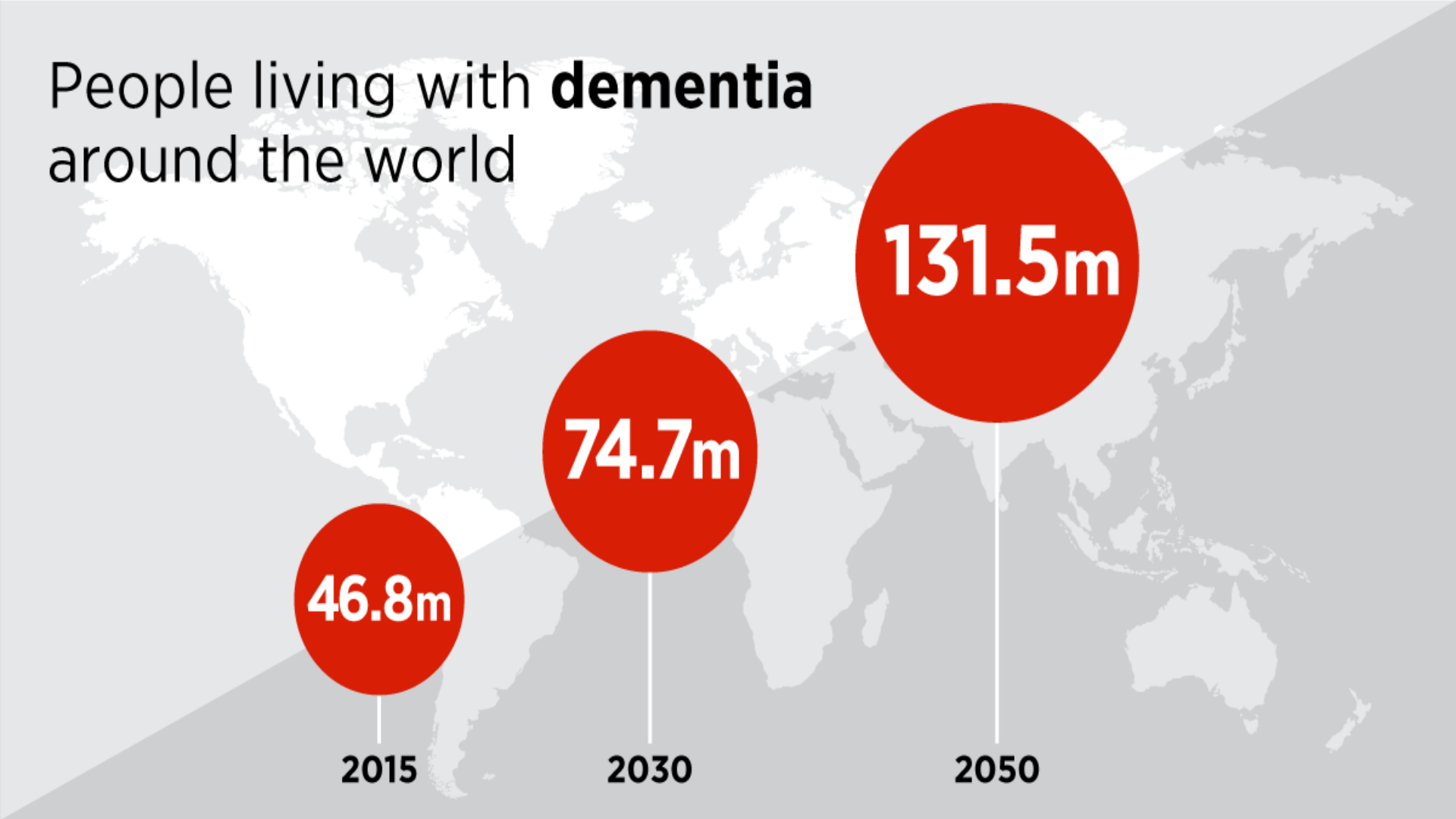
Dementia analytics: Using big data to understand dementia in Northern Ireland

