

Plenary Session

National Policies and Programs to Improve Medication Safety in US

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National Policies and Programs to Improve Medication Safety in the US

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Important Issues

- Errors in ambulatory drug prescribing are a major public health problem
- Historic attempts to improve medication use have not always been effective
- We can do a better job than we are today
- Computer technology may help
- Diverse professionals are working together to improve the health care system

Is This A Large Issue?

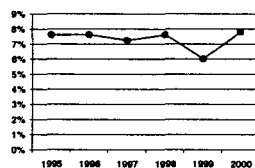
- 3% of all admissions are from adverse drug events
- 29,000 deaths from adverse drug events
- "The rates and severity of adverse reactions to individual drugs are remarkably low in view of their pharmacologic properties." Jick *JAMA* 1970; 213:1455-1460
- 1.5 million US hospitalizations from adverse drug reactions
- 106,000 US deaths from adverse drug reactions Lazarou *JAMA* 1998; 279:1200-1205.
- >\$175 billion spent on adverse drug events:
 - 70% of expenses: hospitalizations
 - 18% of expenses: long-term care admissions Ernst *J Am Pharm Assoc* 2001.

Is This A Large Issue?

- Average cost for defending malpractice claims due to preventable adverse drug events: \$73,700 *Arch Intern Med*, 2002
- Gurwitz *JAMA* 2003; 289:1107-1117
 - 1,900,000 adverse drug reactions
 - more than 25% preventable
 - More than 180,000 life-threatening or fatal adverse drug events per year
 - More than 50% preventable
 - Fatal or life-threatening adverse drug events are the most likely to be preventable (50% versus 25%)

No Change From 1995 to 2000

- "No improvement in the prescribing of potentially inappropriate drugs at elderly patient ambulatory care visits."



Goulding. *Arch Intern Med*.
2004;164:305-312

Drug Related Problems

- An event or circumstance involving a patient's drug treatment that actually, or potentially interferes with the achievement of an optimal outcome.
 - Untreated Indications
 - Improper Drug Selection
 - Sub-therapeutic Dosage
 - Failure To Receive Drugs
 - Over-dosage
 - Adverse Drug Reactions
 - Drug Interactions
 - Drug Use Without Indication

Hepler and Strand 1990

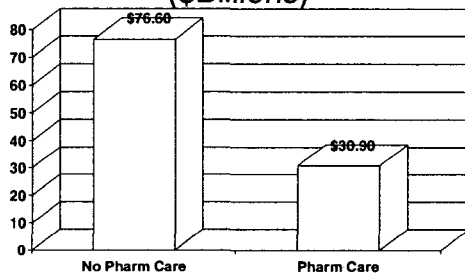
Drug Related Morbidity and Mortality Cost of Illness Model

- Clinical outcomes
 - 23% of patients experience Treatment Failure
 - 11% of patients experience New Medical Problem
 - 7% of patients experience Treatment Failure / New Medical Problem
 - ~ 60% of patients have optimal outcome
 - Resource consumed from drug related problems
 - 8.8 million hospital admissions (\$47.4 billion)
 - 3.2 million long term care admissions (\$14.4 billion)
 - 17.1 million emergency department visits (\$ 5.3 billion)
 - 198,800 deaths due to DRP's
 - Total Cost \$76.6 billion
- Johnson JA, Bootman JL, Arch of Intern Med 1995; 155:1949-56
- 2001 estimate of total cost: > \$170 Billion
 - For every dollar spent on prescription drugs, \$1.33 is spent on healthcare costs related to adverse drug events
- Ernst FR, Grizzle AJ, J Am Pharm Assoc 2001;41:192-9

Institute of Medicine Report

- Evidence-based practice
 - Chronic disease
 - Consumer involvement
 - Payment restructuring
 - Informatics
 - Interdisciplinary approach
 - Leadership
 - Academic health centers need to prepare work force to do their work differently and use new types of health care delivery organizations
- Institute of Medicine Report
Crossing the Quality Chasm: A New Health System for the 21st Century March 1, 2001

Possible Savings Associated Pharmaceutical Care (\$Billions)



Johnson/Bootman Am J Hosp Pharm March 1, 1997

Iowa Medicaid Pharmaceutical Case Management

- **Services:** Clinical problem solving, drug therapy problem identification and resolution
- **Method:** Medicaid identifies patients and refers them to an eligible pharmacy
- **Pharmacist tasks:** initial assessment, consult with prescriber, review history, formulate treatment goals, assess compliance, make written recommendations to prescriber.
 - Pharmacist acts on plan after approved by prescriber

