN THE ELDERLY

3. PATIENT PERSPECTIVE:

- Scenario:
  - You are a new hospital patient, and a nurse comes to you with a container of 20 drugs – different sized capsules/tablets and then says “take these drugs, and I will be prepare an injection that I will give you”
  - Thoughts? Feelings?

WHY DOES UNDESIRED POLYPHARMACY OCCUR IN THE ELDERLY?

1. ***DOMINO EFFECT***
   - Drug A causes ADR A, which is treated with Drug B, which causes ADR B, which is treated with Drug C
2. ***CONTINUE TO TREAT AGGRESSIVELY***
   - Treat to unnecessary targets ie. BP, BG
   - No discussion with patient – goals of therapy? Ie. comfort/function vs. prevention

WHY DOES UNDESIRED POLYPHARMACY OCCUR IN THE ELDERLY?

3. *DON'T ASSUME PATIENT WANTS TO BE TREATED WITH MEDICATION FOR CONDITION*

Patient states: "I have oral secretions" (uses suction)

-MD assumes wants to be treated with medications

-pharmacist speaks to patient – "managing secretions well with suction"

Nurse states: "she has symptoms of Parkinson's disease – rigidity, slowness in movement"

-seen by neurologist and prescribed Sinemet

-pharmacist spoke to patient – "symptoms not debilitating, I rather not start medications at this time"

ROLE OF PHARMACISTS IN POLYPHARMACY IN THE ELDERLY

1. Educate patient – why taking drugs? ADR to monitor
   - workshops for patients – how to prepare for your doctor's appointment – questions to ask
2. Discuss with patient – goals of therapy – ie. Focus of goals of therapy – comfort/function versus aggressive prevention/treatment of diseases – are all drugs needed from patient perspective? Provide non-drug measures recommendations when appropriate
3. Discuss with physician – are all drugs still medically needed?

PHARMACEUTICAL COMPANIES:

VIEWS?

PHARMACEUTICAL COMPANIES

- Developed drugs that have had significant impact on patient lives
- Process of drug development:
  1. Research – discovery of drug
  2. Clinical Trials – test drug in animals and humans
  3. Approval – Health Canada approves drug for licensing – effective and safe

PHARMACEUTICAL COMPANIES

- Economics involved:
  - 1 billion dollars spend by pharmaceutical companies to from development to licensing of drug (average is 10 years)
  - Only 1 in 10 drugs that enter clinical testing are approved by Health Canada
  - Only 1 in 5 licensed drugs generate a profit – for further drug development
  - Patent only for 20 years before generic companies can produce drug and sell at lower price

PHARMACEUTICAL COMPANIES

- **Limitations regarding the application of results from trials to clinical practice:**

1. *Important patient populations may be excluded from trials*
   - Those with multiple diseases (“sicker”) or elderly – drugs as effective and safe?
2. *Length of trial may not be appropriate*
   - Sufficient time captured to assess long-term risk of ADR

PHARMACEUTICAL COMPANIES

3. *Markers of efficacy may not be clinically relevant or meaningful to patient*
   - Ie. Drug A reduces cholesterol by 50%, but does it reduce risk of having a heart attack
4. *Drug A not always compared to Drug B*
   - Ie. Is new drug better? safer? than old drug used to treat same disease

PHARMACEUTICAL COMPANIES

5. How data presented

- Relative risk difference typically presented (versus absolute risk difference)
- Example:
  - Drug A vs. Placebo (control)
  - 100 patients in each group
  - Length of study – 1 year
  - Outcome – incidence of heart attack
    - Placeo – 2/100 (2% or 0.02) vs. drug – 1/100 (1% or 0.01)

PHARMACEUTICAL COMPANIES

5. How data presented

- *Relative risk difference = (1 – [0.1/0.2]) = 0.5 or 50%*
  - Interpretation - Drug A decreases risk of heart attack by 50% versus placebo in 1 year
- *Absolute risk difference = 2% - 1% = 1%*
  - Interpretation - 1% difference in the incidence of heart attack when comparing Drug A versus placebo in 1 year

  Ie. If risk of heart attack in 1 year was 5%, taking Drug A would reduce this risk to 4%

THOUGHTS?

ROLE OF PHARMACISTS:

- Critical analysis of clinical trials – can I apply results of trial to my patient?
- Educating physicians on interpretation of results
- Involved in post-marketing activities:
  - Further trials - including specialty population ie. elderly
  - Reporting of ADR – Health Canada database
  - Economic analyses
    - Ie. Is Drug A more cost-effective than B? ie. Cost per unit of BP lowered
    - Ie. Is treating patients with Drug A to reduce fracture risk less than costs for hip replacements

COLD-FX CASE – application of some principles discussed in lecture

- Cold-FX is an herbal product (American ginseng)
- States prevents and treats colds/flus
- Who has had Cold-FX? (Prevention and/or treatment products)
  - Influences on decision to trial product
  - Effective? ADRs?

COLD-FX CASE – application of some principles discussed in lecture

- One clinical trial that helped launched availability to public
  - **McElhaney et al (*Journal of the American Geriatrics Society*, 2004)**
- Who:
  - 198 patients
  - > 60 years (applicable to young?)
  - Healthy patients in nursing home (applicable to “sick”)
- Drug vs placebo for up to 12 weeks
- Outcome - Acute respiratory infections (ARI) incidence using laboratory confirmed tools (presence of viruses) – appropriate measure? Ie. meaningful to patient?

COLD-FX CASE – application of some principles discussed in lecture

- Results:
  - Drug – 1%, Placebo – 7%
  - Absolute risk difference = 6%
  - Relative risk difference = (1 – [0.01/0.07]) = 0.86 or 86% reduction in ARI with Cold-FX

*Interestingly, no trials conducted to assess efficacy in treatment of colds – however such products available

THOUGHTS?

COLD-FX CASE – application of some principles discussed in lecture

- Herbal product safe?
  - Drug-drug interaction – Coumadin (may increase bleed risk)
  - Drug-disease interaction –may worsen s/s of autoimmune diseases (Cold-fx boosts immune system)
- Expensive product:
  - Cheaper alternatives to prevent cold?

CONCLUSION

- Cannot describe different aspects of drugs in black and white terms
  - Effective?
  - Safe?
  - Pharmaceutical companies are “bad”
  - Pharmacists are “pill pushers”

ALWAYS BE CRITICAL!

QUESTIONS,
COMMENTS?