Overview of presentation

1. Introduction and project aims
2. Methodology
3. Results
4. Discussion

Introduction

- 19,000 people with dementia (PwD) in Northern Ireland
- Projected to increase to 60,000 by 2050
- Vital we understand more about what predicts dementia and improve quality of life for people with dementia


People living with **dementia** around the world
46.8m
74.7m
131.5m
2015
2030
2050


BIG
DATA
INFORMATION
MANAGEMENT
TECHNOLOGIES
PETABYTES
ANALYSIS
RESEARCH
SEARCH
INTERNET
STORAGE
LARGE
SETS
MILLION
SOFTWARE
SAN
NAS
VOLUME
PROCESS
GOVERNMENT
SIZE
EXABYTES
DEVELOPMENT
TECHNOLOGY
SCIENCE
FUTURE
BILLION
NEW
PARALLEL
LEARNING
EVERY
WORLD
BASED
AMOUNT
APPLICATIONS
ANALYTICS
PROCESSING
DATABASES
FRAMEWORK
BUSINESS
SOCIAL
SYSTEMS
FACTOR
ONLINE
DAY
MASSIVE
DEFINITION
BETWEEN
STATISTICS
VISUALIZATION
INITIATIVE
ECONOMIC
TERABYTES
RELATED
TIME
SENSOR
PRIVACY
INTERNATIONAL
IMPLEMENTATION
BECOMES
APPROACHES
PROCESSES
PARADIGM
RECORDS
COST
INSIGHT
TOOLS
FUNDING
CENTER
ARCHITECTURE
SHARED
USES
NEEDED
SUCCESSFUL
CAPABILITIES
YEAR
TERMS
INFRASTRUCTURE
WORK
STRUCTURE
REAL
HIGH
USERS
DEPARTMENT
SET
WELL
DETERMINE
HIGHER
RATE
ALGORITHMS
COMPANIES
QUERIES
USING
PAST
ANNOUNCED
LIMITS
COMPLEX
CHALLENGES
HANDLE
SOURCES
REPLICATION
DRIVE
RESULTS
YEARS
MANAGE
WORLDWIDE
INTEGRATION
MAKING
HAND
CAPACITY
ONE
SECOND
NATIONAL
FLOW
INTELLIGENCE
OUT
INCLUDE
NETWORKS
HYPOTHESIS
END
NOST
NEARLY
MAPREDUCE
CRITIQUES
STATE
CRITIQUE
PEOPLE
TRAFFIC
USE
CURRENTLY
APPROACH
MANY
PER
PROJECT
ANNUAL
HOW
WOULD
MARKET
VARIETY
DISTRIBUTED
RELEVANT
USED
PRIVATE
VARIOUS
TIMES
LESS
HUGE
COMPARED

Introduction

Projects

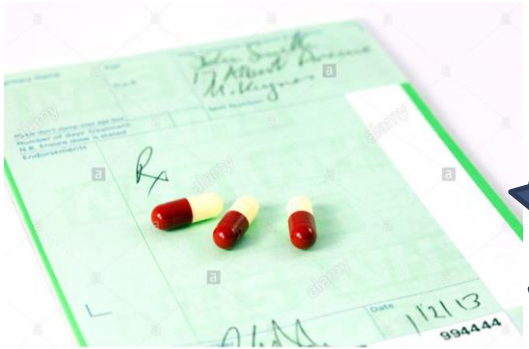
1. Mortality rates in dementia

2. The influence of anticholinergic drugs on people with dementia

METHODS

Enhanced prescribing database

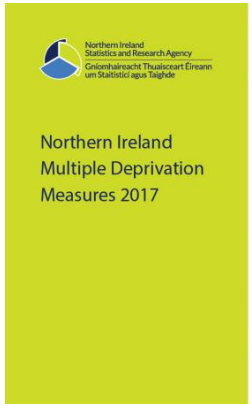
- Information on 80-90% of all medications prescribed by a pharmacist and dispensed by a general practitioner.



