



Medication: A Double-Edged Sword for Older ID/DD Adults

Presenter:

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Outline

1. Why Increased ADRs
2. ACSC and ADRs and Health Care Costs
3. Age Related Changes in Metabolism of Medications
4. Concerns of ADR Increase in Older ID/DD Adult Population
5. Examples of Medication and ADRs
6. Staff Outcomes
7. Strategies to Reducing ADRs

Purpose

- To increase awareness and observational skills of formal and informal caregivers with respect to how medications may increase ACSC by mimicking, masking, exacerbating or causing dementia or diseases in the older ID/DD adults

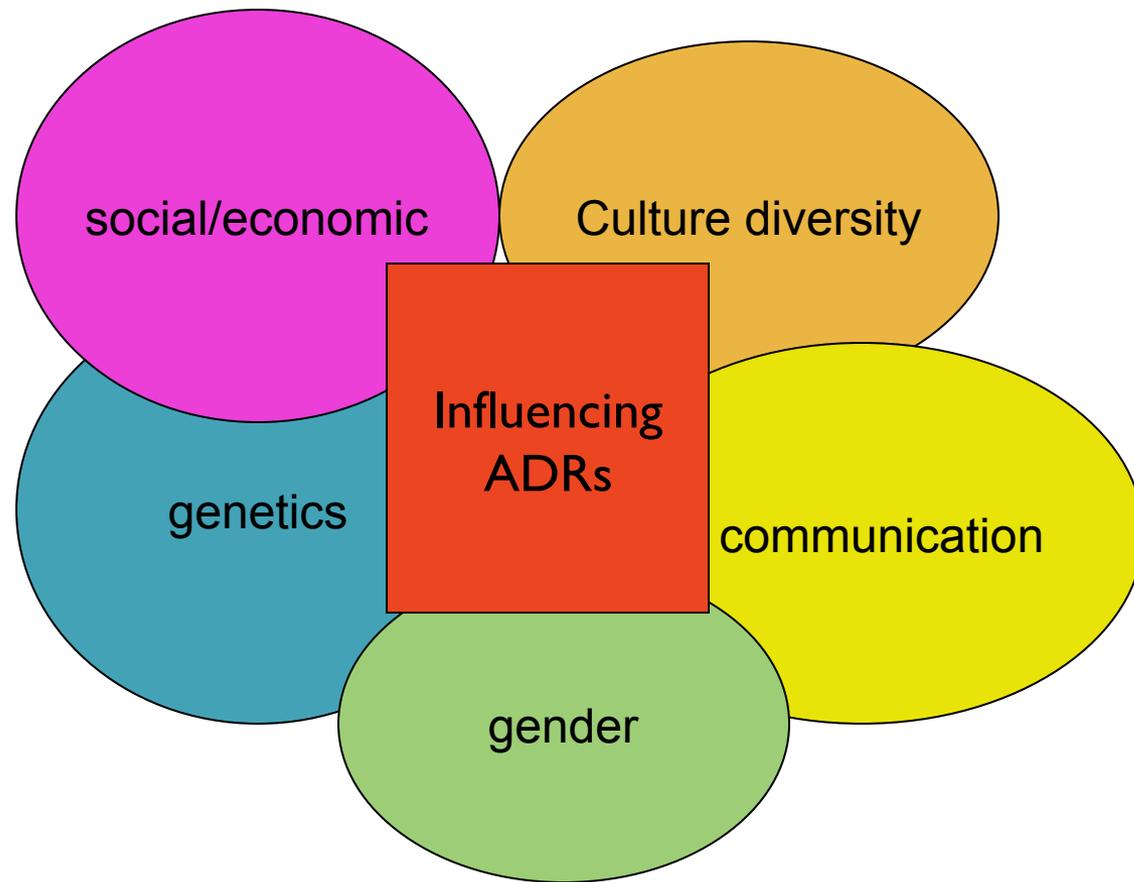
Increased Adverse Drug Reactions (ADRs) in an Aging Population Increases the Risk of ACSC



SECTION 1

Causes of Increased Risk of ADRs

1. Age related changes in the ability to metabolize medications increases the amount of medication in the blood for a longer period of time
2. Increase in co-morbidity in the older ID adult increases the number of medications consumed
3. Overlapping with culture and gender influences medication(s) affects - (masking or mimicking, exacerbating other diseases or disorders)



Interaction of five influences which affect aging and healthcare disparities in the general and ID/DD populations

Overlap of Age-Related Changes with Culture & Gender (examples)

- Caucasians experience twice the side effects of Hispanics from the antidepressants Prozac and Paxil
- African-Americans administered some anti-psychotic drugs seem more likely than whites to suffer tardive dyskinesia (repetitive, involuntary movements)
- Asians administered half the dose of an anti-psychotic drug responded better than Caucasians who received the regular dose.

