# DEMENTIA AND DRIVING: AN INTERNATIONAL APPROACH TO KNOWLEDGE SYNTHESIS

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# An international study of the quality of national-level guidelines on driving with medical illness

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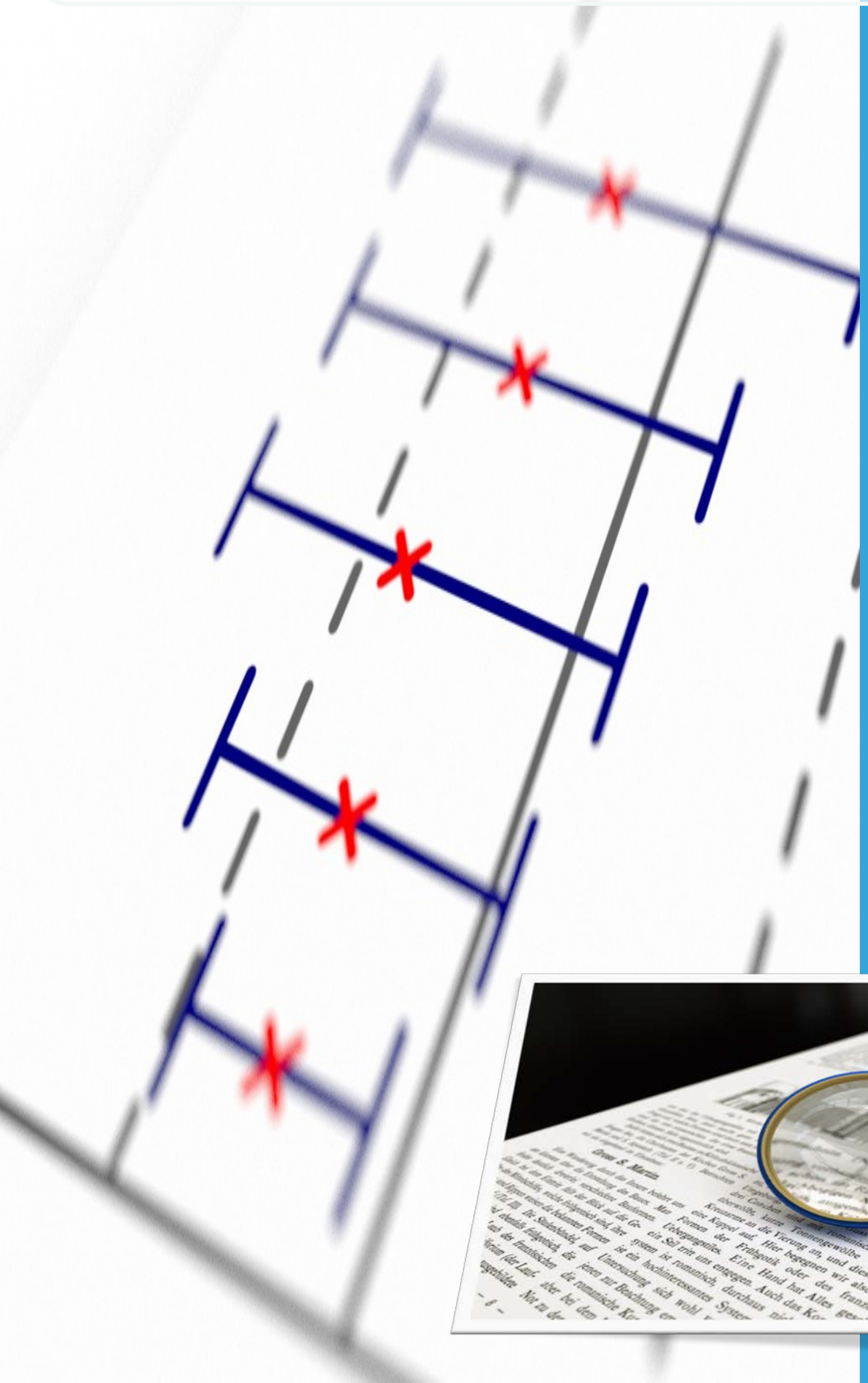
# RELEVANCE OF THIS KNOWLEDGE SYNTHESIS

- To address this problem, we are conducting an up-to-date **evidence-based knowledge synthesis** and **clinical guideline revisions** on **driving risks** and **dementia** for clinicians and transportation authorities to apply in clinical practice and policy.
- In the process, we are:
  - leveraging the skills of international **knowledge experts**; as well as
  - incorporating the input of **transportation and clinician knowledge-users**.
- A well-executed knowledge synthesis will have a **positive impact on patient outcomes**, **increase confidence of clinicians** using the guidelines, **inform transportation policy**, and provide a **model for updating syntheses** for international guidelines on other health conditions and driving.