The first date a dementia medication was dispensed was used a proxy for date of dementia diagnosis.

METHODS

- Age
- Gender (males have higher mortality)
- Northern Ireland Multiple deprivation measure
- Comorbidity medications



RESULTS

Total	Age	Gender
25,418	Mean 77.3 years (SD=8.4 years)	16,537 females (65%) 8,881 males (35%)

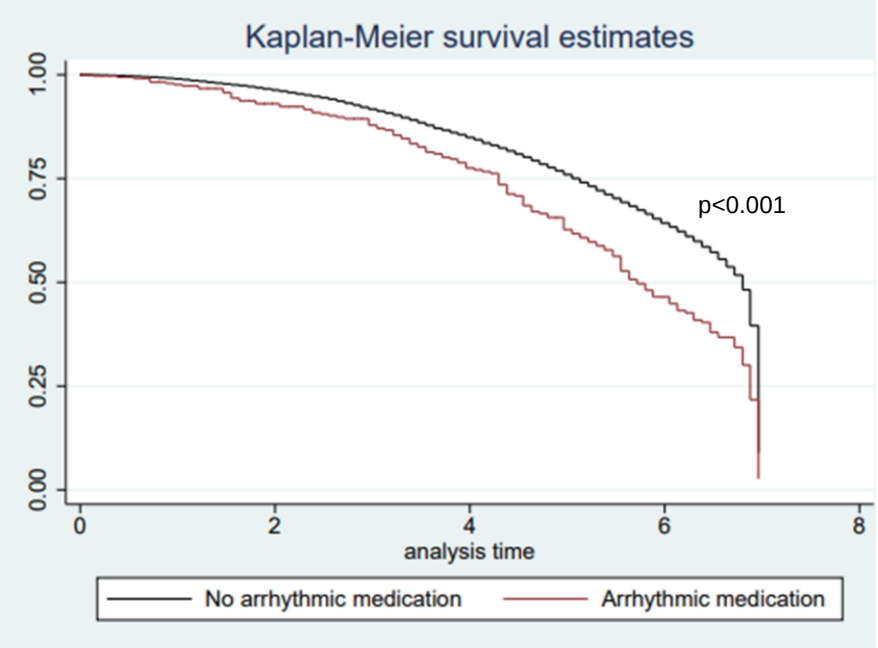
RESULTS

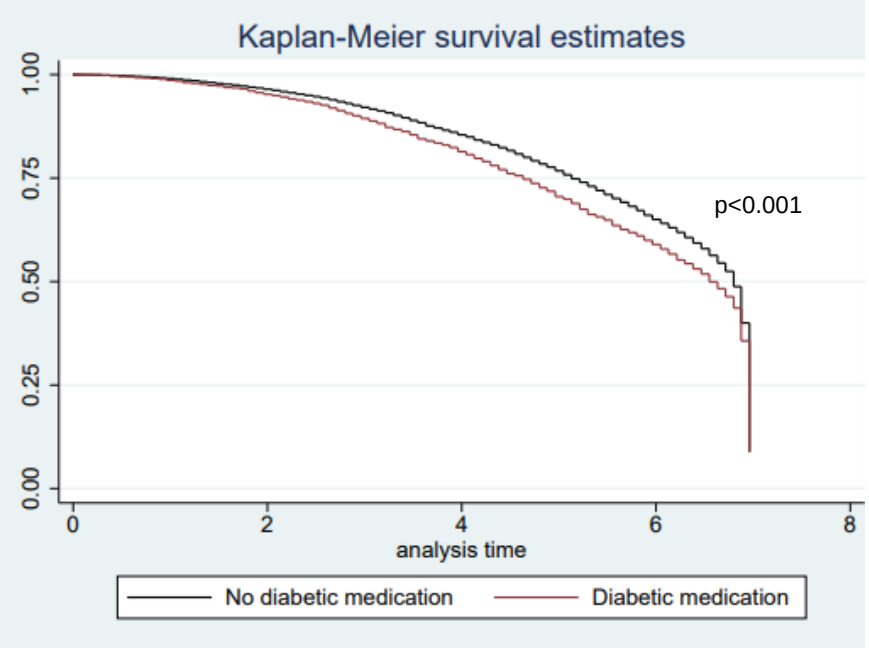
- Males
- Increased age
- High levels of area deprivation
- Nursing home transitions
- Comorbidity medication