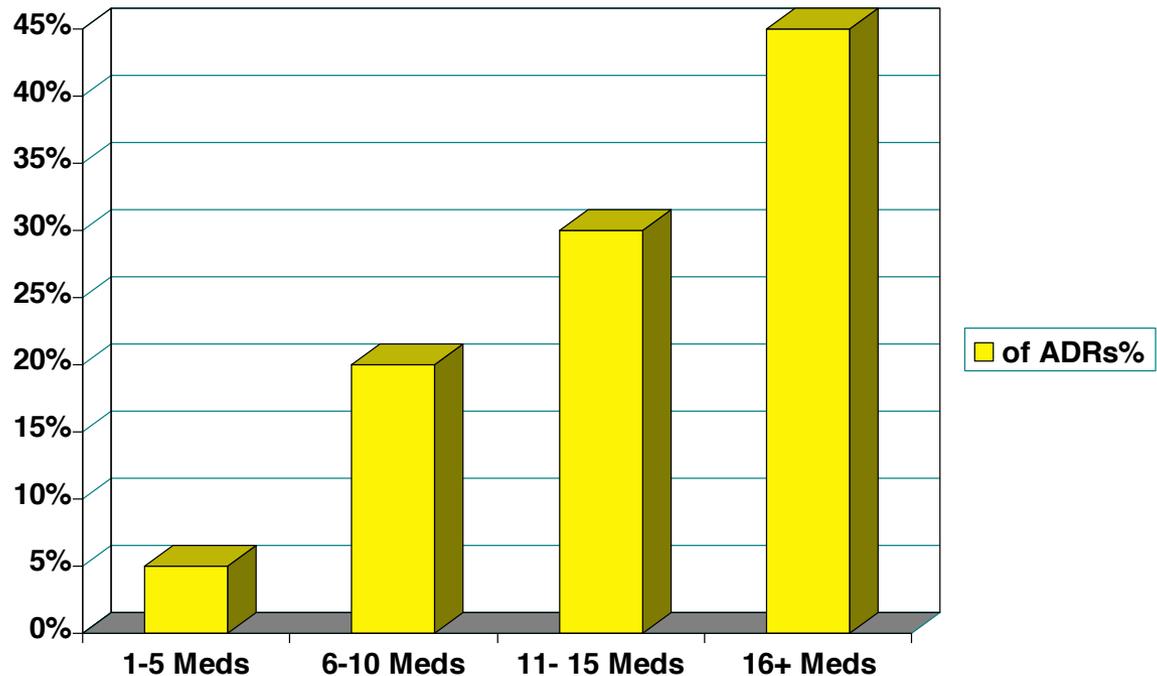
Overlap of Age-Related Changes with Culture & Gender (examples)

- As many as 40% of African-Americans have gene variant that makes them non-responsive to beta blocker medication for hypertension
- Females more vulnerable to ADRs due to size differences and changes in metabolism
 - increasing absorption of antidepressants, benzodiazepines
 - decreasing absorption of phenytoin and barbiturates
- Optimum dosages of many cardiovascular or psychotropic drugs are lower for Dominicans and Puerto Ricans and higher in Mexican Americans, compared with other racial/ethnic groups

Causes of Increased Risk of ADRs

Increasing the number of medications due to co-morbidity overlapping with disabilities, increases the risk of drug to drug interactions – **general population average of 7 -10 medications but higher in the older ID/DD adults**