CIHR IRSC
Canadian Institutes of Health Research | Instituts de recherche en santé du Canada



# METHODOLOGY

# TEAM STRUCTURE: MEMBERSHIP

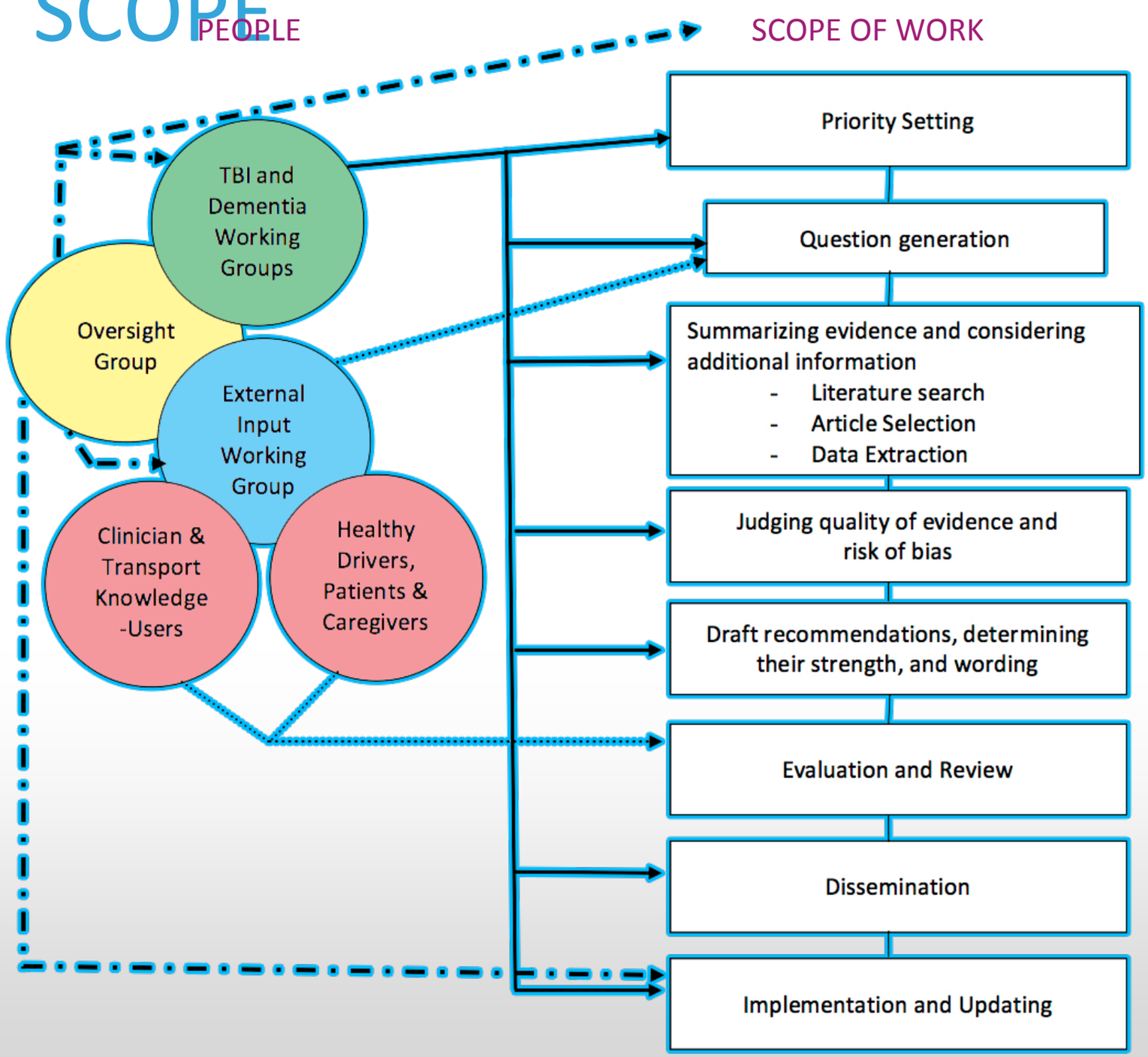
- An international team of experts followed the ADAPTE guideline adaptation process[21] to: a) perform a knowledge synthesis on driving with dementia; and b) update existing clinical recommendations.

| COUNTRY | CITIES | # MEMBERS |
|---|---|---|
| Canada | Toronto, Ottawa, Hamilton, London, Kingston, Quebec City, Victoria | 16 |
| Australia | Clayton | 2 |
| Belgium | Brussels | 1 |
| Ireland | Dublin | 2 |
| UK | Coventry | 2 |
| USA | St. Louis, MO, New Haven, CT | 2 |

| TRAINING | SPECIALTY | # MEMBERS |
|---|---|---|
| MD | Geriatric Psychiatrist, Geriatrician, Physiatrist, Psychiatrist, Neurologist, Family Physician | 13 |
| PhD | Pharmacologist, Psychologist, Occupational Therapist | 9 |
| Medical Librarian | | 1 |
| Transportation Knowledge User | | 2 |