P<.05

- Married

RESULTS


Kaplan-Meier survival estimates
1.00
0.75
0.50
0.25
0.00
p<0.001
0
2
4
6
8
analysis time
No arrhythmic medication
Arrhythmic medication


Kaplan-Meier survival estimates
1.00
0.75
0.50
0.25
0.00
p<0.001
0
2
4
6
8
analysis time
No diabetic medication
Diabetic medication

Assessing the influence of anticholinergic medication on people with dementia in Northern Ireland

Anticholinergic drugs have been consistently shown to:

1. Increase mortality rates
2. Increase the rate of cognitive impairment
3. Increase the risk of a dementia diagnosis

RESEARCH

OPEN ACCESS

Anticholinergic drugs and risk of dementia: case-control study

Kathryn Richardson,[1] Chris Fox,[2] Ian Maidment,[3] Nicholas Steel,[2] Yoon K Loke,[2] Antony Arthur,[1] Phyo K Myint,[4] Carlota M Grossi,[1] Katharina Mattishent,[2] Kathleen Bennett,[5] Noll L Campbell,[6] Malaz Boustani,[7] Louise Robinson,[8] Carol Brayne,[9] Fiona E Matthews,[10] George M Savva[1]

News > Medscape Medical News > Psychiatry News

More Evidence Anticholinergic Meds Boost Dementia Risk

Drugs with ACB Score of 1

Generic Name	Brand Name
Alimemazine	Theralen™
Alverine	Spasmonal™
Alprazolam	Xanax™
Aripiprazole	Abilify™
Asenapine	Saphris™
Atenolol	Tenormin™
Bupropion	Wellbutrin™, Zyban™
Captopril	Capoten™
Cetirizine	Zyrtec™
Chlorthalidone	Diuril™, Hygroton™
Cimetidine	Tagamet™
Clidinium	Librax™
Clorazepate	Tranxene™
Codeine	Contin™
Colchicine	Colcrys™
Desloratadine	Clarinex™
Diazepam	Valium™
Digoxin	Lanoxin™
Dipyridamole	Persantine™
Disopyramide	Norpace™
Fentanyl	Duragesic™, Actiq™
Furosemide	Lasix™
Fluvoxamine	Luvox™
Haloperidol	Haldol™
Hydralazine	Apresoline™
Hydrocortisone	Cortef™, Cortaid™
Iloperidone	Fanapt™
Isosorbide	Isordil™, Ismo™
Levocetirizine	Xyzal™
Loperamide	Immodium™, others
Loratadine	Claritin™
Metoprolol	Lopressor™, Toprol™
Morphine	MS Contin™, Avinza™
Nifedipine	Procardia™, Adalat™
Paliperidone	Invega™
Prednisone	Deltasone™, Sterapred™
Quinidine	Quinaglute™
Ranitidine	Zantac™
Risperidone	Risperdal™
Theophylline	Theodur™, Uniphyl™
Trazodone	Desyrel™
Triamterene	Dyrenium™
Venlafaxine	Effexor™
Warfarin	Coumadin™