Number of Medications vs. Increases in ADRs



	Per 1000 patients		<i>P</i> -value ^a
	With ID (<i>n</i> = 701)	Control (<i>n</i> = 2936)	
During contact with GPs			
Psycholeptics	444	192	<0.001
Antibacterials	256	239	0.013
Anticonvulsants	194	11	<0.001
Anti-inflammatory and antirheumatic products	182	204	0.640
Sex hormones and modulators of the genital system	181	204	0.696
Corticosteroids, dermatological preparations	174	110	<0.001
Anti-asthmatics	174	169	0.078
Antifungals for dermatological	149	86	<0.001
Use laxatives	143	46	<0.001
Ophthalmologicals	143	72	<0.001
	With ID (<i>n</i> = 440)	Control (<i>n</i> = 1374)	
Repeat prescriptions ^l			
Psycholeptics	1929	391	<0.001
Anticonvulsants	1127	41	<0.001
Psychoanaleptics	504	158	<0.001
Anti-asthmatics	461	365	<0.001
Sex hormones and modulators of the genital system	361	394	0.416
Analgesics	318	191	<0.001
Antacids, drugs for treatment of peptic ulcer	282	211	0.016
Laxatives	257	1	<0.001
Thyroid therapy	234	51	<0.001
Diuretics	216	124	<0.001

Number of non- prescription and prescription medications per 1000 patients with and without intellectual disabilities

Reference: Stratemans, Van Schroyen Stein Lantman-de Valk, Schellevis and Jan Dinant. 2007. Health problems of people with intellectual disabilities: the impact for general practice. *British Journal of General Practice* 57: 64–66.

ACSC and ADRs and Health Care Costs



SECTION 2

ACSC Costs Due to ADRs (USA studies)

- Adverse Drug Reactions are responsible for 20% of hospital admissions in older adults and close to 60% are due to falls attributed to ADRs to medications
- 30% over 65 and 50% over 80 will fall resulting in 1.5 million annual broken bones (including hips)
 - 40% of those are admitted to nursing homes,
 - 25% die within 6 months of the break

ACSC Costs Due to ADRs

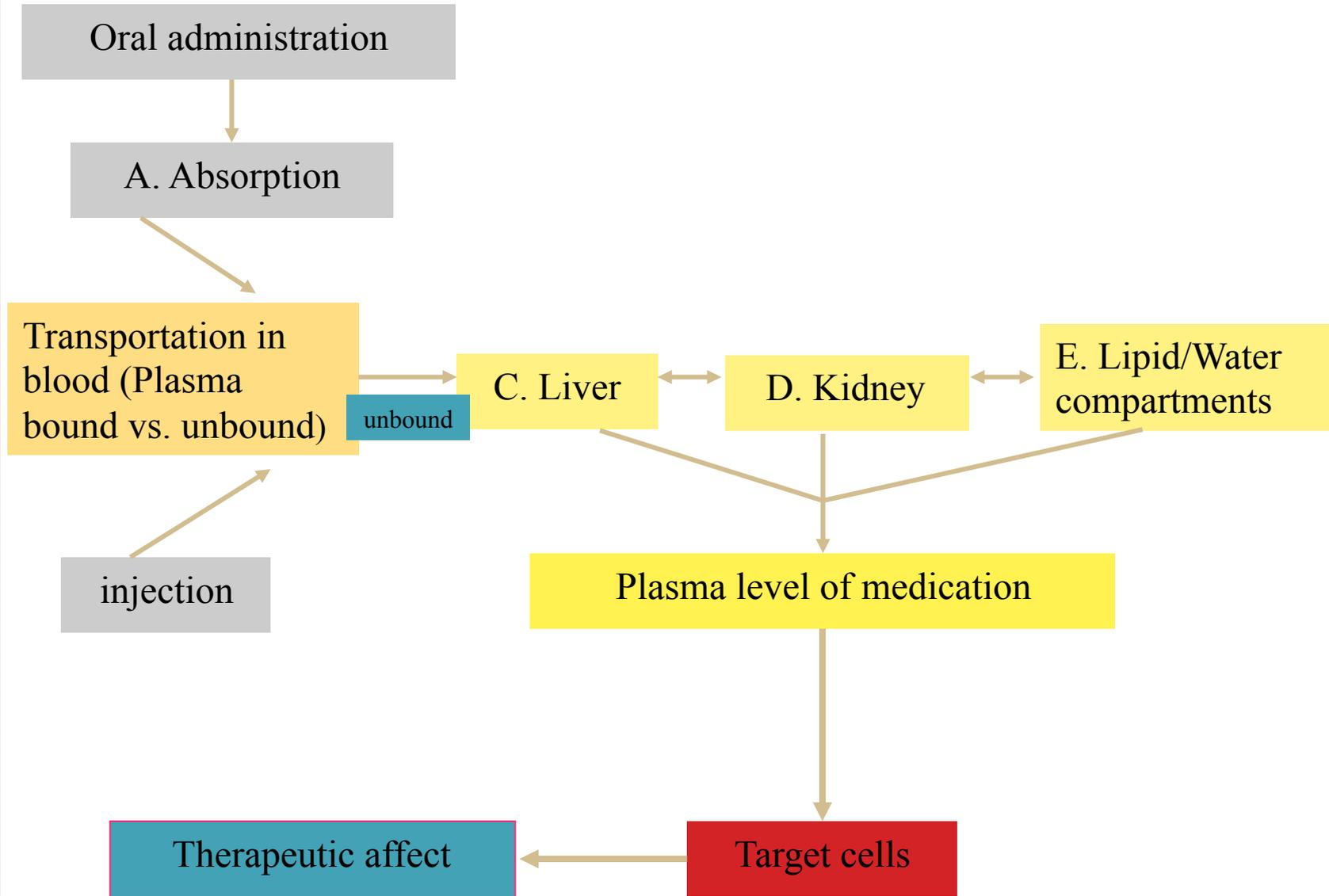
- The annual cost of drug related morbidity and mortality was recently estimated at \$176.6 billion with \$47 billion related to hospital admissions.
- To place this in perspective, the annual cost for diabetes care is estimated at about 45 billion dollars

