



FONDAZIONE IRCCS CA' GRANDA
OSPEDALE MAGGIORE POLICLINICO
Sistema Sanitario Regione Lombardia

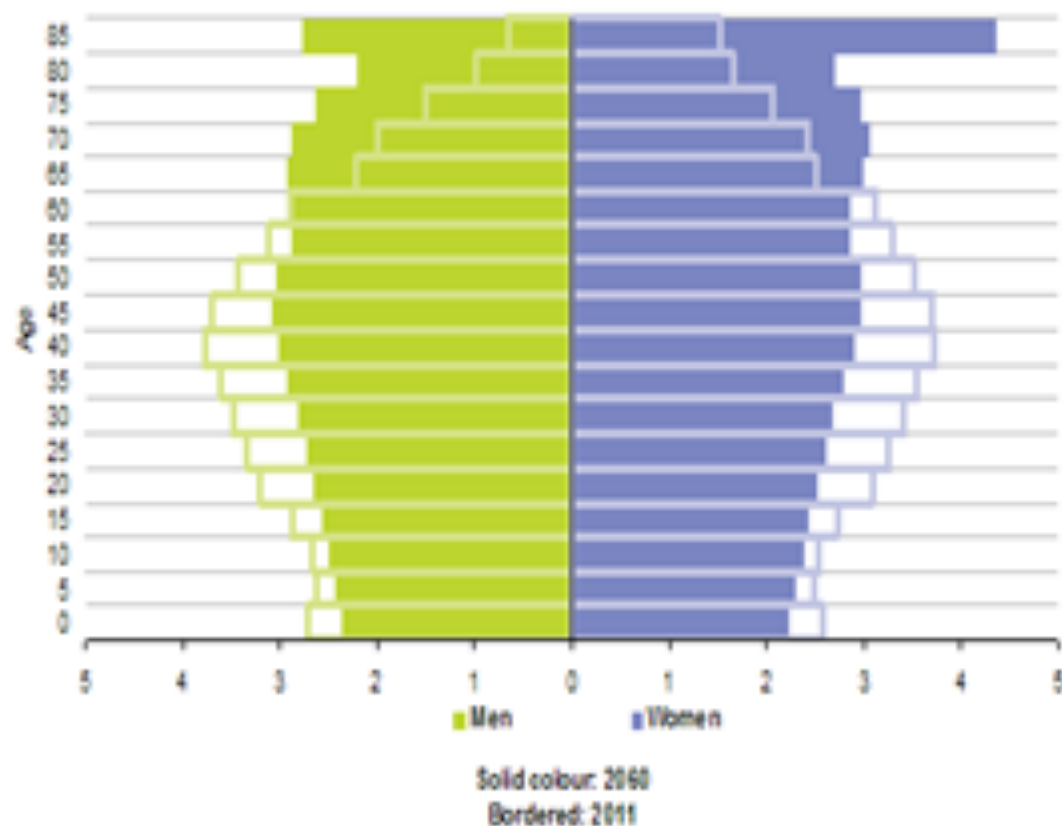


INTERNATIONAL SEMINAR
REPOSI2015
Milan, Italy 24-25 September
**TARGETING THE BURDEN
OF POLYPHARMACY
IN THE ELDERLY**

**Improving drug prescription
in elderly diabetic patients**

FRANCESC FORMIGA
Hospital Universitari de Bellvitge

Evolution of the 'modern epidemic'. European population 2011 vs 2060



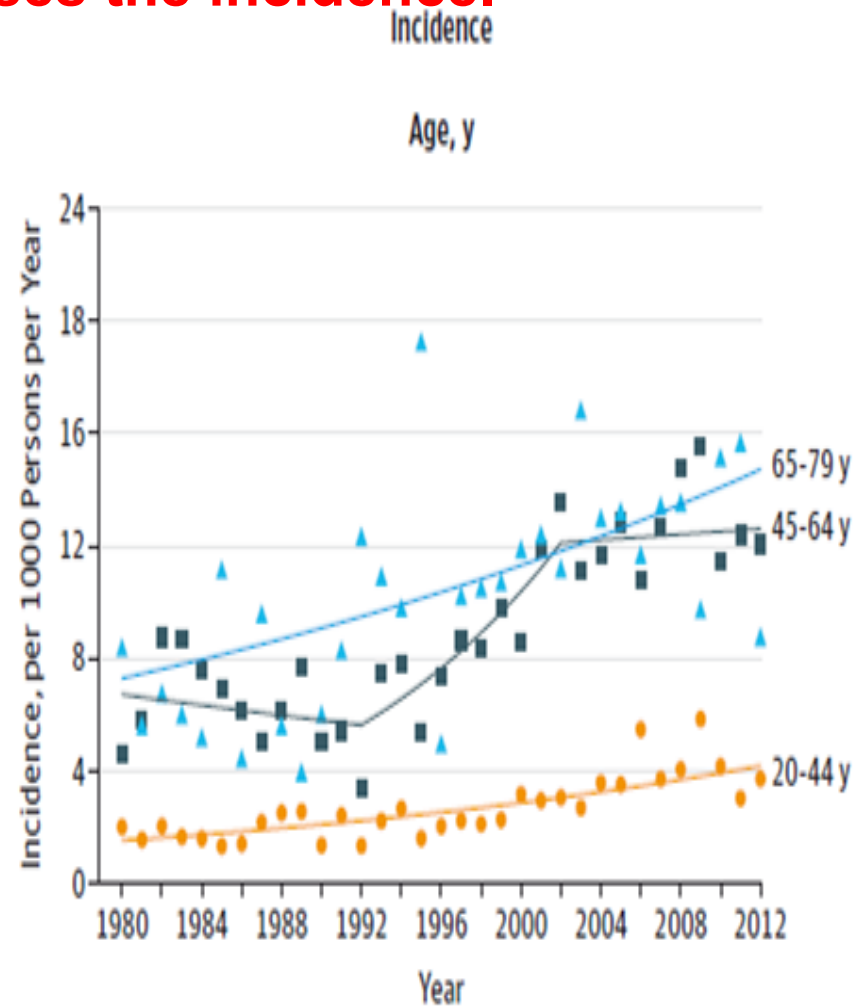
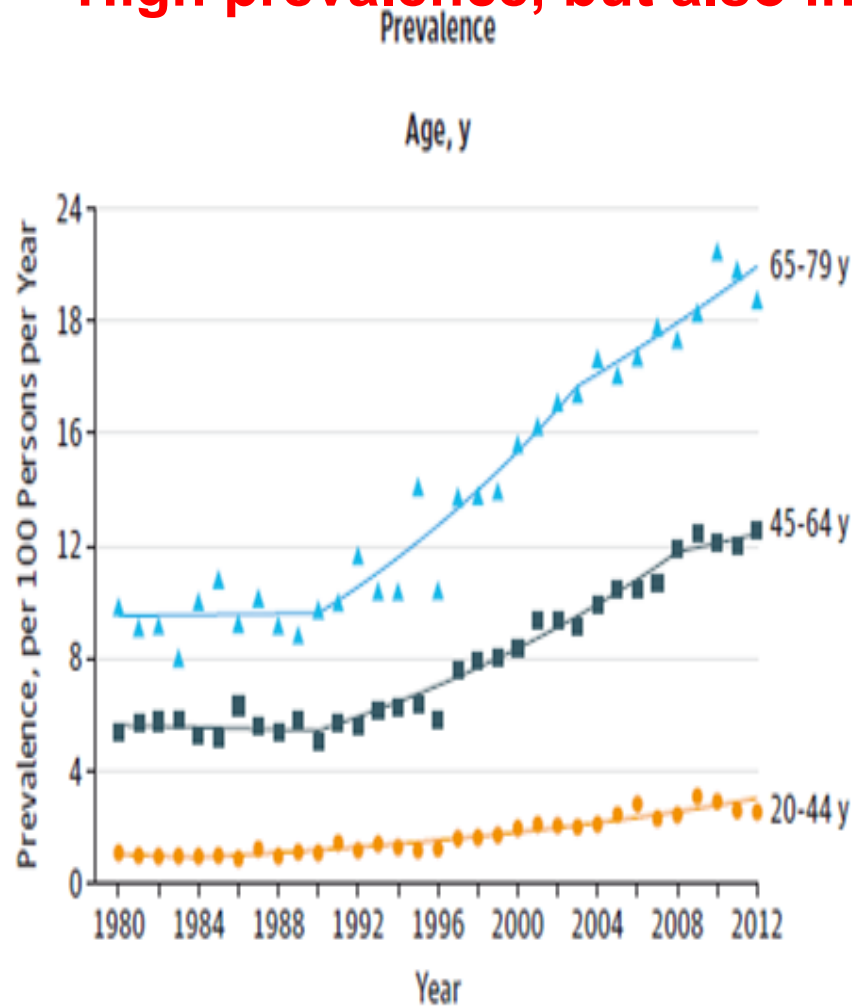
(1) 2011, provisional; 2060 data are projections (EUROPOP2010 convergence scenario).
Source: Eurostat (online data codes: demo_pjangroup and pro_10c2150c)



Prevalence and Incidence Trends for Diagnosed Diabetes Among Adults Aged 20 to 79 Years, United States, 1980-2012

JAMA September 24, 2014 Volume 312, Number 12

High prevalence, but also increases the incidence.



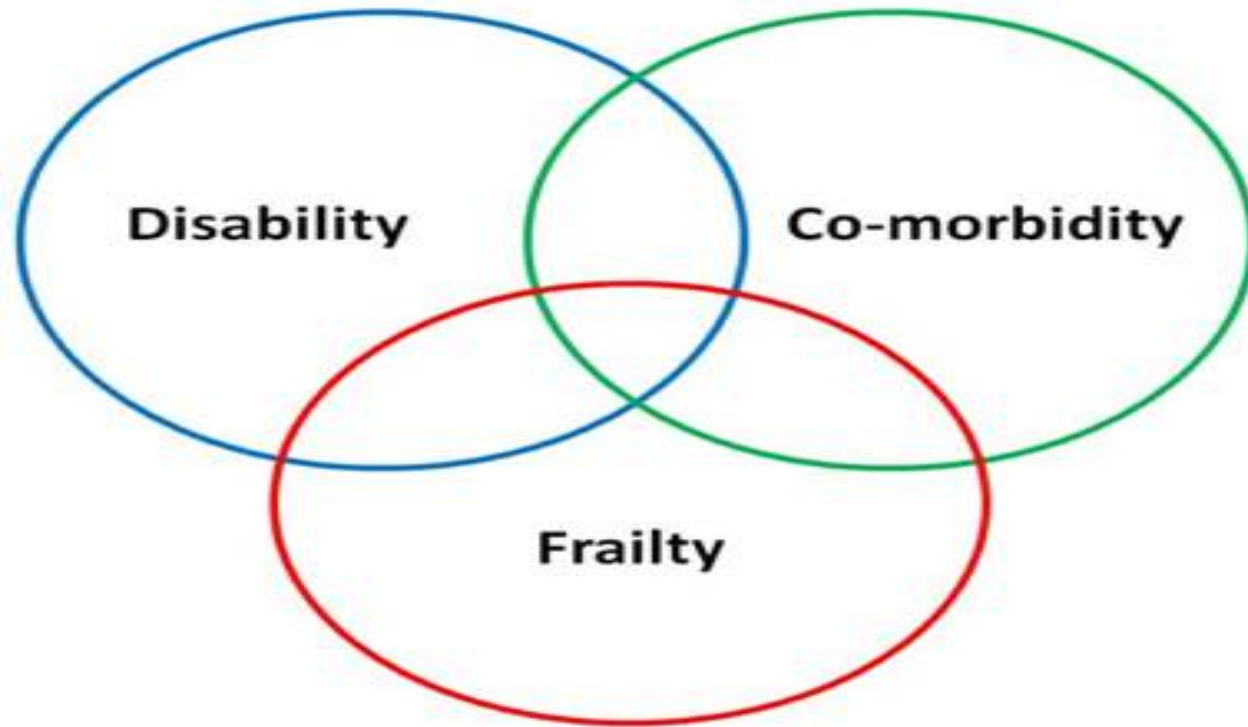
The older the patients, the higher the percentages