Drugs with ACB Score of 2

Generic Name	Brand Name
Amantadine	Symmetrel™
Belladonna	Multiple
Carbamazepine	Tegretol™
Cyclobenzaprine	Flexeril™
Cyproheptadine	Periactin™
Loxapine	Loxitane™
Meperidine	Demerol™
Methotrimeprazine	Levoprome™
Molindone	Moban™
Nefopam	Nefogesic™
Oxcarbazepine	Trileptal™
Pimozide	Orap™

Categorical Scoring:

- Possible anticholinergics include those listed with a score of 1; Definite anticholinergics include those listed with a score of 2 or 3

Numerical Scoring:

- Add the score contributed to each selected medication in each scoring category
- Add the number of possible or definite Anticholinergic medications

Notes:

- Each definite anticholinergic may increase the risk of cognitive impairment by 46% over 6 years. [3]
- For each on point increase in the ACB total score, a decline in MMSE score of 0.33 points over 2 years has been suggested. [4]
- Additionally, each one point increase in the ACB total score has been correlated with a 26% increase in the risk of death. [4]

Aging Brain Care

www.agingbraincare.org

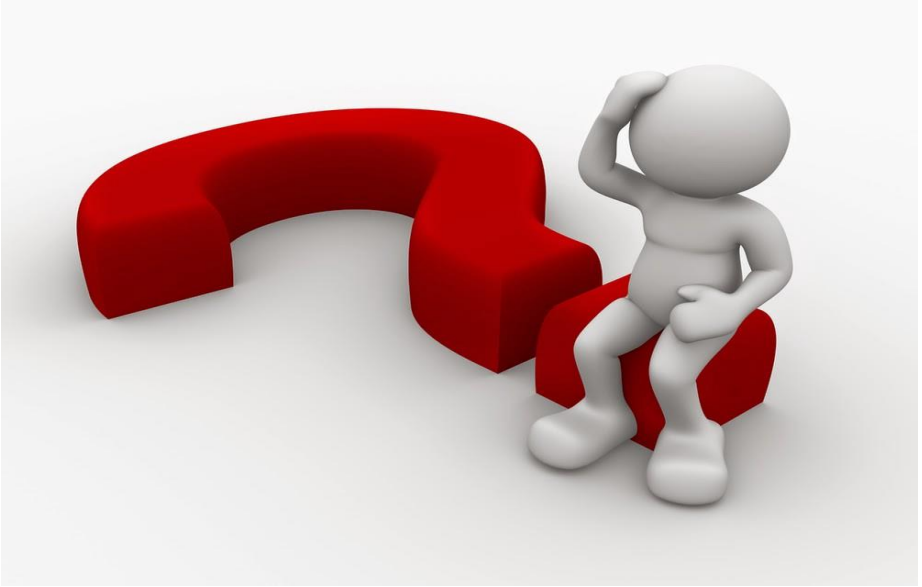
Drugs with ACB Score of 3

Generic Name	Brand Name
Amitriptyline	Elavil™
Amoxapine	Asendin™
Atropine	Sal-Tropine™
Benztropine	Cogentin™
Brompheniramine	Dimetapp™
Carbinoxamine	Histex™, Carbihist™
Chlorpheniramine	Chlor-Trimeton™
Chlorpromazine	Thorazine™
Clemastine	Tavist™
Clomipramine	Anafranil™
Clozapine	Clozaril™
Darifenacin	Enablex™
Desipramine	Norpramin™
Dicyclomine	Bentyl™
Dimenhydrinate	Dramamine™, others
Diphenhydramine	Benadryl™, others
Doxepin	Sinequan™
Doxylamine	Unisom™, others
Fesoterodine	Toviaz™
Flavoxate	Urispas™
Hydroxyzine	Atarax™, Vistaril™
Hyoscyamine	Anaspaz™, Levsin™
Imipramine	Tofranil™
Meclizine	Antivert™
Methocarbamol	Robaxin™
Nortriptyline	Pamelor™
Olanzapine	Zyprexa™
Orphenadrine	Norflex™
Oxybutynin	Ditropan™
Paroxetine	Paxil™
Perphenazine	Trilafon™
Promethazine	Phenergan™
Propantheline	Pro-Banthine™
Propiverine	Detrunorm™
Quetiapine	Seroquel™
Scopolamine	Transderm Scop™
Solifenacin	Vesicare™
Thioridazine	Mellaril™
Tolterodine	Detrol™
Trifluoperazine	Stelazine™
Trihexyphenidyl	Artane™
Trimipramine	Surmontil™
Trospium	Sanctura™