Age-Related Changes in Medication Metabolism



SECTION 3

The pathway in the metabolism of medications, as illustrated below, determines the proper therapeutic concentration of medication at the “target” cell, all affected by age-related changes



Age-Related Changes in Medication Metabolism

A. Changes in the Absorption of Medications in the Intestines

- Change in acidic state
 - Down syndrome adults are high risk for acid reflux which affects absorption
- Reduced movement of medication in intestine
 - Down syndrome adults are high risk for constipation – slowing of intestines which increases absorption.

Age-Related Changes in Medication Metabolism (cont' d)

B. Transportation by Blood Proteins

- Poor dietary proteins may result in an increase in medications in the blood (females and African-Americans have a higher level of unbound medications)
 - potential problems with I/DD adults with high numbers of medications)

Age-Related Changes in Medication Metabolism (cont' d)

C. Reduced Ability of Liver to Break-Down Medications

- Potential risk with ID adults with high numbers of meds
- Genetic variations (Hispanic subgroups ability to drug metabolize medications may result in higher or lower blood levels of drugs. (Remember the diversity in the ID/DD populations)
- Hormones control liver metabolism (some drugs not metabolized as fast in females)

Age-Related Changes in Medication Metabolism (cont' d)

D. Kidney

- Ability to filter blood declines by 33% increasing the time to eliminate medications from the blood
- Increase in ADRs

Age-Related Changes in Medication Metabolism (cont' d)

E. Body Fat Compartments

- Medications may be stored in body fat (potential risk for DS adults due to high levels of fat storage)
- When weight is lost, stored medication will re-enter blood, resulting in an increased blood level of medications and possible drug to drug ADRs

Age-Related Changes in Medication Metabolism (cont' d)

F. Water Compartments

- Older adults are at risk for dehydration, increasing medication concentration and vulnerability to mimicking, masking or exacerbating health care problems
- Because of an increased threshold to thirst older adults do not recognize dehydration.

Concerns of ADR Increase in Older ID/DD Adult
Population



SECTION 4

Why a Concern?

- Intellectually disabled population is growing older with similar aging concerns as the general population
- Critical area of concern for both populations is the increase in medication use and the negative affects on functioning
 - there is more awareness of this concern in the general population than in the ID aging population