Several Pathophysiological peculiarities of diabetes in the elderly

- Predominant defect in insulin secretion because of the failure of the beta cells.
- Insulin resistance is usually lower than in younger patients.
- Hepatic glucose production is slightly altered.
- **Fasting glycemia may be slightly altered**
- **Postprandial hyperglycemia is significant**

The differences are not only pathophysiological, but also global

- Much better **elderly diabetic patients** than the “classical” diabetes in the elderly





Contents lists available at ScienceDirect

Diabetes Research
and Clinical Practice

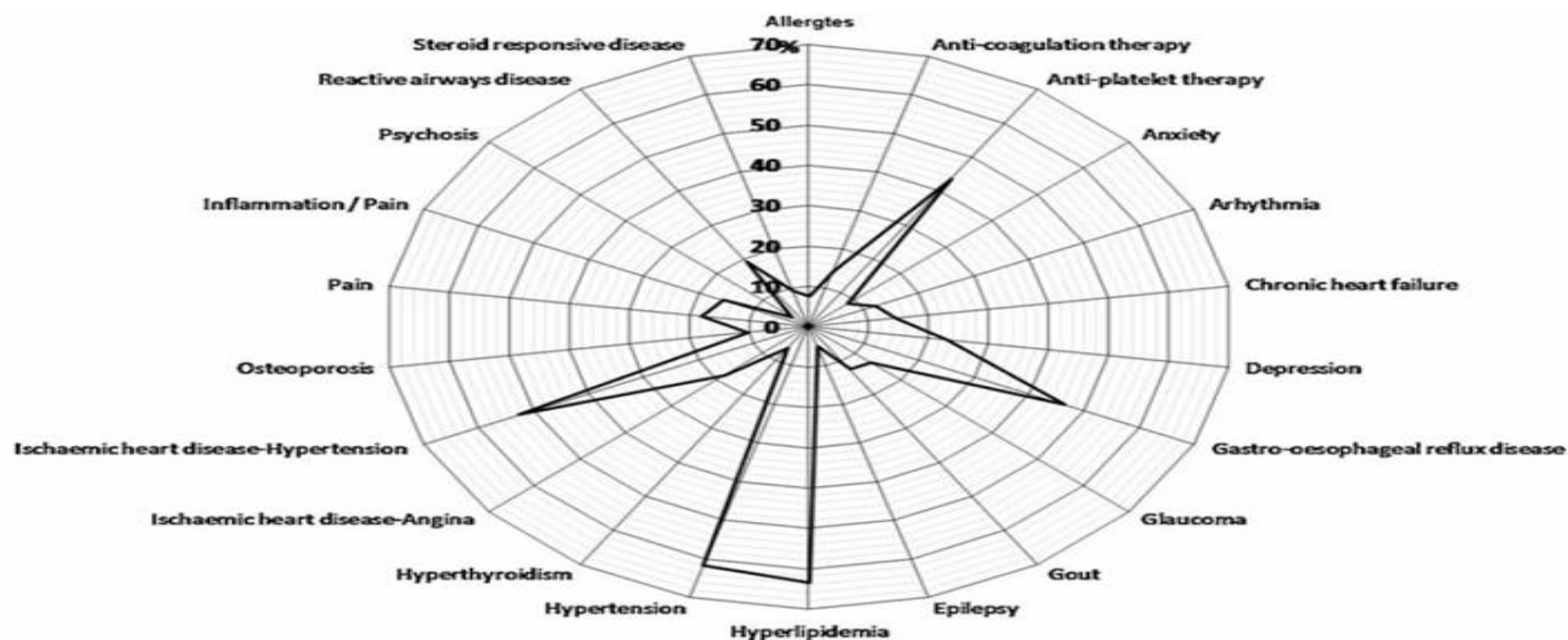
Journal homepage: www.elsevier.com/locate/diabres



International
Diabetes
Federation



Comorbidity in the elderly with diabetes: Identification of areas of potential treatment conflicts



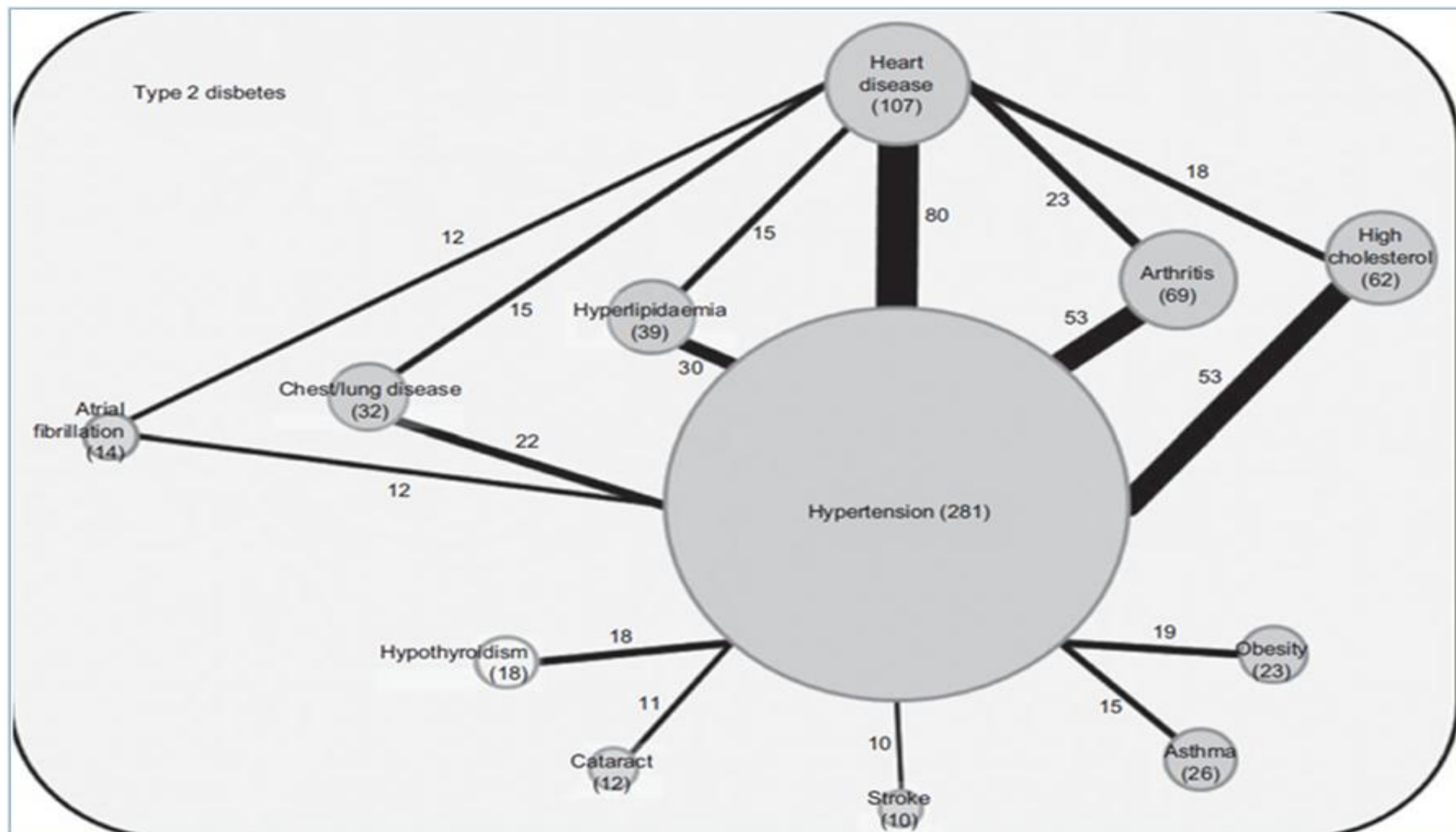
**BROAD
SPECTRUM**

Fig. 1 - Prevalence of comorbid conditions in an elderly (≥ 65 years) diabetic cohort ($n = 18,968$)^a.
^aOnly those comorbidities with a prevalence of $\geq 5\%$ are presented.

Multimorbidity in a cohort of patients with type 2 diabetes

European Journal of General Practice, 2013; 19: 17–22

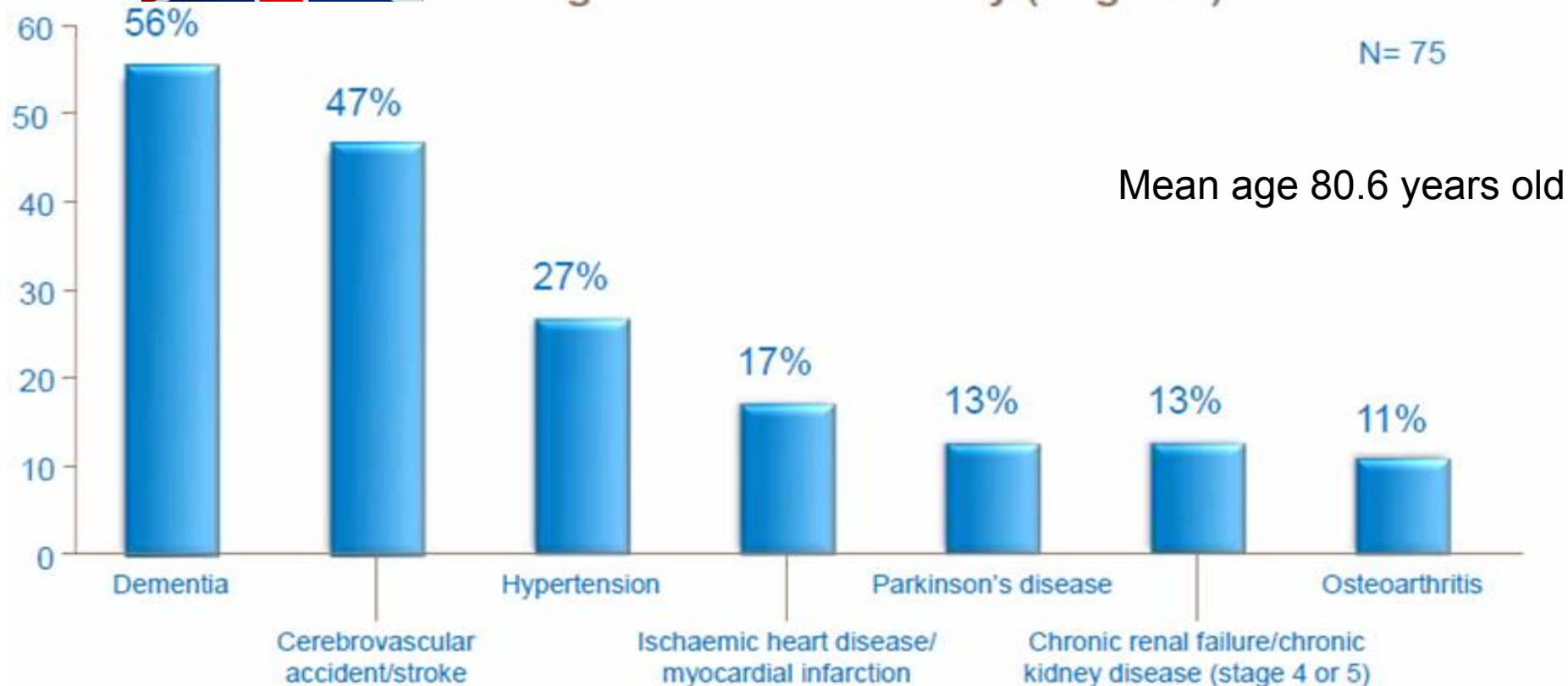
Conor Teljeur¹, Susan M. Smith^{1,2}, Gillian Paul^{1,3}, Alan Kelly¹ & Tom O'Dowd¹



Older adults with diabetes are frequent comorbidity patients



Nursing Homes en Coventry (England)



An average of 4 comorbidities

Gadsby R, et al. Diabet. Med. 2011;28:778-80

Association between clusters of diseases and polypharmacy in hospitalized elderly patients: Results from the REPOSI study [Eur J Intern Med. 2011; 22:597-602.](#)

Alessandro Nobili ^{a,*}, Alessandra Marengoni ^{b,1}, Mauro Tettamanti ^a, Francesco Salerno ^{c,1}, Luca Pasina ^a, Carlotta Franchi ^a, Alfonso Iorio ^{d,1}, Maura Marcucci ^e, Salvatore Corrao ^f, Giuseppe Licata ^{f,1}, Pier Mannuccio Mannucci ^{g,1}

Mean number of drugs (95% confidence intervals, CI) and odds ratios (OR) for polypharmacy according to clusters of diseases. Findings adjusted for age, sex, education, Charlson Index and participating centers.