THE RESEARCH QUESTIONS

Does anticholinergic medication influence mortality?

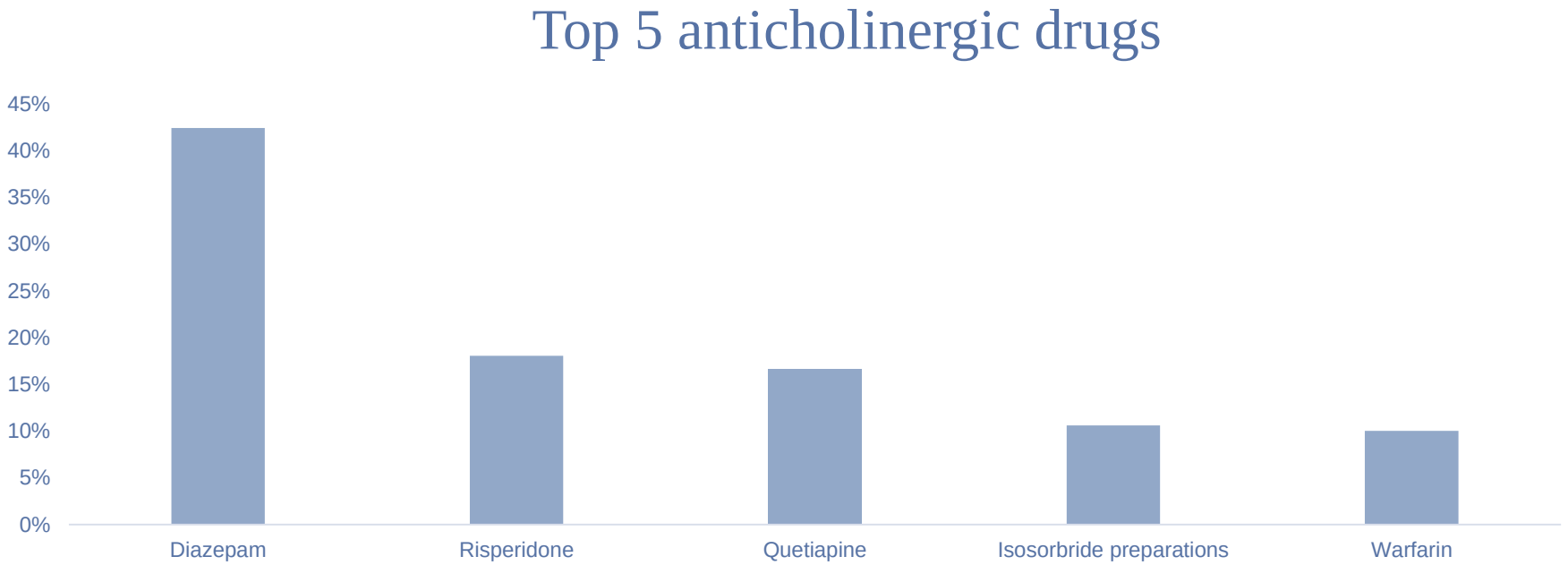
What demographic characteristics influence anticholinergic burden?