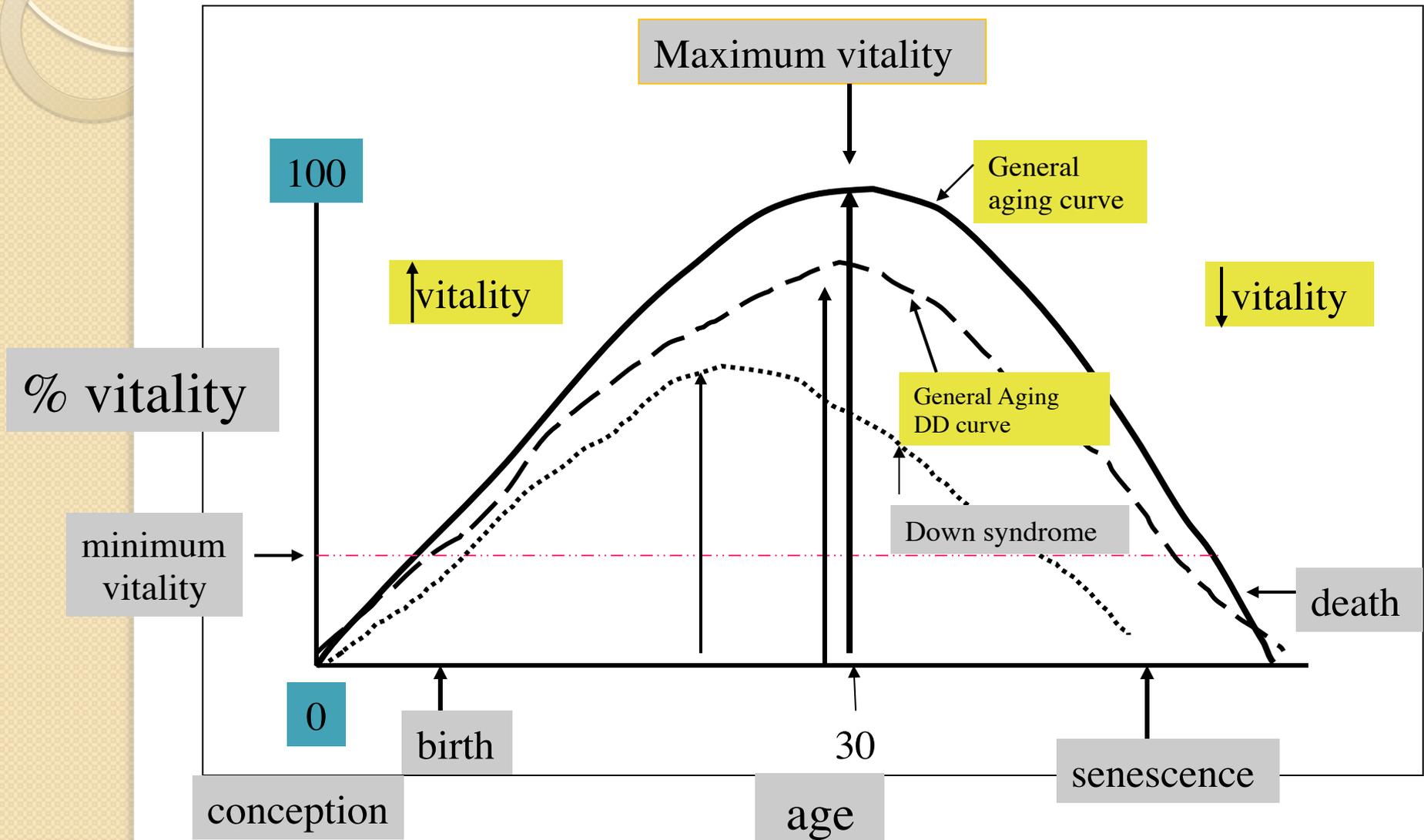
Concerns of ADR Increase in Older ID/DD Population (cont' d)

- In drug research, as in other fields of public health research, **it is** important to studying issues specific to women and **various** cultures in areas of drug research
- This also is true in the IDD adult. Unfortunately very little research on medications has been conducted on the influence early age related changes and medication metabolism

Concerns of ADR Increase in Older ID/DD Population (cont' d)

- Reduced life expectancy of individuals with Down syndrome and Cerebral palsy has led to the supposition that:
 - They may age prematurely and display signs of aging as early as 30-40 years of age
 - They may suffer earlier from health problems usually found in the 70 year old general population.