Clusters of diseases	Mean no. of drugs (95% CI)	OR	95% CI
Diabetes and CHD and CVD	8.3 (7.1–9.5)	9.8	1.3–72.2
Diabetes and CHD	8.7 (7.9–9.5)	5.8	2.6–13.2
HF and AF	7.6 (6.7–8.5)	5.5	2.0–14.9
Thyroid dysfunction and AF	7.4 (6.7–8.1)	5.0	1.8–14.1
COPD and CHD	8.3 (7.3–9.2)	4.1	1.7–9.9
Hypertension and dyslipidemia	7.1 (6.5–7.7)	3.7	2.0–6.7
HF and COPD	8.7 (7.4–9.9)	3.7	0.8–16.8
Diabetes and CVD	7.4 (6.7–8.0)	3.2	1.5–6.7
Diabetes and dyslipidemia	7.9 (7.2–8.6)	2.8	1.3–6.1
Diabetes and CRF	8.3 (7.4–9.2)	2.7	0.9–7.9
Hypertension and diabetes	7.7 (7.1–8.2)	2.4	1.6–3.5
Hypertension and CVD	6.7 (6.3–7.1)	2.3	1.7–3.0
HF and CRF	8.2 (6.8–9.6)	2.2	0.4–11.5
CRF and anemia	7.9 (6.5–9.3)	1.8	0.7–4.8
Gastric and gastro-intestinal diseases	7.1 (6.0–8.1)	1.8	0.6–5.4
Arthritis and dementia	5.7 (3.8–7.5)	0.9	0.2–4.5
Liver cirrhosis and anemia	6.5 (4.9–8.1)	0.7	0.2–3.0
Liver cirrhosis and malignancy	6.1 (4.9–7.3)	0.6	0.3–1.6

CVD = Cerebrovascular Disease; HF = Heart Failure, AF = Atrial Fibrillation, COPD = Chronic Obstructive Pulmonary Disease, CRF= Chronic Renal Failure, CHD = Coronary Heart Disease.

DIABETES IS PRESENT IN SEVENT OF THE CLUSTERS
Most of which also include cardiovascular problems

Multimorbidity in people with type 2 diabetes in the Basque Country (Spain): Prevalence, comorbidity clusters and comparison with other chronic patients

European Journal of Internal Medicine 26 (2015) 197–202

Edurne Alonso-Morán^{a,*}, Juan F. Orueta^b, Jose Ignacio Fraile Esteban^c, José M^a. Arteagoitia Axpe

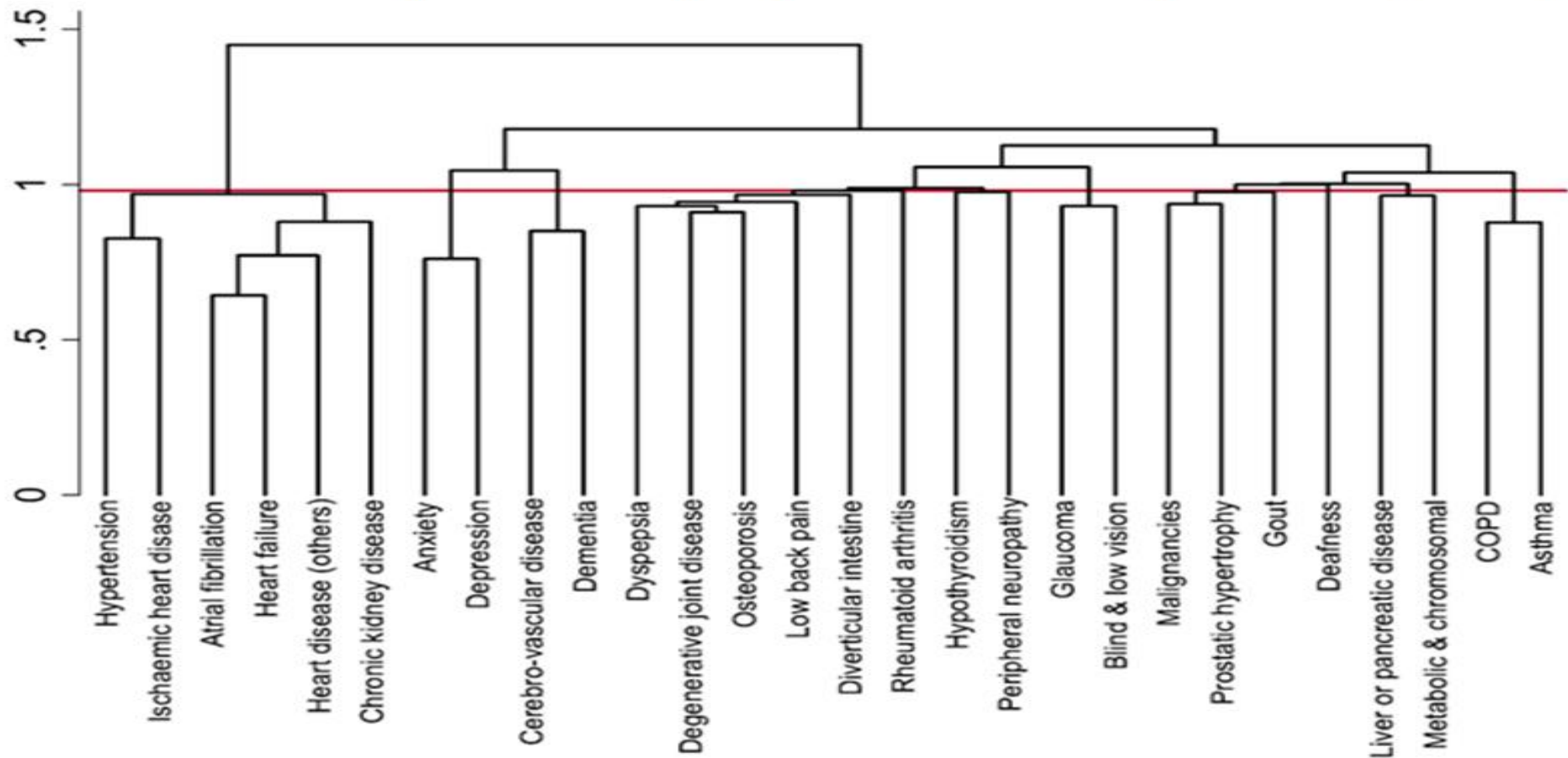


Fig. 1. Morbidity clusters in patients with type 2 diabetes mellitus (T2DM) using Wards-linkage clustering (cut-off line at $y = 0.98$).

10 relevant disease clusters in patients with T2DM were identified



Usually comorbidity is associated with POLYPHARMACY

The NEW ENGLAND JOURNAL of MEDICINE

REVIEW ARTICLE

DRUG THERAPY

Adherence to Medication

Lars Osterberg, M.D., and Terrence Blaschke, M.D.

Drugs don't work in patients who don't take them.

— C. Everett Koop, M.D.

“Drugs don’t work in patients who don’t take them” C Everett M.D. Adherence to medication New Engl J Med 2005: 353: 487.

WATCH THE ADHERENCE

Association between clusters of diseases and polypharmacy in hospitalized elderly patients: Results from the REPOSI study [Eur J Intern Med. 2011; 22:597-602.](#)

Alessandro Nobili ^{a,*}, Alessandra Marengoni ^{b,1}, Mauro Tettamanti ^a, Francesco Salerno ^{c,1}, Luca Pasina ^a, Carlotta Franchi ^a, Alfonso Iorio ^{d,1}, Maura Marcucci ^e, Salvatore Corrao ^f, Giuseppe Licata ^{f,1}, Pier Mannuccio Mannucci ^{g,1}

DM TENDS TO CLUSTER

- **Considered as a single disease, diabetes was associated with nearly double the risk of polypharmacy, but clustered with other conditions, especially cardiovascular diseases, showed a much greater increase in the prescription of polypharmacy compared to diabetes alone.**
- **The risk of polypharmacy in the elderly patients with diabetes mellitus might be explained by the high probability of co-occurring diseases.**

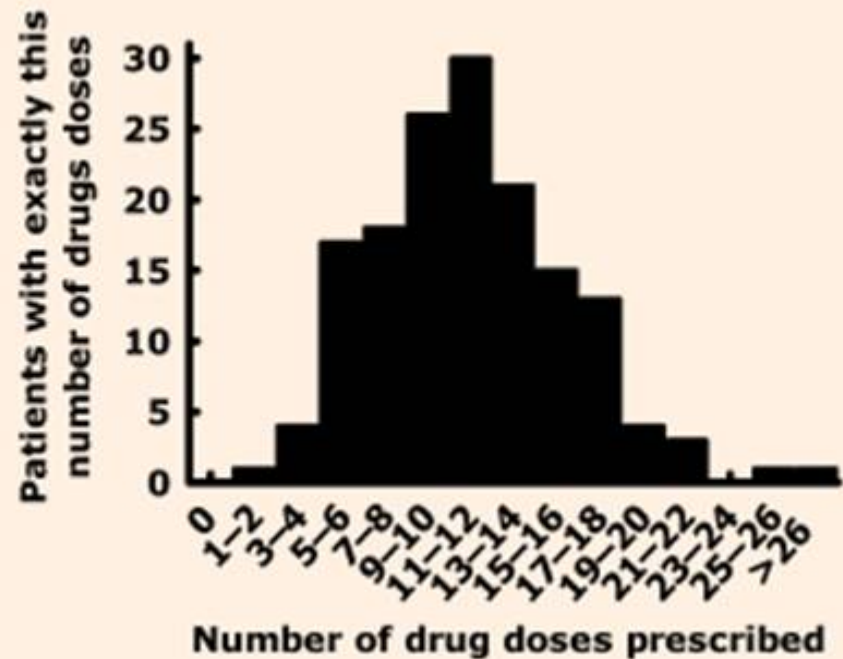
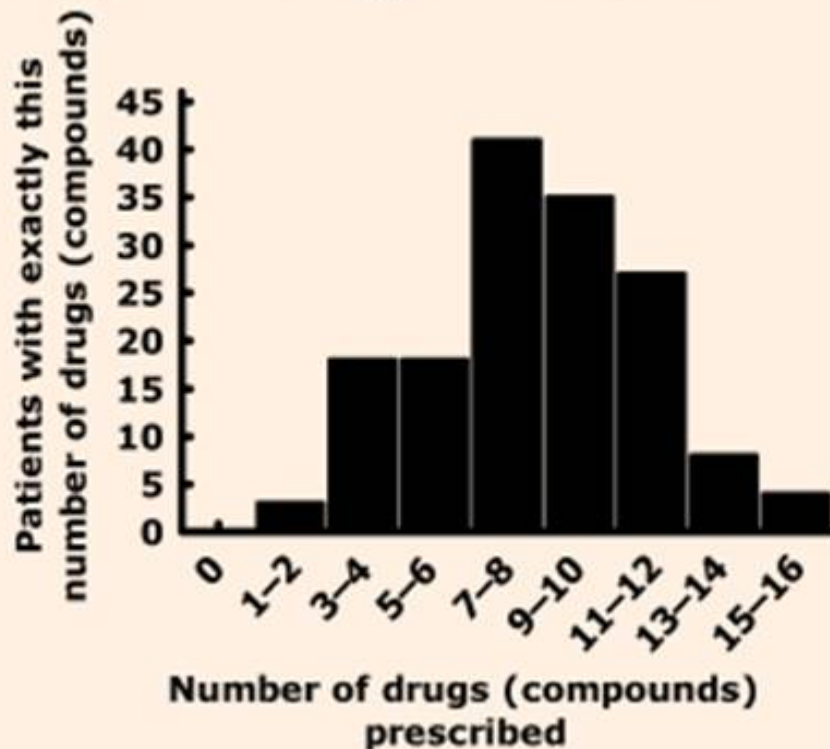
GREAT INCREASE IN THE PRESCRIPTION OF POLYPHARMACY

Polypharmacy in people with Type 1 and Type 2 diabetes is justified by current guidelines—a comprehensive assessment of drug prescriptions in patients needing inpatient treatment for diabetes-associated problems

S. Bauer and M. A. Nauck

Diabet. Med. 31, 1078–1085 (2014)

People with Type 2 diabetes



In this study with a means of 8 drugs per day in DM patients, over 97% of the prescriptions corresponded to recommendations found in guidelines.