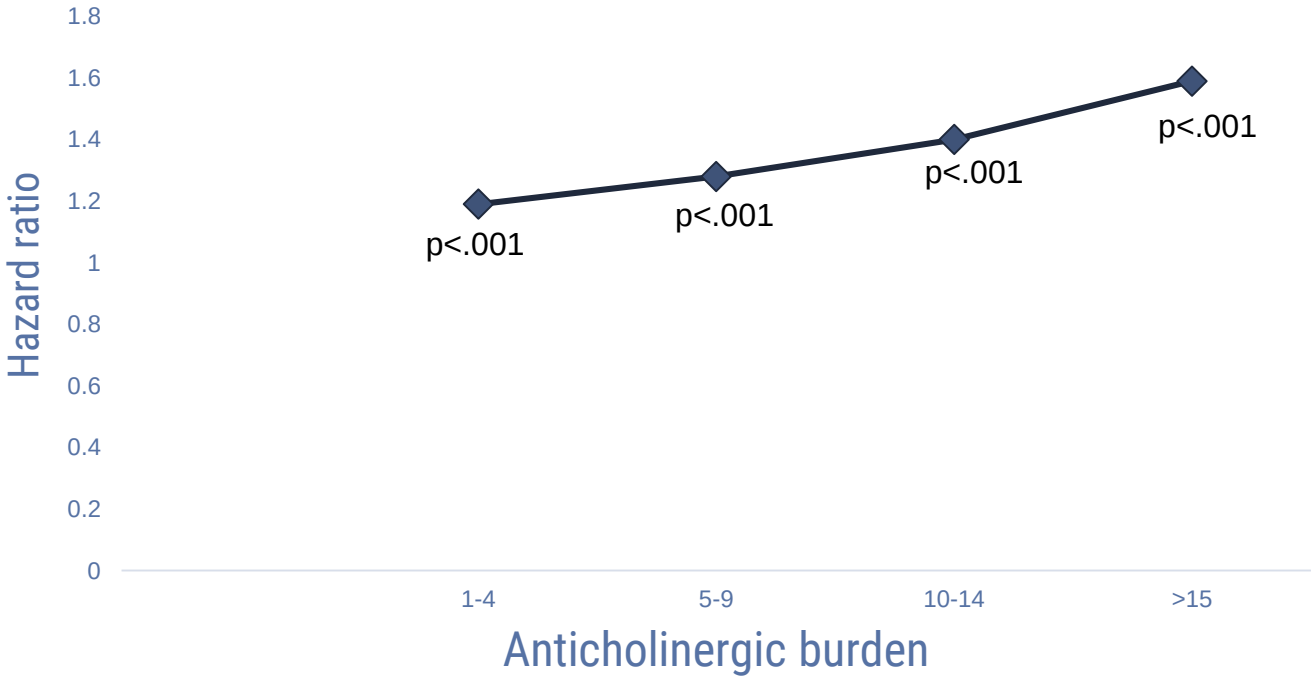
RESULTS

Anticholinergic burden	N (%)
0	3,880 (15.2%)
1-4	14,403 (56.6%)
5-9	6,208 (24.4%)
10-14	83 (.33%)
15>	89 (.35%)

RESULTS

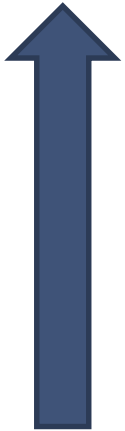

Top 5 anticholinergic drugs
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Diazepam
Risperidone
Quetiapine
Isosorbride preparations
Warfarin

RESULTS


1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Hazard ratio
p<.001
p<.001
p<.001
p<.001
1-4
5-9
10-14
>15
Anticholinergic burden

RESULTS

- Marriage
- High levels of area deprivation
- Rural



p<.05

Conclusions

- Understanding mortality rates in dementia is essential for resource planning and may help provide information to patients, their medical team, family and carers
- Understanding predictors of dementia and predictors of mortality can help health and social care plan for the expected increase in dementia
- Disparities in deprivation should continue to be investigated

THANKS FOR LISTENING!

Any questions?