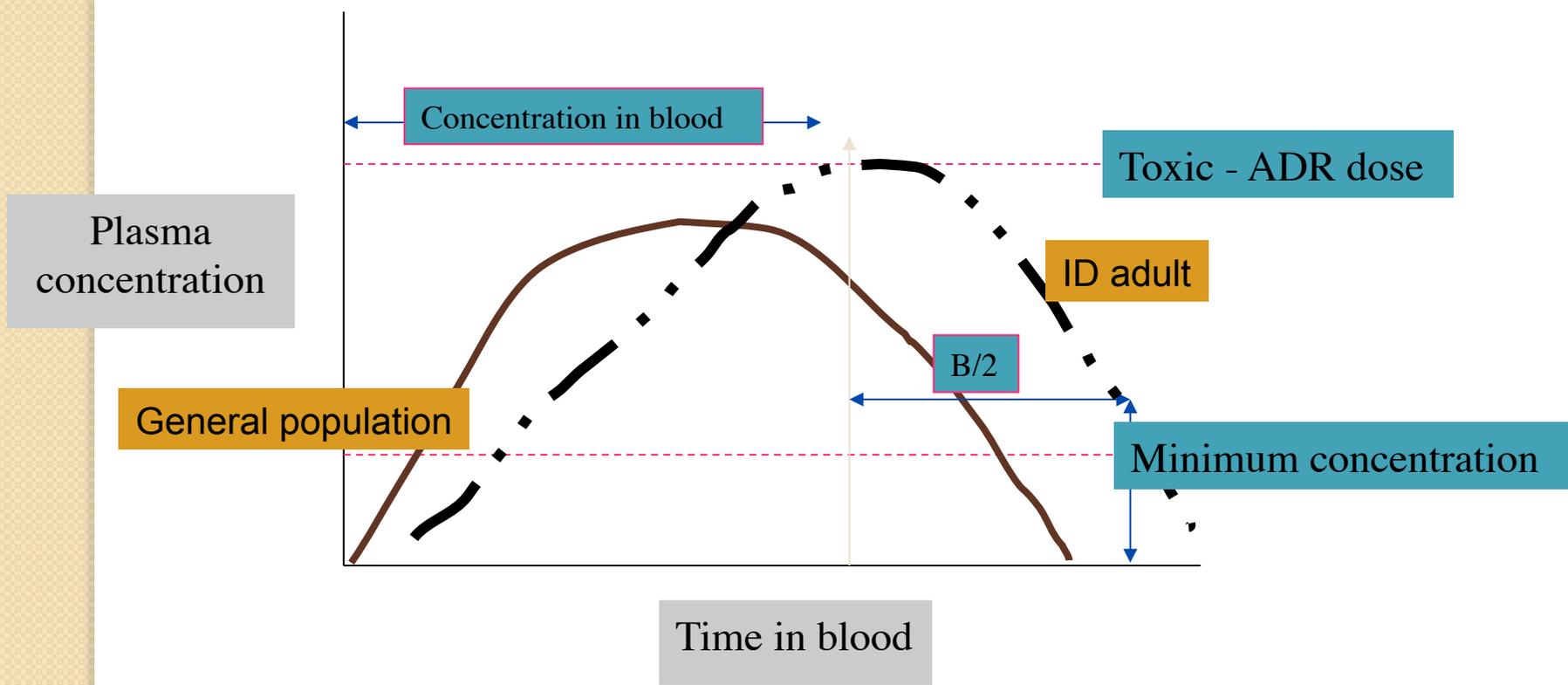
Early age-related changes in DS adults may affect medication metabolism



Question:

- Do the early **age related changes** in the older DS adult with an concomitant increase in chronic health conditions, place them at the same or greater risk for ADRs as the general population but at an earlier age?

Assumption – Early Age-Related Changes in DS Adults Affect The Ability to Metabolize Medications Earlier than the General Population , Increasing The Risk for ADRs



Drug Dose Curve for the General and ID/DD population and the older DS population

Multi-Medication Use

(increased risk for ADRs)

- Medicines are not used to treat Down syndrome disabilities, but to treat chronic co-morbidity diseases associated with Down syndrome
- A total of 24 categories of medications were identified for treating the chronic conditions in DS adults.

Categories of Chronic Co-Morbidity Diseases

- Increased at-risk co-morbidities in DS resulting in multiple medication use:
 - Congenital heart disease
 - Leukemia and other cancers
 - Immune system problems
 - Thyroid problems
 - Bone, muscle, nerve, or joint problems
 - Hearing and eye problems
 - Digestive problems
 - Seizure disorders
 - Alzheimer's disease
 - Acute dementia

Change in the % of medication use in younger and older adults with DS

	<50 years old	>50 years old	Total
Anti-anxiety	16	16	16
Anticonvulsant	16	38	26
Antidepressant	25	14	20
Antihypertensive	4	19	11
Antipsychotic	9	19	14
Antispasmodic	1	5	3
Cholesterol lowering	9	11	10
Fosamax	21	23	22
GERD related	18	22	20
Hormones	13	14	14
Hypothyroidism	35	38	36
Respiratory	26	28	27
Vitamin A	1	0	1
Vitamin B12	3	8	5
Vitamin C	4	6	5