Clinical Practice Guidelines and Quality of Care for Older Patients With Multiple Comorbid Diseases

Table 4. Potential Treatment Interactions for a Hypothetical 79-Year-Old Woman with 5 Chronic Diseases

Type of Disease	Medications With Potential Interactions	Type of Interaction		
		Medication and Other Disease	Medications for Different Diseases	Medication and Food
Hypertension	Hydrochlorothiazide, lisinopril	Diabetes: diuretics increase serum glucose and lipids*	Diabetes medications: hydrochlorothiazide may decrease effectiveness of glyburide	NA
Diabetes	Glyburide, metformin, aspirin, and atorvastatin	NA	Osteoarthritis medications: NSAIDs plus aspirin increase risk of bleeding Diabetes medications: glyburide plus aspirin may increase the risk of hypoglycemia; aspirin may decrease effectiveness of lisinopril	Aspirin plus alcohol: increased risk of gastrointestinal tract bleeding Atorvastatin plus grapefruit juice: muscle pain, weakness Glyburide plus alcohol: low blood sugar, flushing, rapid breathing, tachycardia Metformin plus alcohol: extreme weakness and heavy breathing Metformin plus any type of food: medication absorption decreased
Osteoarthritis	NSAIDs	Hypertension: NSAIDs: raise blood pressure†; NSAIDs plus hypertension increase risk of renal failure	Diabetes medications: NSAIDs in combination with aspirin increase risk of bleeding Hypertension medications: NSAIDs decrease efficacy of diuretics	NA
Osteoporosis	Calcium, alendronate	NA	Diabetes medications: calcium may decrease efficacy of aspirin; aspirin plus alendronate can cause upset stomach Osteoporosis medications: calcium may lower serum alendronate level	Alendronate plus calcium: take on empty stomach (>2 h from last meal) Alendronate: avoid orange juice Calcium plus oxalic acid (spinach and rhubarb) or phytic (bran and whole cereals): eating these foods may decrease amount of calcium absorbed (>2 h from last meal)
Chronic obstructive pulmonary disease	Short-acting β-agonists	NA	NA	NA

12 drugs for chronic use

Drug-disease and drug-drug interactions: systematic examination of recommendations in 12 UK national clinical guidelines

BMJ 2015;350:h949 |

Siobhan Dumbreck,¹ Angela Flynn,¹ Moray Nairn,² Martin Wilson,³ Shaun Treweek,⁴

Objective:

To identify the number of drug-disease and drug-drug interactions for exemplar index conditions within National Institute of Health and Care Excellence (NICE) clinical guidelines.

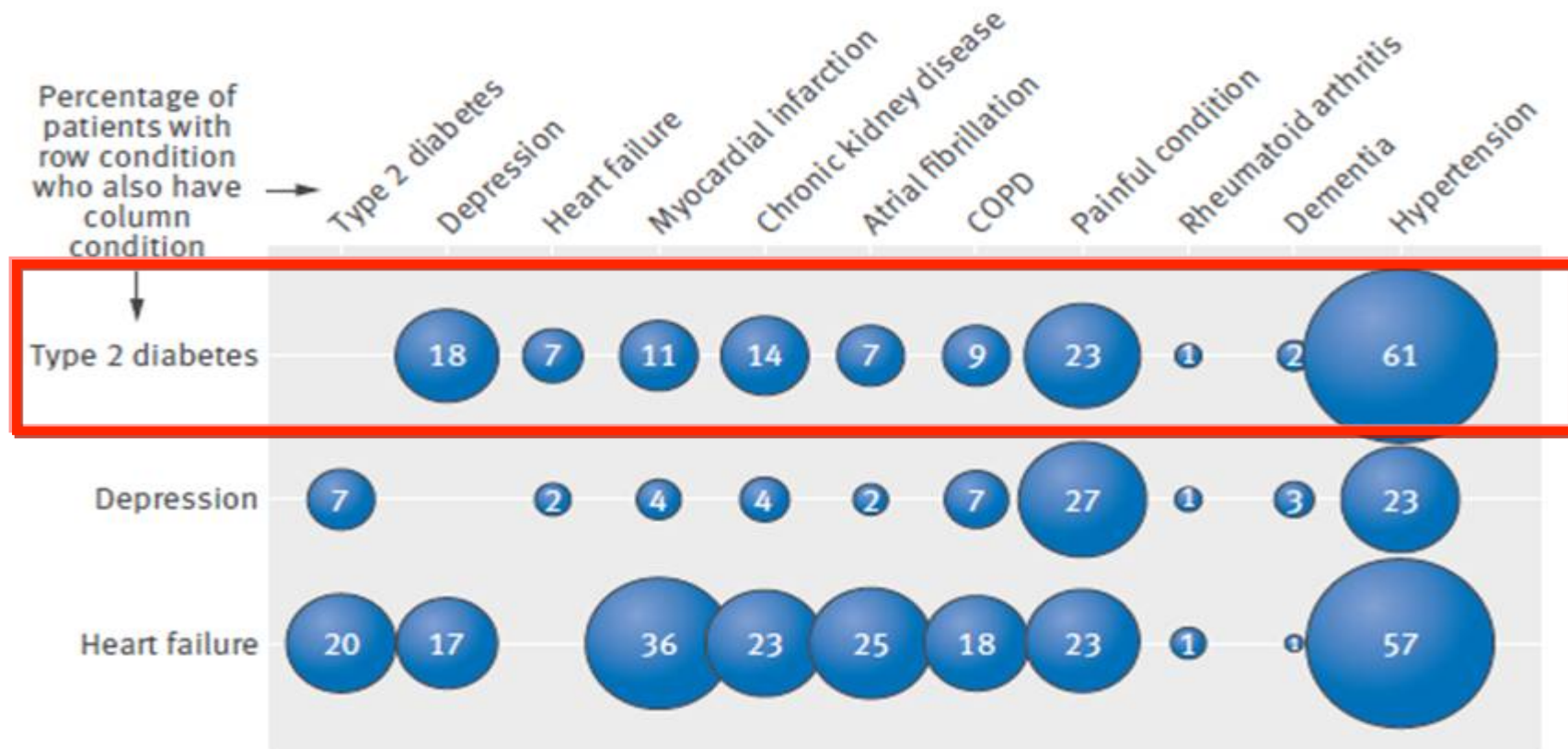
Design

Systematic identification, quantification, and classification of **potentially serious drug-disease and drug-drug interactions** for drugs recommended by NICE clinical guidelines for diabetes, heart failure, and depression in relation to 11 other common conditions and drugs recommended by NICE guidelines for those conditions.

Drug-disease and drug-drug interactions: systematic examination of recommendations in 12 UK national clinical guidelines

BMJ 2015;350:h949 |

Siobhan Dumbreck,¹ Angela Flynn,¹ Moray Nairn,² Martin Wilson,³ Shaun Treweek,⁴



Proportion of people with 3 index conditions who have the other conditions.

Adaptive electronic based guidelines let us see what proportion of people with DIABETES index condition suffer from other conditions as well.

Drug-disease and drug-drug interactions: systematic examination of recommendations in 12 UK national clinical guidelines

BMJ 2015;350:h949 |

Siobhan Dumbreck,¹ Angela Flynn,¹ Moray Nairn,² Martin Wilson,³ Shaun Treweek,⁴

Table 1 | Number of drugs recommended for each condition in each NICE guideline considered

Condition	Guideline No	Year published	No of drugs/drug classes recommended	
			First line	Second line
Type 2 diabetes	CG87	2009	4	19

At that time Diabetes NICE Guides recommended
-4 first line drugs
-19 second line drugs.

Drug-disease and drug-drug interactions: systematic examination of recommendations in 12 UK national clinical guidelines

BMJ 2015;350:h949 |

Siobhan Dumbreck,¹ Angela Flynn,¹ Moray Nairn,² Martin Wilson,³ Shaun Treweek,⁴

HIGHER RISK in people WITH DIABETES

Table 2 | Number of drug-disease interactions between drugs/drug classes recommended for each index condition and 11 other conditions in NICE guidelines. First line treatments are explicitly described as first line drugs or recommended for (almost) everyone with the condition; second line treatments (or other drugs) are explicitly described as second or third line drugs or recommended for only some subgroups or in some uncommon circumstances

Index conditions	CKD (dose change)	CKD (avoid)	Heart failure	Depression	Type 2 diabetes	Atrial fibrillation	Osteoarthritis	COPD	Hypertension	Post MI	Dementia	Rheumatoid arthritis	Neuropathic pain	Total
Type 2 diabetes*														
First line	3	2	0	0	–	0	0	0	0	0	0	0	0	5
Second line	11	11	5	0	–	0	0	0	0	0	0	0	0	27

There were **32** potentially serious drug-disease interactions between drugs recommended in the guideline for diabetes and the 11 other conditions compared with **six** interactions for drugs recommended for depression and **ten** for drugs recommended for heart failure.

Most of them were interactions between the recommended drug and chronic kidney disease.

Drug-disease and drug-drug interactions: systematic examination of recommendations in 12 UK national clinical guidelines

BMJ 2015;350:h949 |

Siobhan Dumbreck,¹ Angela Flynn,¹ Moray Nairn,² Martin Wilson,³ Shaun Treweek,⁴

Table 3 | Type of harm expected from potentially serious drug-drug interaction for each index condition

Index condition	Cardiovascular*	Bleeding	Renal/potassium	Central nervous system	Other†	Total
Type 2 diabetes						
First line recommended drug	3	3	2	0	12	20
Second line recommended drug	54	11	18	1	29	113
Depression						
First line recommended drug	1	9	0	7	2	19
Second line recommended drug	10	13	0	27	20	70
Heart failure						
First line recommended drug	15	0	4	0	2	21
Second line recommended drug	17	34	17	0	22	90

*Includes effects on heart rate or rhythm or effects on blood pressure.

†Includes myopathy with statin treatment, or clinically relevant altered plasma concentration (for example, of digoxin, lithium, ciclosporin, or theophylline), which might require dose alteration or closer monitoring.

Potentially more serious drug-drug interactions were identified between drugs recommended by guidelines for each of the three index conditions and drugs recommended for the 11 other conditions: **133 drug-drug interactions for drugs recommended in DM**, 89 for depression, and 111 for heart failure.