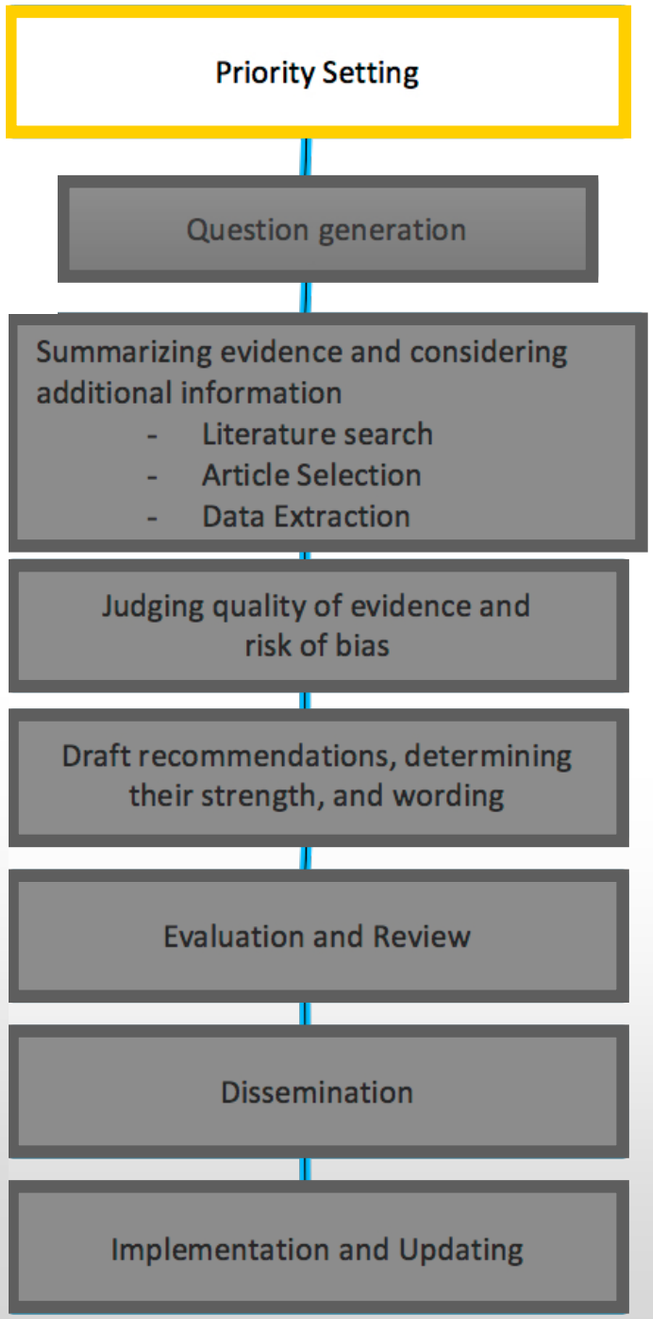
# TEAM STRUCTURE: WORKING GROUPS AND PROJECT SCOPE

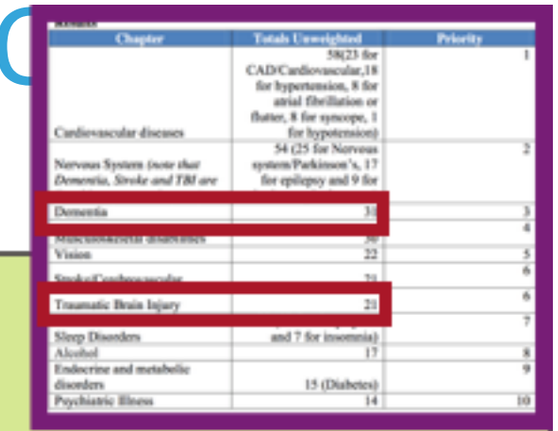
Adapted from Guidelines 2.0: systematic development of a comprehensive checklist for a successful guideline enterprise.