Increased Risks of ADRs in DS Adult Population

- mimic or mask diseases
- acute dementia overlaying AD
- reduced functioning level and reduced independence
- exacerbates existing disabilities associated with DS
- **Very little research on DS adults and ADRs**

ADR Symptoms Similar to Age Related/ Associated Changes and Diseases

- Biological changes
 - Impaired senses
 - Cardiovascular functioning
 - Incontinence or retention
 - Increased or decreased appetite
 - Constipation or diarrhea
 - Skin - rashes, itching
 - Dryness of mouth
 - Stomach – nausea
 - Male impotence
 - Dehydration

ADR Symptoms Similar to Age Related/ Associated Changes and Diseases

- Behavior changes (Dementia symptoms mimic these)
 - Acute dementia
 - Agitation/excitable/
restlessness/wandering
 - Anxiety
 - Behavioral changes
(euphoria)
 - Cognitive function decline
 - Communication skills
decline
 - Confusion
 - Delusions
 - Depression
 - Disorientation to person,
place or time
 - Disturbed concentration
 - Depression, sadness,
irritability
 - Delusion/hallucinations
(auditory/visual)
 - Increased or decreased
sleep
 - Loss of interest
 - Memory loss (short and
long term)
 - Personality change

ADR Symptoms Similar to Age Related/ Associated Changes and Diseases

- Neurological changes
 - Black-out spells
 - Coma
 - Dizziness
 - Headache
 - High fever/elevated body temperature
 - Numbness
 - Tingling
- Muscle coordination
 - Convulsion
 - Decreased or loss of muscle coordination
 - Falls/uncoordinated movement
 - Tremors/twitches
 - Restlessness
 - Seizures
 - Unsteady gait

Examples of Medications and ADRs



SECTION 4

Examples of Medications and ADRs

- Dilantin – phenytoin associated ADRs mimicking, masking, or exacerbating dementia or other diseases/ disorders:
 - dizziness, headache, atrial fibrillation, hypotension, reduced heart rate – **mimics CVD**
 - blurred vision – **mimics or masks vision problems in DS adults**
 - nausea, vomiting, constipation, weight loss – **mimicking GI problems**
 - aplastic anemia, leucopenia – **masks leukemia associated with DS adults**
 - confusion, aggression, slurred speech, insomnia, depression – **mimics or masks Alzheimer's**

Examples of Medications and ADRs

Important Note

Some research has shown the following medications used to reduce symptoms of Alzheimer's disease in the general population may not be as effective in the DS adult (little research in the general ID/D population)

1. Reduce inflammation

- Namenda (memantine) - Glutamate inhibitor

2. Increase acetylcholine

- Aricept, Exelon

Namenda (memantine)

- Therapeutic Use
 - Reduces symptoms of inflammation
 - Mid to late stages - works better if given with cholinergic mimics
 - Does not work for all individuals, efficacy may vary with individuals
 - Reduced effectiveness over time
- ADRs
 - Common: dizziness, confusion, somnolence (sleepy) - mimics AD
 - Not common: hypertension, vomiting, constipation, back pain, rash, fatigue, pain - mimics GI problems, reduced stamina
 - May affect cimetidine levels - mimics or mask GI problems

Aricept (donepezil)/Exelon (rivastigmine)

- Therapeutic Use
 - Reduces symptoms by increasing acetylcholine concentration in the brain compensating neuron loss
 - Early to mid stages - works better if given with memantine
 - Does not work for all individuals, efficacy may vary with individuals and reduced effectiveness over time
- ADRs
 - dizziness, headache atrial fibrillation, reduced heart rate - **mimicking CVD**
 - Nausea, vomiting, diarrhea, ulcers, asthma, GI bleeding, abdominal stress, flatulence - **mimicking GI problems**
 - seizures - **mimicking, masking or exacerbating existing seizures in DS and CP**
 - insomnia, fatigue, agitation, lethargic, nightmares, incontinence - **mimics AD**



CAUTION - **AGING INTO MEDICATION**

Older individuals with IDD who are on medications for extended periods of time may begin to experience ADRs from those medications due to age related changes in metabolism.