DIABETIC ISSUES THAT FAVOR POLYPHARMACY



-GLYCEMIC CONTROL

-MULTIPLE COMORBIDITIES ASSOCIATED

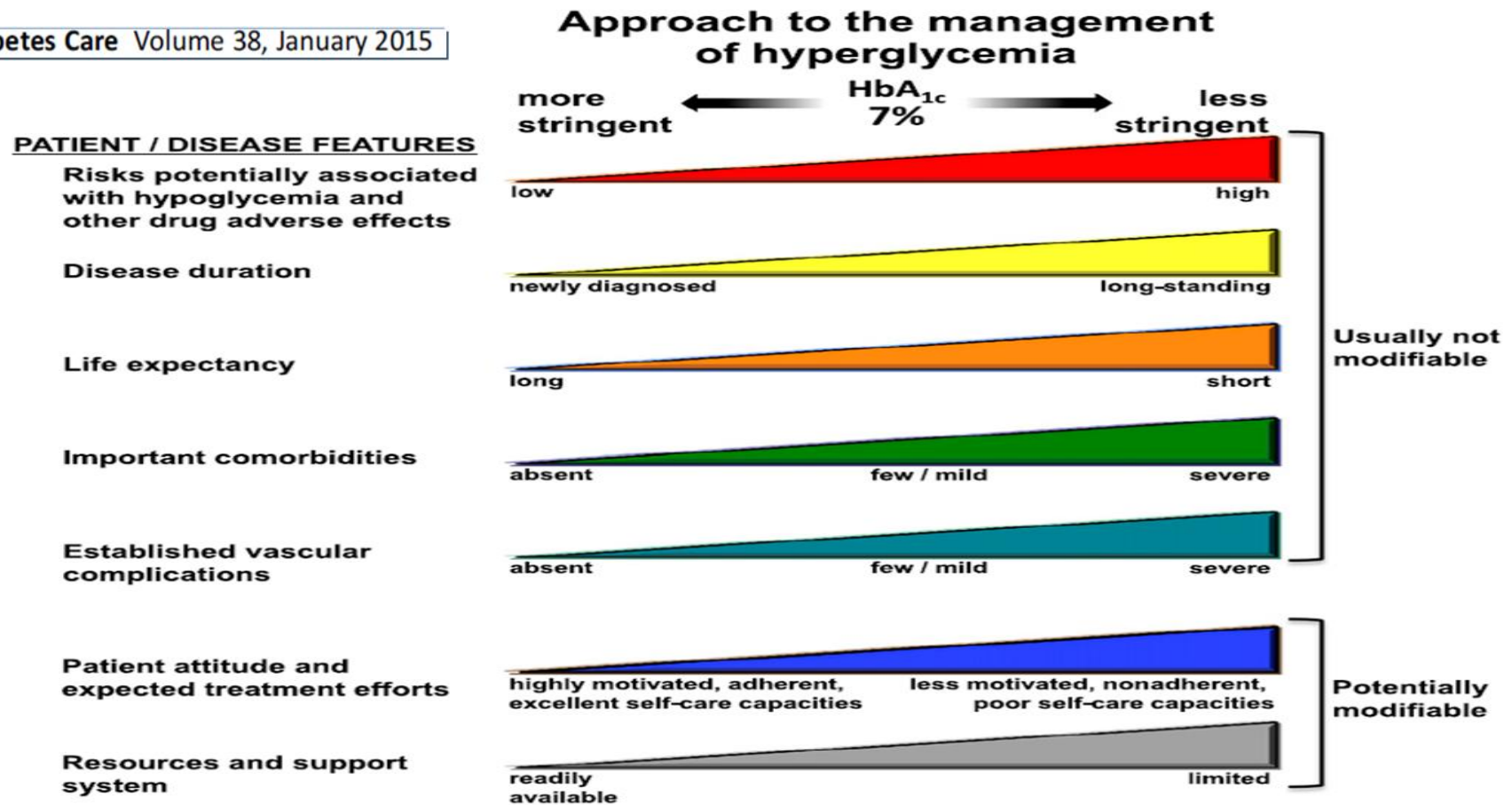
In diabetic patient polypharmacy is often unavoidable, since multiple drug therapy has become the standard for most of its common comorbidities.

The potential risk of interactions caused by polypharmacy is likely to continue rising as more therapeutic options become available.

Management of Hyperglycemia in Type 2 Diabetes: A Patient-Centered Approach

Position Statement of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD)

Diabetes Care Volume 38, January 2015



-SUITABLE THERAPEUTIC TARGETS

INDIVIDUALIZE

Diabetes in Older Adults: A Consensus Report

M. Sue Kirkman, MD,^a Vanessa Jones Briscoe, PhD, NP, CDE,^b Nathaniel Clark, MD, MS, RD,^c Hermes Florez, MD, MPH, PhD,^d Linda B. Haas, PHC, RN, CDE,^e Jeffrey B. Halter, MD,^f Elbert S. Huang, MD, MPH,^g Mary T. Korytkowski, MD,^b Medha N. Munshi, MD,ⁱ Peggy Soule Odegard, BS, PharmD, CDE,^j Richard E. Pratley, MD,^k and Carrie S. Swift, MS, RD, BC-ADM, CDE^l

Table 1—A framework for considering treatment goals for glycemia, blood pressure, and dyslipidemia in older adults with diabetes

Patient characteristics/ health status	Rationale	Reasonable A1C goal (A lower goal may be set for an individual if achievable without recurrent or severe hypoglycemia or undue treatment burden)	Fasting or preprandial glucose (mg/dL)	Bedtime glucose (mg/dL)	Blood pressure (mmHg)	Lipids
Healthy (Few coexisting chronic illnesses, intact cognitive and functional status)	Longer remaining life expectancy	<7.5%	90–130	90–150	<140/80	Statin unless contraindicated or not tolerated
Complex/intermediate (Multiple coexisting chronic illnesses* or 2+ instrumental ADL impairments or mild to moderate cognitive impairment)	Intermediate remaining life expectancy, high treatment burden, hypoglycemia vulnerability, fall risk	<8.0%	90–150	100–180	<140/80	Statin unless contraindicated or not tolerated
Very complex/poor health (Long-term care or end-stage chronic illnesses** or moderate to severe cognitive impairment or 2+ ADL dependencies)	Limited remaining life expectancy makes benefit uncertain	<8.5%†	100–180	110–200	<150/90	Consider likelihood of benefit with statin (secondary prevention moreso than primary)

INTERNATIONAL DIABETES FEDERATION
**MANAGING OLDER PEOPLE
WITH TYPE 2 DIABETES**

Table 2. General glycaemic targets according to functional category*

Functional category	General glycated haemoglobin target
Functionally Independent	7.0-7.5% / 53-59 mmol/mol
Functionally dependent	7.0-8.0% / 53-64 mmol/mol
<ul style="list-style-type: none">• Frail	<ul style="list-style-type: none">• Up to 8.5% / 70 mmol/mol
<ul style="list-style-type: none">• Dementia	<ul style="list-style-type: none">• Up to 8.5% / 70 mmol/mol
End of life	Avoid symptomatic hyperglycaemia

Chronic consequences of hypoglycemia in older people.

- **General physical function decline. Reduced ability in performing activities of daily living. Complete dependence.**
- **Frequent falls.**
- **Increased risk of fractures including hip fracture.**
- **Frequent hospitalisations.**
- **Increased risk of vascular disease.**
- **Impaired cognitive function. Increased risk of dementia.**
- **Increased social isolation. Behavioural changes.**
- **Increased risk of disability.**
- **Increased risk of mortality.**

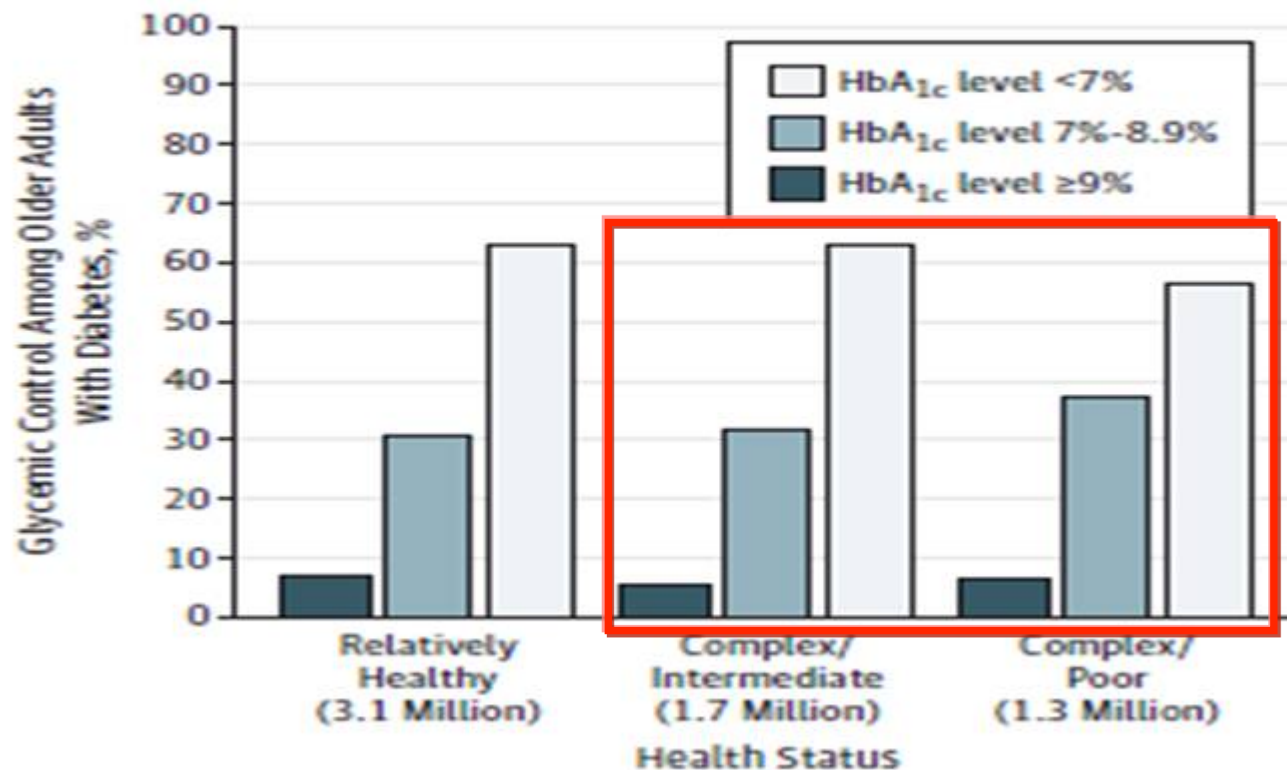
Abdelhafiz AH et al

[Hypoglycemia in older people - a less well recognized risk factor for frailty.](#)

Potential Overtreatment of Diabetes Mellitus in Older Adults With Tight Glycemic Control

Kasia J. Lipska, MD, MHS; Joseph S. Ross, MD; Yinghui Miao, MPH; Nilay D. Shah, PhD;

Figure 1. Achieved Glycemic Control Among Older US Adults With Diabetes Mellitus Across 3 Health Status Categories

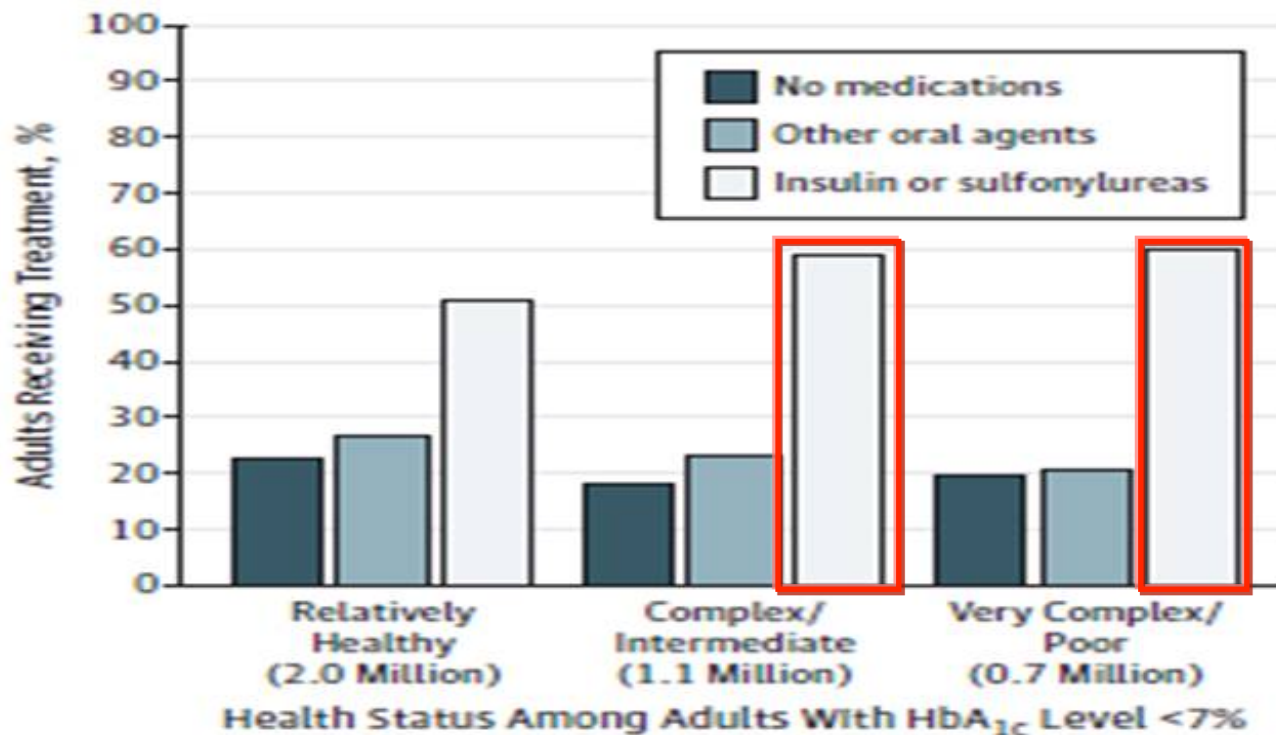


Although the harms of intensive treatment probably exceeded the benefits for older patients with complex/intermediate or very complex/poor health status, most of these adults reached tight glycemic targets.