Asheville, NC Pharmacist Diabetes Management

- **Training:** multidisciplinary-2 weekends. American Diabetes Association guidelines, case studies, role play patients
- High risk patients assigned to pharmacies. Copayments waived. Patients seen monthly
- **Billing:** using HCFA-1500 forms. Fees: initial visit: \$50-\$100 (1-1.5 hrs). Follow-up: \$20-\$60
- **Outcome parameters:** medical care utilization and costs, periodic lipid, HGA1C, SF-36, patient satisfaction
- **Outcomes:** More patients in diabetes and lipid control. High patient satisfaction. Costs slightly lower

Computers and Collaboration Needed

- Information technology is integral to reforming health care. Not only for access to information, but to support clinical decision making
- Pharmacists, physicians (other health professionals) and patients (consumers) need to increase collaboration to insure the value of drug therapy

The Problem with Outpatient Therapy

- Unexpected, but rates of adverse drug events may be higher with outpatient therapy
- Inpatient adverse drug events have been estimated to be approximately 6%.
- Outpatient adverse event rates may be higher (approximately 27%)

"The longer rate of exposure may contribute to the higher rate of events."

N Eng J Med 2003;348:1556-64

Elderly are at Risk

- Beers List Criteria (1991)¹
 - Identifying potentially inappropriate medications in skilled nursing facilities
 - Filled a pharmacoepidemiologic void
 - Modified by almost all users; haphazard implementation
 - Used in ways entirely unintended by authors
- First major revision of criteria list (1997)²
 - Consensus panel of 6 nationally-recognized experts
 - Adopted by CMS for skilled nursing facilities in 1999
- Second major revision of criteria list (2003)³
 - US consensus panel of experts using modified delphi method

1: Beers et al. *Arch Intern Med*. 1991; 151:1825-32
2: Beers. *Arch Intern Med*. 1997; 157:1531-6
3: Fick et al. *Arch Intern Med*. 2003; 163:2716-24

Risk for Elderly

Examples of Beers drugs, *independent* of condition

- Indomethacin (central nervous system)
- Methyldopa (depression, bradycardia)
- Chlorpropamide (long elimination half-life)
- Amitriptyline (anticholinergic adverse effects)
- Long-acting benzodiazepines (long half-life)
- High doses of short-acting benzodiazepines (increased sensitivity)
- Mineral oil (risk of aspiration)

Fick et al. *Arch Intern Med* 2003; 163:2716-24

Risk for Elderly

Examples of Beers drugs, *dependent* upon condition

- If congestive heart failure: disopyramide
- If benign prostatic hypertrophy: anticholinergics
- If stress incontinence: alpha-blockers
- If arrhythmias: tricyclics
- If Parkinson Disease: metoclopramide
- If cognitive impairments: anticholinergics
- If depression: long-term benzodiazepine use
- If seizures: bupropion

Use of High Risk Drugs

- Application of Beers list drugs in clinical practice is associated with
 - Increased total healthcare costs
 - Increased provider costs
 - Increased facility costs
 - More inpatient days
 - More outpatient visits
 - More emergency department visits
- These increases remain even after controlling for age, sex, comorbidity, number of prescriptions

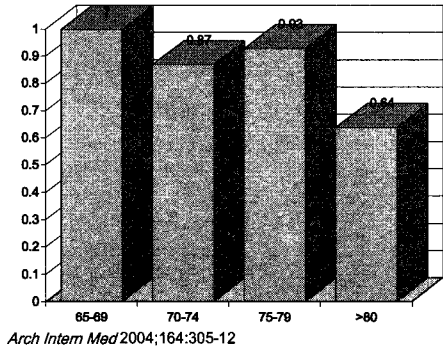
Fick et al. *J Manag Care Pharmacy*. 2001; 7:407-13

Medication Problems

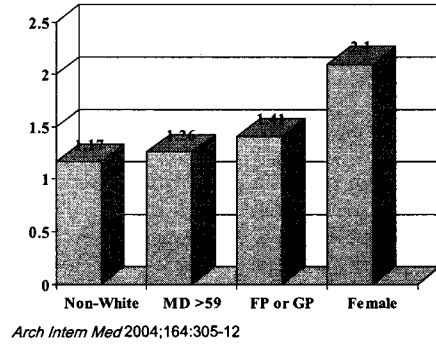
- 50% of elderly medication problems involve pain therapy and other central nervous system *agents*
- Most commonly prescribed drugs of caution in the elderly
 - Propoxyphene (pain therapy)
 - Hydroxyzine (antihistamine)
 - Diazepam (anti-anxiety)
 - Amitriptyline (antidepressant)
 - Oxybutynin (urinary tract antispasmodic)