Staff Outcomes



SECTION 6

Staff Outcomes – Reducing ADRs in DS Adults

1. To have increased observations skills (see assessment handout in Session 3 and ADRs listed in this session) to recognize changes in older ID/DD adults that may be due to ADRs
2. To be aware that ADRs may mimic, mask, exacerbate or cause dementia and other diseases
3. To have an understanding of what age related changes may contribute to reduced medication metabolism
4. To recognize the importance of being an advocate, calling attention to the health care practitioners regarding changes that may be attributed to ADRs

Strategies to Reducing ACSC from ADRs



SECTION 7

Strategies to Reducing ACSC from ADRs

1. Develop a process to record any observed changes after medication(s) regime is changed
2. Develop a training program to increase observation and reporting skills including elements of the following slide
3. Develop a reporting protocol of changes to be provided to the health care practitioner (see handout)

Example of Elements in Developing a Protocol on Identification, and Reporting Observed Changes

Staff	Key changes	Why changes	When to assess
Nursing	Biological	No. of Medications	Sudden Changes (1-2 weeks)
Therapists	CNS	Types of Medications	New Patient (within 1 month)
Aides	Behavior	Dose/aging	Change in regime (dose new or DC administration)
Family	Motor/ movement	Environment	
Staff		Biological change	
Individual		Social factors	
		Illness	

Case Study

Software Version- eMAS

(electronic Medication Alert System)

www.medicationalertsystem.com

A male adult (71) with mild ID (Down's syndrome) has been diagnosed with senile dementia. He is confused and is apathetic to the environment around him - he refuses to participate in any activities. He is taking medications for hypothyroidism, ulcer and seizures. Recently he was placed on a medication to help increase his cognitive function and memory. Two weeks after he was started on this medication you noticed some changes from his normal behavior and from his prior symptoms of dementia.

He appears to be more: confused, tired, lathargic/apathetic, and problems sleeping, resulting in many short naps. He also appears to have loss his appetite along with black out spells and small muscle tremors.

PATIENT

OBSERVATIONS

MEDS

MATCH

SAVE



Observations/ ADRs

Assessments for:
Mr. John Johns (DS)

Entered by:

Mr. Ronald Lucchino

On:

02/27/2013

Select Category:

--Choose Category--

Select Observation:

Identified:

02/27/2013

SAVE

Category:	Observed Reaction:	Date identified:	Status:
Behavior	Confusion	06/01/2012	Active
Behavior	Fatigue	06/01/2012	Active
Behavior	Uncooperative	06/01/2012	Active
Digestive	Increase or decrease appetite	06/01/2012	Active
nervous	Black out spells	06/01/2012	Active
nervous	Tremors	06/01/2012	Active
Sleep	Excess sleep at night	06/01/2012	Active

BACK

CANCEL

MEDS

Medications Taken

Medications for: Mr. bob jones

Summary Detail

NEW:

Drug Name: ↓ ✓

NDC:# ↓

Prescribed By: ↓ On:

More: Dosage: Frequency: Purpose:

	Drug	Purpose	Prescribed By	On	Status
(-)	Rivastigmine			04/30/2013	Active ▾
(-)	Levothyroxine			04/30/2013	Active ▾
(-)	Ranitidine			04/30/2013	Active ▾
(-)	Levetiracetam			04/30/2013	Active ▾

BACK

CANCEL

MATCH

PATIENT

OBSERVATIONS

MEDS

MATCH

SAVE



Assessment for: bob jones
Created by: Mr. Ronald Lucchino
Created On: 05/21/2013
Match ID#: D213K4630



Match Identified - At Risk or ACBS matches located.
 Follow-up Recommended

Auto Notifications (*Select Recipients*): **SEND**

SUMMARY:

Match identified 4 medications with **ADRs** (Adverse Drug Reactions). Of those ADRs 3 where Severe. **1 medication was identified by the ACBS List and likely have Anticholinergic Effects (not recommended for the elderly).** A follow-up with your medical practitioner for possible change(s) in drug regime is recommended.

Observed Reaction	Drugs with Associated ADRs	Severity	Match
Confusion	Levetiracetam, Levothyroxine, Ranitidine, Rivastigmine	Compounding (Severe)	4
Increase or decrease appetite	Levothyroxine, Rivastigmine	Severe	2
Tremors	Levothyroxine	Severe	1
ACBS List:	Ranitidine		

References

These two websites list medications that are high risk for ADRs in older adults:

- **Beer's list** (copy and paste to browser)

http://www.americangeriatrics.org/files/documents/beers/2012BeersCriteria_JAGS.pdf

- **Anticholinergic cognitive burden scale (ACBS)**

<http://www.indydiscoverynetwork.org/AnticholinergicCognitiveBurdenScale.html>