Potential Overtreatment of Diabetes Mellitus in Older Adults With Tight Glycemic Control

Kasia J. Lipska, MD, MHS; Joseph S. Ross, MD; Yinghui Miao, MPH; Nilay D. Shah, PhD;

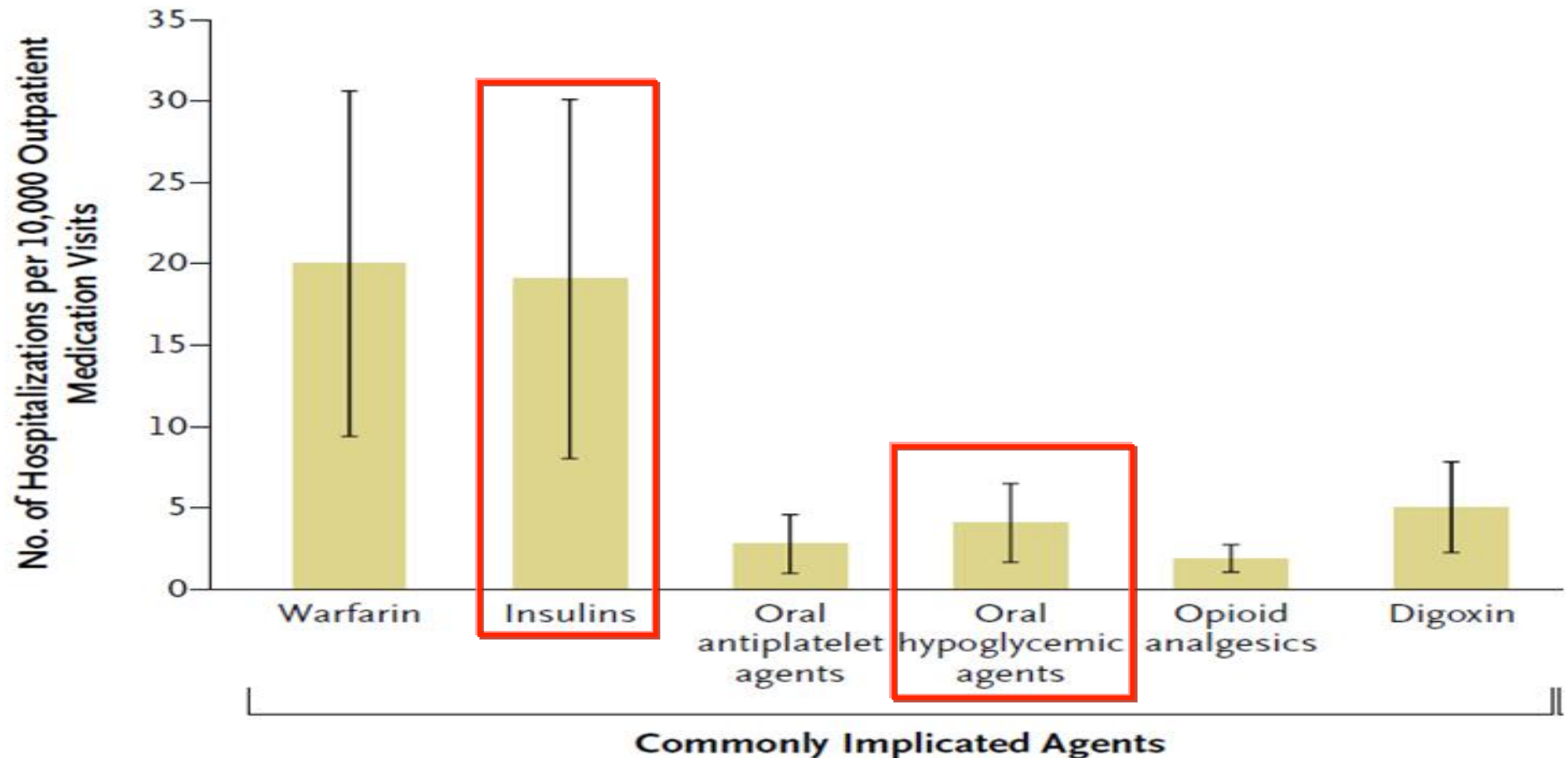
Figure 2. Treatment of Older US Adults With Diabetes Mellitus With an HbA_{1c} Level of Less Than 7% Across Health Status Categories



Most of them were treated with insulin or sulfonylureas, which may lead to severe hypoglycemia. A substantial proportion of older adults with diabetes were potentially overtreated.

Emergency Hospitalizations for Adverse Drug Events in Older Americans

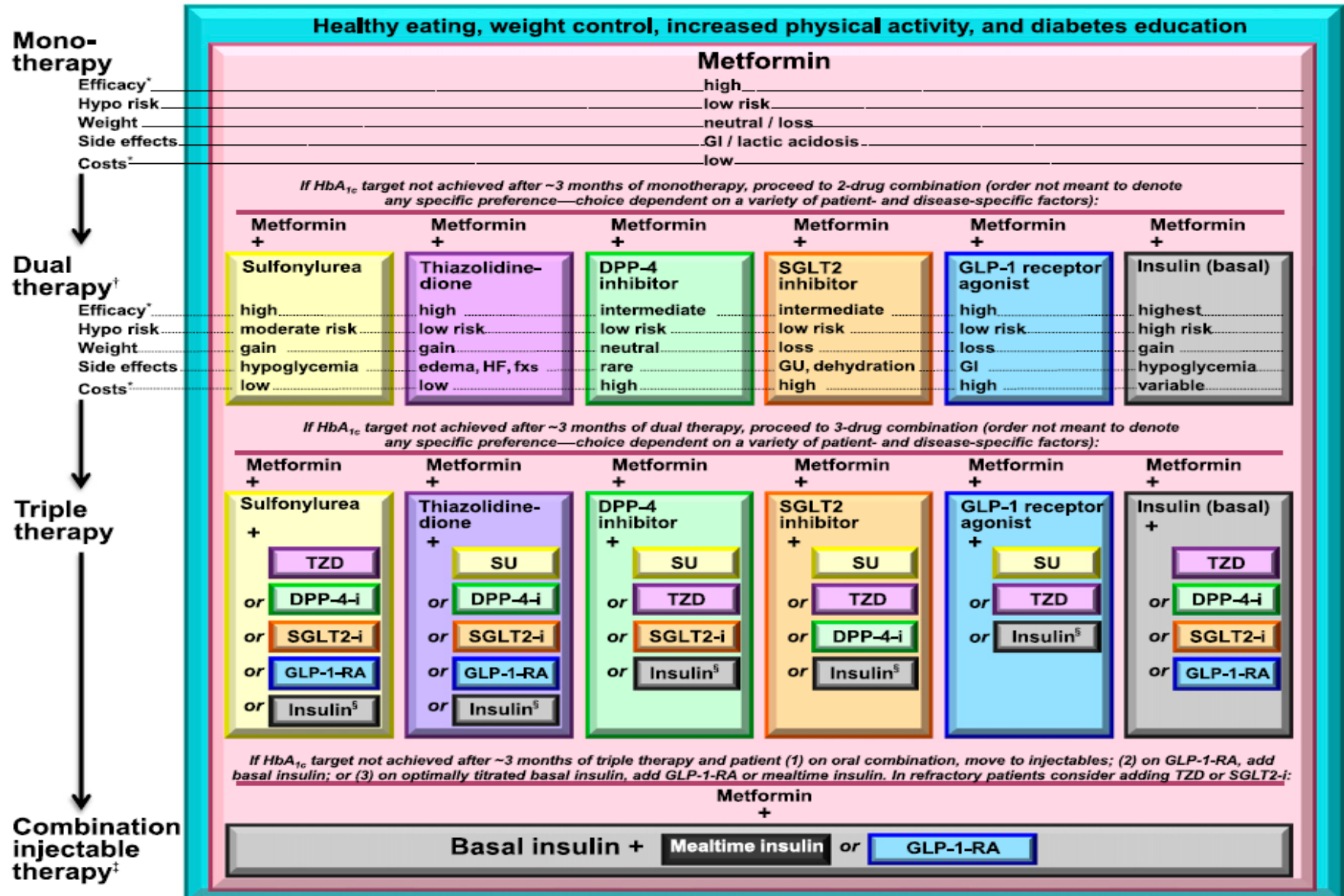
N ENGL J MED 365;21 NEJM.ORG NOVEMBER 24, 2011



Hypoglycemia: insulins (13.9%), and oral hypoglycemic agents (10.7%).

DRUG REVIEW: DM

Diabetes Care Volume 38, January 2015



Potential drug interactions associated with treatments for Type 2 diabetes and its comorbidities: a clinical pharmacology review

DRUG REVIEW: GLOBAL

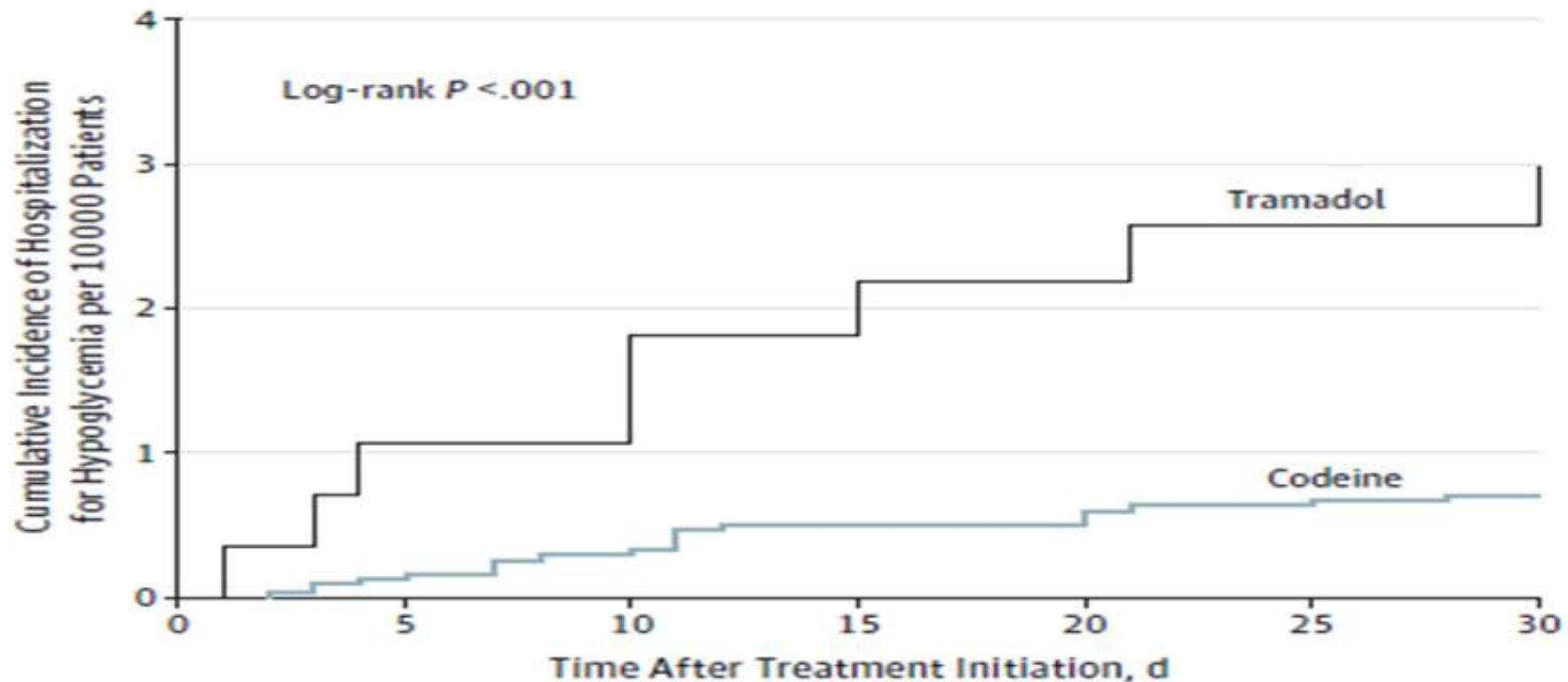
- In addition to hyperglycemia, patients with T2DM are likely to have dyslipidemia and hypertension.
- Patients with T2DM are more likely to suffer from mood and cognitive disturbances.
- The presence of multiple comorbidities makes the management of T2DM complex and often leads to polypharmacy.
- Careful and thoughtful review of all the drugs a patient is taking is key for the healthcare provider to optimize patient health and quality of life.