Goulding. *Arch Intern Med* 2004;164:305-12

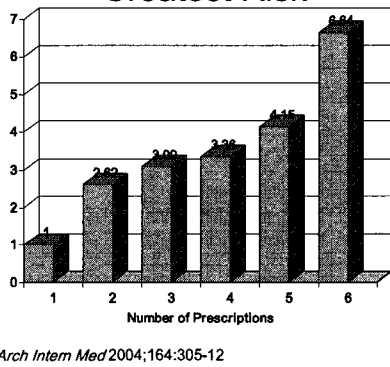
Risk Decreases as Age Increases



Patients at Risk



Polypharmacy Creates the Greatest Risk

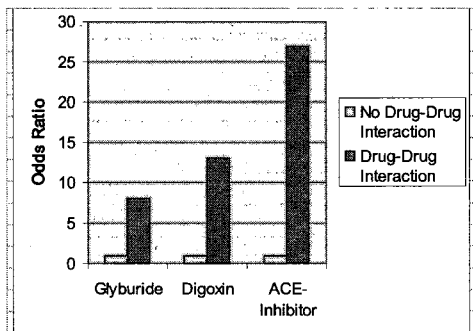


Consequences of Drug-Drug Interactions

- Analysis of hospitalizations and presence of drug-drug interactions within one week before admission:
 - Hypoglycemia admissions on glyburide
 - Risk with cotrimoxazole vs. amoxicillin
 - Digoxin toxicity admissions
 - Risk with clarithromycin vs. cefuroxime
 - Hyperkalemia admissions on ACE Inhibitors
 - Risk with K⁺ sparing diuretic indapamide

Juurlink *JAMA* 2003; 289:1652-8

Odds of Drug-Drug Interaction 1 Week Before Admission



Pharmacy Benefit Management

- A range of organizational activities designed to influence the behavior of prescribers, dispensers, and patients
- The goal is to impact the cost and use of prescription drugs and other health care resources

PBM Management Tools

- Drug formulary development and management
- Contract price negotiations with the pharmaceutical manufacturers for discounted fees or capitated rates
- Rebate contracting from pharmaceutical manufacturers
- Development and management of pharmacy networks of preferred providers
- Negotiated reimbursement of retail pharmacies and prescribers
- Efficient claims processing systems
- Drug utilization review (DUR): online and retrospective
- Product substitution (generic or therapeutic)
- Academic detailing

Programs to Improve Medication Safety

- Education, training, vigilance
- Focused patient drug outcomes monitoring
- Letters written to prescribers
- Drug information and improved product labeling
- Electronic medical records and networking
- Outcomes and pharmaco-economic research

Goal of DUR

- Engage in educational interventions with physicians and patients to improve prescribing and drug use
- Disease management programs are more “sophisticated DUR programs” that consider appropriateness of drugs used to treat particular diseases

Drug Utilization Review (DUR)

- A process used to assess the appropriateness of drug therapy against predefined criteria through the evaluation of drug therapy
 - Also called drug use evaluation (DUE) or medication use evaluation
- Retrospective: after medication dispensing
- Prospective (concurrent): online, usually during dispensing, before patient begins therapy

Drug Use Evaluation

- Online Drug Use Review
 - Online, real-time alerts to dispensing pharmacists
 - However, this may disrupt prescription dispensing process
 - Appropriate when the risk of an adverse drug event is severe or occurs quickly
- Retrospective Drug Use Review
 - Letter to prescriber after peer review committee reviews therapy profile
 - Unfortunately, raises issues after they occur
 - Useful when drug monitoring required
 - Appropriate when the *pattern* of care is the issue

Problems with Current Online DUR

- Too many alerts received by pharmacies
- Many alerts concern issues that may not be clinically significant; alert overrides are common
- Current systems may miss important drug therapy issues
- Professional agreement on criteria needed
- Enhanced exchange of patient data needed