Tramadol Use and the Risk of Hospitalization for Hypoglycemia in Patients With Noncancer Pain

Jean-Pascal Fournier, MD, PhD; Laurent Azoulay, PhD; Hui Yin, MSc;

JAMA Intern Med. 2015;175(2):186-193.

Figure 2. Cumulative Incidence of Hospitalization for Hypoglycemia in Patients Newly Treated With Tramadol Hydrochloride and Codeine in the First 30 Days After Treatment Initiation



The initiation of tramadol is associated with an increased risk of hypoglycemia requiring hospitalization.

Inappropriate prescribing to older patients admitted to hospital: A comparison of different tools of misprescribing and underprescribing



Antonio San-José^{a,b,l,*}, Antonia Agustí^{c,d,e}, Xavier Vidal^{c,d,e}, Francesc Formiga^{f,l}, Alfonso López-Soto^{g,l}, Antonio Fernández-Moyano^{h,l}, Juana García^{i,l}, Nieves Ramírez-Duque^{j,l}, Olga H. Torres^{b,k,l}, José Barbé^{a,b,l}, on behalf of Potentially Inappropriate Prescription in Older Patients in Spain (PIPOPS) Investigators' Project

- **An observational and prospective study carried out in 7 Spanish hospitals in patients aged 75 and older.**
- **The Beers and STOPP criteria were used to assess potentially inappropriate medicines (PIMs), and the START criteria and ACOVE-3 quality indicators were used to assess potentially prescribing omissions (PPOs).**
- **672 patients [mean age 82), 56% female.**
- **The mean number of prescription drugs used was 10**
- **The prevalence of Inappropriate Prescribing (IP): 87.6%**
- **Polypharmacy (≥ 10 medicines) was the strongest predictor of IP [OR=11.34].**

Inappropriate prescribing in elderly people with diabetes admitted to hospital

Diabetic Medicine

F. Formiga^{1,2}, X. Vidal^{3,4}, A. Agustí^{3,4}, D. Chivite^{1,2}, B. Rosón¹, J. Barbé^{2,5,6}, A.

- 249 patients (mean age 82.4 years, 62.9% female) had DM diagnosis.
- The mean number of prescription drugs used by DM patients was **12.6 vs.** 9.4 in non-DM patients ($p < 0.001$).
- 74.2% of DM patients used 10 or more drugs.
- 54.5% of the DM patients at least one Beers-listed PIM; for STOPP-listed PIMs, START-listed PPOs and ACOVE3-listed PPOs this prevalence was 54.5%, 68.1% and 64.4% respectively.
- Except for the Beers criteria, these prevalences were significantly higher than those found among non-DM patients.

Higher percentages of Inappropriate Prescribing in DM patients

The effect of integrated health management model on the health of older adults with diabetes in a randomized controlled trial

Jianqian Chao^{a,*}, Liang Yang^a, Hui Xu^b, Qing Yu^b, Lili Jiang^a, Mengmeng Zong^a

Archives of Gerontology and Geriatrics 60 (2015) 82–88

An integrated health management model is effective in improving the health of older adults with diabetes.

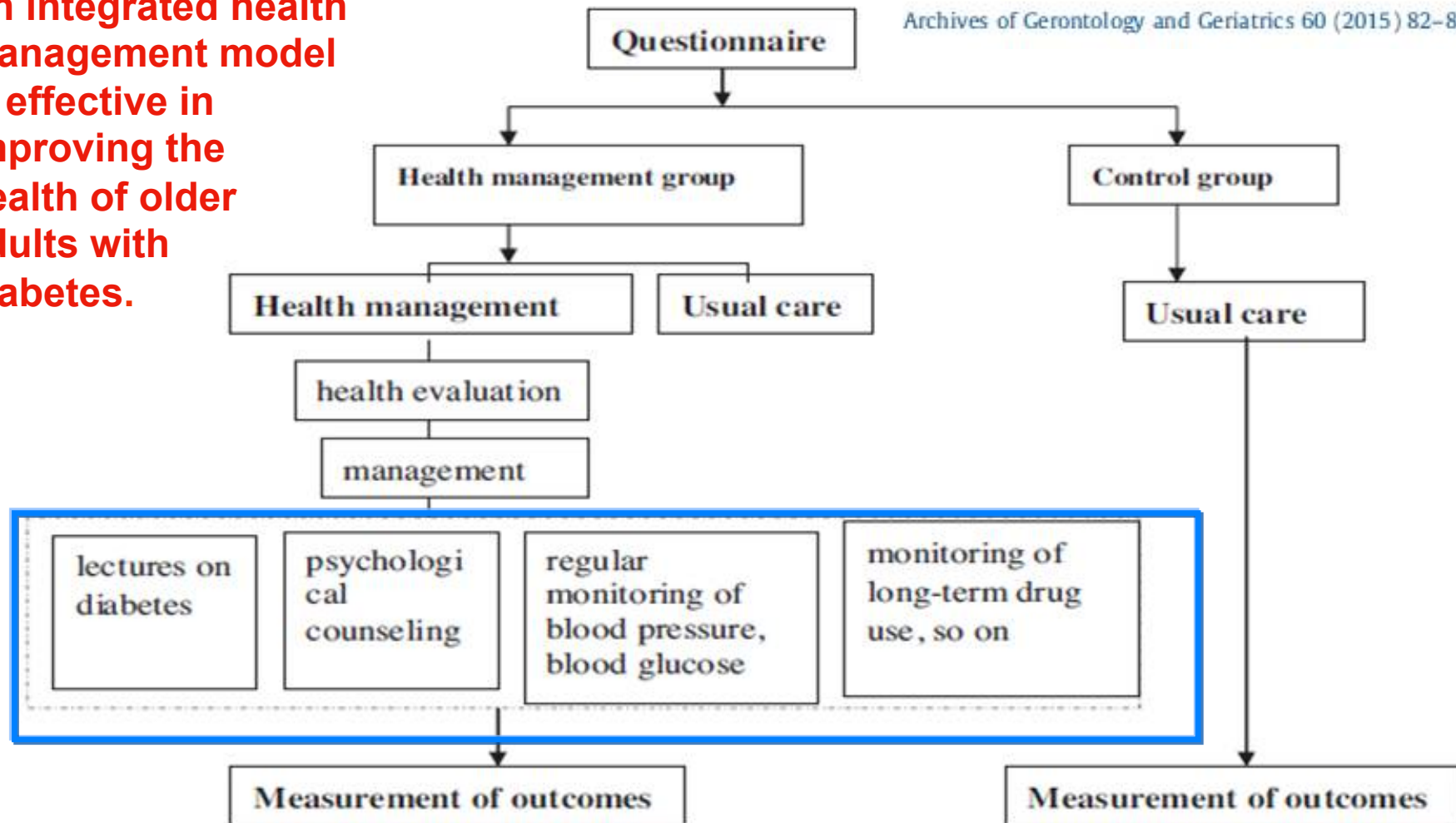


Fig. 2. Graphical depiction of the intervention.

The European Network of Centres for Pharmacoepidemiology and Pharmacovigilance: application to diabetes and vascular disease

2011

- The 2010 EMA regulatory action relating to rosiglitazone included a pharmacoepidemiological drug utilisation study to evaluate the benefit–risk profile in a real-life setting and has also led to the commissioning of an ENCePP European Network of Centres for **Pharmacoepidemiology and Pharmacovigilance** study to evaluate the impact of risk-minimisation activities.

The role of different regulatory and pharmacovigilance agencies will be essential as they will keep us informed about alerts and warnings.

Systematic Review or Meta-analysis

Adherence to diabetes medication: a systematic review

I. Krass¹, P. Schieback² and T. Dhippayom³

Diabet Med. 2015

DOI: 10.1111/dme.12651

- Of the 27 studies included in the present review, the prevalence of adherence ranged from **38.5 to 93.1%**.
- Only six out of 27 studies (22.2%) reported **prevalence of adherence of $\geq 80\%$** among their study population.

IDENTIFY PROBLEMS

Pharmaceutical consultation as a tool to improve health outcomes for patients with type 2 diabetes

- There were reductions in glycemia ($P < 0.0001$), glycated hemoglobin ($P = 0.0022$), cholesterolemia ($P = 0.0072$), triacylglycerolemia ($P = 0.0204$) and blood pressure ($P < 0.0001$).
- Increased concordance with drug treatment and correction of drug-related problems contributed to improved treatment.
- **Pharmaceutical consultation program** was suitable for improving health outcomes in T2DP by reducing risk factors for diabetic complications.

Safe and effective use of medicines for patients with type 2 diabetes – A randomized controlled trial of two interventions delivered by local pharmacies

- **The trial included five pharmacies; five pharmacists and five pharmaconomists, and 205 patients.**
- **The program comprising patients' narratives, problem and resource identification, and multi-dimensional individually tailored patient medication management solutions, seems to be an appropriate intervention to reduce non-adherence.**
- **The study showed improvement in patients' health, well-being, knowledge, and satisfaction as a result of the trial.**

Safe and effective use of medicines for patients with type 2 diabetes – A randomized controlled trial of two interventions delivered by local pharmacies

Research in Social and Administrative Pharmacy 11 (2015) 47–62

	Basic intervention	Extended intervention
Provided by	Pharmaconomists	Pharmacists
Estimated time for delivering the intervention	About 65 min distributed over at least 4 sessions and delivered within 6 months	About 130 min distributed over at least 4 sessions and delivered within 6 months
Process		
Medicines use check	Identify potential non-adherence and patient-reported problems using the Quick Screening Instrument Check personal electronic medication records for adherence problems Check personal medication record for medication-related issues	Identify potential non-adherence and patient-reported problems using the Quick Screening Instrument Check personal electronic medication records for adherence problems Medication review (therapeutic and economic issues)
Blood pressure measurement	Not measured	Measured according to a manual
Blood glucose measurement	Using a manual	Using a manual
Interview	Short basic interview with patient narratives as starting point Shared decision on most important problem and choice of solution for this among the following solutions	Comprehensive interview with focus on patient narratives Shared decision on which of the following solutions the patient would choose to work with.
Knowledge and beliefs	Provide information and counseling Provide pamphlets	Provide information and counseling Provide pamphlets Patient education in issues regarding the metabolic syndrome including glucose levels, blood pressure, lipid levels, medication, self-management
Motivation	Dialog based on “motivating interview” Agreement on shared goals and plans	Dialog based on “motivating interview” Using coaching techniques when deemed necessary Agreement on shared goals and plans
Behavior	Support to structuring and remembering medication intake: <ul style="list-style-type: none"> • Individually designed reminder strategies • Dosing aids • Dose dispensing • Medication event monitoring systems (MEMS) and feedback • Blood pressure measurements at home • Paper- or net-based diaries containing own data • SMS service or e-mail service 	Support to structuring and remembering medication intake: <ul style="list-style-type: none"> • Individually designed reminder strategies • Dosing aids • Dose dispensing • Medication event monitoring systems (MEMS) and feedback • Blood pressure measurements at home • Paper- or net-based diaries containing own data • SMS service or e-mail service
Contact with GP	Feedback to GP concerning dialog and referral of patient if deemed necessary	Feedback to GP concerning dialog and referral of patient if deemed necessary
Network and other health professionals	Involving network in support for medicines use Referral to other health services, e.g. smoking cessation	Involving network in support for medicines use Referral to other health services, e.g. smoking cessation

It is essential to assess information in a comprehensive way.

Development of an evidence-based checklist for the detection of drug related problems in type 2 diabetes

Bob W. van Roozendaal · Ines Krass

Pharm World Sci (2009) 31:580–595

- **An evidence-based checklist can be used specifically in patients with type 2 diabetes, to assist pharmacists and other healthcare professionals in systematically identifying drug related problems (DRPs).**
- **There is a high prevalence of DRPs in the population of patients with type 2 diabetes and poor glycaemic control.**
- **The most important DRPs in type 2 diabetes patients seem to be therapy failure and drug choice problems.**

This one includes 88 items

Practical Problems with Medication Use that Older People Experience: A Qualitative Study

JAGS

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Kim Notenboom, MSc, Erna Beers, MD,†‡ Diana A. van Riet-Nales, PharmD,§ Toine C. G.*

- **Older people experience a number of practical problems using their medicines, and their strategies to manage these problems are sometimes suboptimal.**
- **These problems can lead to incorrect medication use with clinically relevant consequences.**
- **These findings pose a challenge for healthcare professionals, drug developers, and regulators to diminish these problems**

GENERAL PROBLEMS

Table 1. Practical Problems and Related Management Strategies as Reported by 59 Participants

Practical Problem (n)	Management Strategy
Reading and understanding instructions for use (53 total reported by 37 participants)	
Text too small (12)	No solution or do not read package insert (regularly) (6), use magnifying glass (5), use extra light (1)
Information too difficult (5)	No solution or do not read package insert (regularly) (4), read information on packaging (1)
Information too extensive (12)	No solution or do not read package insert (regularly) (12)
Information on adverse events distressing (24)	Do not read package insert (regularly) (19), no solution (3), use no or lower dose (3)
Handling of outer packaging (19 total reported by 17 participants)	
Identification of product (3)	Write on packaging (2), no solution (1)
Opening packaging	
Box (6)	Other way of opening (3), use sharp equipment (3)
Wrapper around blister (3)	Use sharp equipment (2), no solution (1)
Removing blister from carton box (7)	Remove package insert (7)
Handling of immediate packaging (73 total reported by 38 participants)	
Separating individual units (sachets, vials, blister cups) (9)	Use sharp equipment (5), no solution (2), use nails (1)
Opening packaging	
For the first time (13)	Assistance (6), use sharp equipment (3), use auxiliary aid (2), no solution (2)
Every time (7)	Not closing properly (4), use other packaging (2), assistance (1), use sharp equipment (1), no solution (1), push or twist with palm of hand (1)
Removing medicine from Bottle (1)	Use other packaging (1)
Blister (42)	Use sharp equipment (6), no solution (6), use nails (1), change packaging (1)
Medicine dents, opens, breaks, or crumbles (15)	Take pieces (9), take another dose (2), use nails (2), no solution (1)
Tearline tears instead of blister opening (4)	No solution (4)
Pockets too small to push (7)	Use nails (to push on pocket or open lidding foil) (6), remove two tablets at once (1)
Pockets too large to localize product (1)	Using nails (1)
Closing packaging (1)	
Preparation before use (38 total reported by 23 participants)	
Identification of medicine (11)	Store separately from look-a-like medicine (5), writing on packaging (2), read embossment (1), no solution (1)
Holding medicine (12)	No solution (12)
Adjusting dose	
Tablet breaking (9)	
Difficult or painful (5)	No solution (3), assistance (1), using tablet splitter (1)
No equal halves or crumbles (4)	Take another (2), administration of pieces (1), use tablet splitter (1)
Measuring correct volume (1)	No solution (1)
Dissolution or disintegration of medicine (6)	No solution (6)
Drug taking (28 total reported by 17 participants)	
Medicine sticks in throat or mouth (17)	Take additional water or food (12), break tablet (2), no solution (2), take before other products (1)
Locating product in mouth (1)	No solution (1)
Unpleasant taste (10)	Take with food or additional water (5), take before other products (2), no solution (2), swallow tablet whole instead of chewing (1)

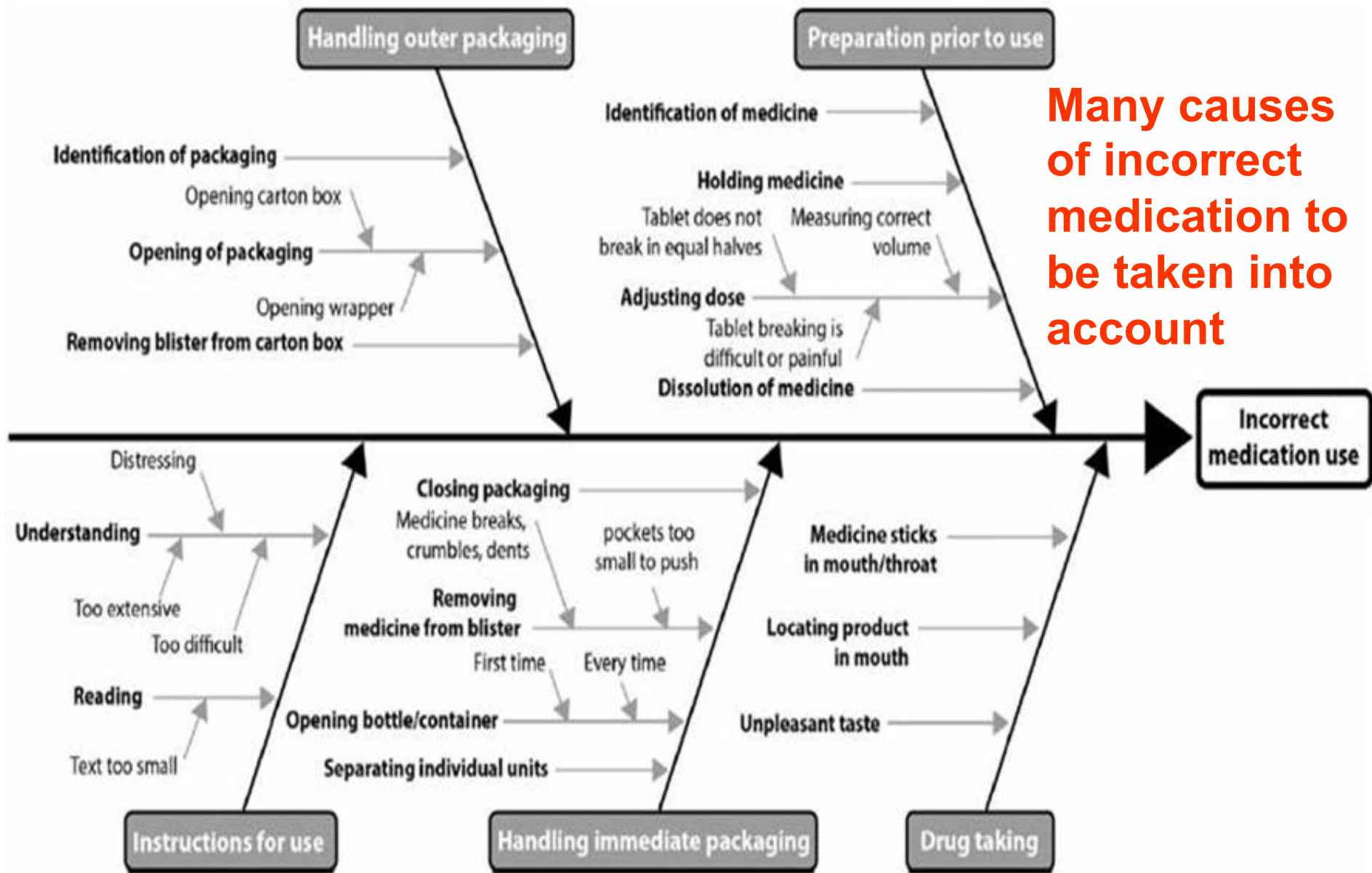


Figure 1. Ishikawa diagram outlining practical causes of incorrect medication use according to sequential step of the medication

Prevalence, Quality of Care, and Complications in Long Term Care Residents With Diabetes: A Multicenter Observational Study

Christopher A. Newton MD^a, Saira Adeel MD^a, Shadi Sadeghi-Yarandi MD^a, Winter Powell MD^a,

Results: Among 1409 LTC residents (age 79.7 ± 12 years), the prevalence of diabetes was 34.2%. Subjects with diabetes were either on no pharmacological agents (10%) or were treated with sliding scale regular insulin (SSI, 25%), oral antidiabetic drugs (OAD, 5%), insulin (34%), or with combination of OAD and insulin (26%). Patients with diabetes had a mean daily BG of 156 ± 39 mg/dL and a mean admission HbA1c of $6.7\% \pm 1.1\%$. Compared with nondiabetes, residents with diabetes had higher number of complications (54% vs 45%, $P < .001$), infections (26% vs 21%, $P = .036$), emergency room (ER) and hospital transfers (37% vs 30%, $P = .003$), but similar mortality (15% vs 14%, $P = .56$). A total of 43% of residents with diabetes had a BG less than 70 mg/dL and those with hypoglycemia had longer median length of stay (LOS, 52 vs 29 days, $P < .001$), more ER or hospital transfers (56% vs 69%, $P = .005$), and mortality (20% vs 10%, $P = .002$) compared with residents without hypoglycemia.

Conclusion: Diabetes is common in LTC residents and is associated with higher resource utilization and complications. Hypoglycemia is common and is associated with increased need of emergency room visits and hospitalization and higher mortality. Our findings emphasize the need for randomized trials evaluating the impact of different approaches to glycemic management on clinical outcome in LTC residents with diabetes.

We must be careful in the nursing homes where DM is common



JAMDA

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Editorial

**How to Manage Diabetes Mellitus in Older Persons in the 21st Century:
Applying These Principles to Long Term Diabetes Care**

Alan Sinclair MSc, MD, FRCP^{a,b}, John E. Morley MB, BCh^{c,*}



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Review

JAMDA 14 (2013) 851.e7–851.e15



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Original Study

Implementing Diabetes Care Guidelines in Long Term Care

Original Study

Improving Diabetes Care and Patient Outcomes in Skilled-Care Communities: Successes and Lessons From a Quality Improvement Initiative

Patrick J. Boyle MD^a, Kevin W. O'Neil MD^b, Carolyn A. Berry PhD^c, Stephanie A. Stowell MPhil^{d,*},

Educational Needs:

Physician

- Comprehensive care of diabetes subpopulations (eg, elderly, renal failure)
- Appropriate use and limitations of sliding scale insulins
- Differences among available insulins
- Use of noninsulin agents in elderly patients with diabetes
- Current nutritional guidelines

Non physician*

- Comprehensive care of patients with diabetes
- Identifying appropriate blood glucose monitoring and target levels, and deciding when levels require physician notification
- Diabetes-related complications
- Signs and symptoms of hyper- and hypoglycemia
- Appropriate use and limitations of sliding scale insulins
- Appropriate timing of insulin and meals
- Types of noninsulin agents available
- Nutrition and diabetes including current nutritional guidelines

Standardization Opportunities:

- Intake form for patients with diabetes
- Comprehensive care tracking form
- SOP for time of blood glucose monitoring
- SOP for physician notification of blood glucose levels
- SOP for appropriate timing between insulin and meal delivery
- SOP for diabetic meal ordering
- Determination of percentage of meals consumed
- Patient education materials explaining appropriate food and meal choices

SOP, standard operating procedure.

MULTIPLE INTERVENTIONS TO CARRY OUT

Burden of Sliding Scale Insulin Use in Elderly Long-Term Care Residents with Type 2 Diabetes Mellitus

Naushira Pandya, MD,* Wenhui Wei, PhD,[†] Juliana L. Meyers, MA,[‡] Brett S. Kilpatrick, MA,[§] and Keith L. Davis, MA[‡]

J Am Geriatr Soc 61:2103-2110, 2013.

RESULTS: Overall, 73.8% of participants received SSI therapy. SSI-treated participants were more likely to be younger ($P = .01$), non-white ($P = .002$), and receiving sulfonylurea ($P = .004$) than non-SSI treated participants. SSI therapy was associated with a mean \pm standard deviation of 19.9 ± 7.9 fingersticks per week, of which 12.5 ± 7.6 were not followed by insulin administration. Fewer SSI-treated participants than non-SSI treated participants had one or more HbA1c measurements of 7.0% or less (48.8% vs 57.2%) or 8.5% or less (85.2% vs 87.6%, respectively). Rates of hypoglycemia were similar in both groups (15.0% vs 14.9%).

Sliding scales are still widely used and associated with a high percentage of fingersticks, and worse glycemic control but a similar rate of hypoglycemia.