DUR Issues

- Retrospective DUR in Medicaid programs too often focuses on the same drug specific problems that are the focus of online DUR
- Retrospective DUR population level pattern analysis and disease management allows a disease based focus and consideration of outcomes

DUR Issues

- DUR is an ongoing program that needs to be frequently updated to include new drugs and new scientific knowledge
- DUR program evaluations have not been done frequently with clearly specified and adequate methods (e.g., a control group)
- Vendors' evaluations of programs may not be rigorous
- Consider partnerships with researchers

Medicaid Retrospective DUR Had Limited Impact on Outcomes

- Comparison of pre- and post-therapy with distribution of retrospective letters in six Medicaid programs.
- "We were unable to demonstrate an effect on clinical outcomes."
- Potential explanations for lack of effect
 - Unknown validity for some criteria
 - Time lag from problem to when letters were written
 - Failure to address underlying rationale for prescribing issues

Hennessy *JAMA*. 2003; 290: 1494-9

Online DUR Has Problems as Currently Implemented

- 88.3% of online DUR issues in 41 Indiana pharmacies were overridden.
- Reasons?
 - We were already aware of the problem: 34%
 - We thought the problem was not real: 33.6%
 - We thought the alert was insignificant: 27%
- Significant "noise" exists in most online DUR programs

Chui and Rupp. *JMCP* 2001

Disease Management Approaches ("Expanded DUR")

- Disseminate evidence-based treatment guidelines
- Medication formulary changes
- Educational interventions
 - Physicians
 - Patients
- Modeling therapy interventions
 - Database assessments

Disease Management Programs

- Identify patients with same disease process
- Use multidisciplinary process to coordinate
- Develop treatment guidelines
- Disseminate information to improve patient care and improve efficiency (costs) of care
- Measure appropriate outcomes to assess results of intervention

DUR Future Issues

- There are no DUR criteria standards
 - Evidence-based assessment is needed
 - Irrelevant DUR alerts should be deleted
- New technology
 - Online diagnoses, laboratory data available?
 - Electronic order entry
- Retrospective DUR assessments should involve disease management

Problems with Identifying Drug-Drug Interactions

Major Drug Interactions (at *Medication Class Level*) by Compendium

| Compendium | No. |
|---|------|
| MicroMedex <i>DRUG-REAX@</i> | 275 |
| <i>Evaluation of Drug Interactions</i> | 64 |
| <i>Drug Interactions: Analysis and Management</i> | 94 |
| <i>Drug Interaction Facts</i> | 141 |
| Total | 406* |

* Sum of column exceeds total due to duplicate interactions.

Concordance of "Major" Drug Interaction Classifications by Compendia

| Number of compendia listing interaction | Micro-Medex | Evaluation of Drug Interactions | Drug Interactions: Analysis and Management | Drug Interaction Facts | Total Cumulative Total |
|---|-------------|---------------------------------|--|------------------------|------------------------|
| Four | 9 | 9 | 9 | 9 | 9 (2.2%) |
| Three | 3 | 3 | 3 | | |
| | 7 | 7 | | 7 | |
| | 20 | | 20 | 20 | |
| | | 5 | 5 | 5 | 35 (8.6%) |

Abarca et al. J Am Pharm Assoc 2004; 44:137-141

Ongoing Improvement Programs

- **Academy of Managed Care Pharmacy**
 - Guiding Principles for Effective Electronic Messaging
 - Eight core principles that focus on:
 - Clarity: the "role" and the "why"
 - Actionable
 - Standardized
 - Non-redundant
 - Planned roll-out beginning late 2004
- **United States Pharmacopeia**
 - Therapeutic Decision-Making efforts with drug-drug interactions
 - Anticipated results of analysis
 - Level of evidence
 - Clinical significance
 - Evidence-based recommendation for/against inclusion in DUR
 - Plan implementation in 2005
- Others, such as individual managed care organizations

Messages for Prescribers

- Please do not assume that pharmacy systems will catch all important drug-drug interactions
- Extra monitoring is needed with multiple prescribers
- Search for adverse drug events
- Assume all patients have a literacy problem
- Health organizations need electronic medical records and electronic prescribing
- Learn and apply the Beers list
- Get to know and use the skills of your pharmacists

Conclusions

- Safety concerns are very complex and many problems continue to exist
- Programs must be based on strong clinical evidence and interventions must be studied with prospective research
- Computer uses will expand for improved monitoring and drug therapy problem identification
- Pharmacists and prescribers must work more closely together to carry out successful strategies