# KNOWLEDGE SYNTHESIS: METHODOLO

- 1. Priority Setting: June - July 2015



| Chapter | Totals Unweighted | Priority |
|---|---|---|
| Cardiovascular diseases | 58(23 for CAD/Cardiovascular,18 for hypertension, 8 for atrial fibrillation or flutter, 8 for syncope, 1 for hypotension) | 1 |
| Nervous System (note that Dementia, Stroke and TBI are | 54 (25 for Nervous system/Parkinson's, 17 for epilepsy and 9 for | 2 |
| Dementia | 31 | 3 |
| Musculoskeletal disorders | 30 | 4 |
| Vision | 22 | 5 |
| Stroke/Cerebrovascular | 21 | 6 |
| Traumatic Brain Injury | 21 | 6 |
| Sleep Disorders | and 7 for insomnia) | 7 |
| Alcohol | 17 | 8 |
| Endocrine and metabolic disorders | 15 (Diabetes) | 9 |
| Psychiatric Illness | 14 | 10 |

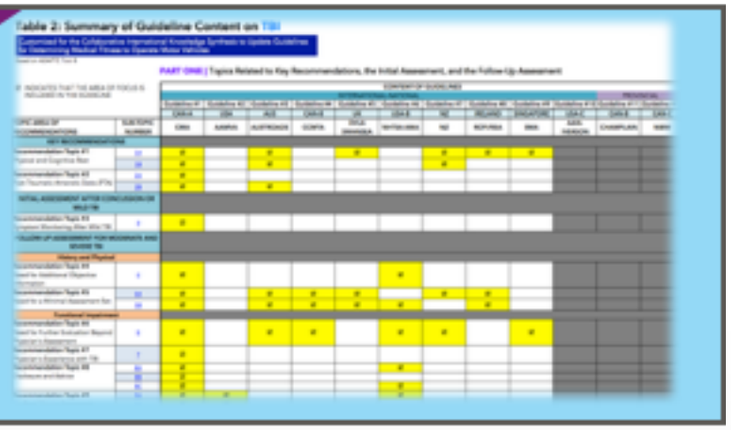
## 1a. DISEASE PRIORITIZATION

In 2014, a disease prioritization exercise was completed to select the diseases of focus according to:

- the number of recommendations in international guidelines; and
- the frequency and prevalence of conditions referred for road tests or reported to transportation authorities.

## 1b. SUMMARY OF EXISTING GUIDELINES

The content of recommendations from several international national-level guidelines was summarized and organized using ADAPTE tools.

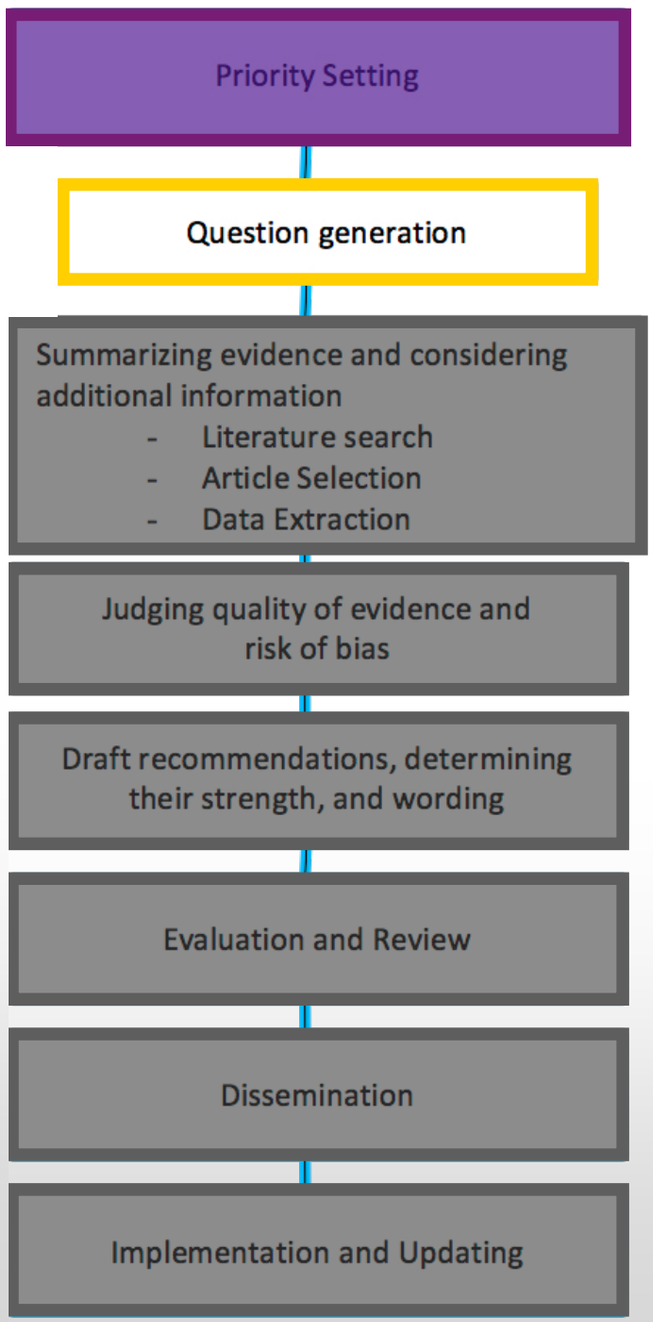


## 1c. TOPIC AREA PRIORITIZATION

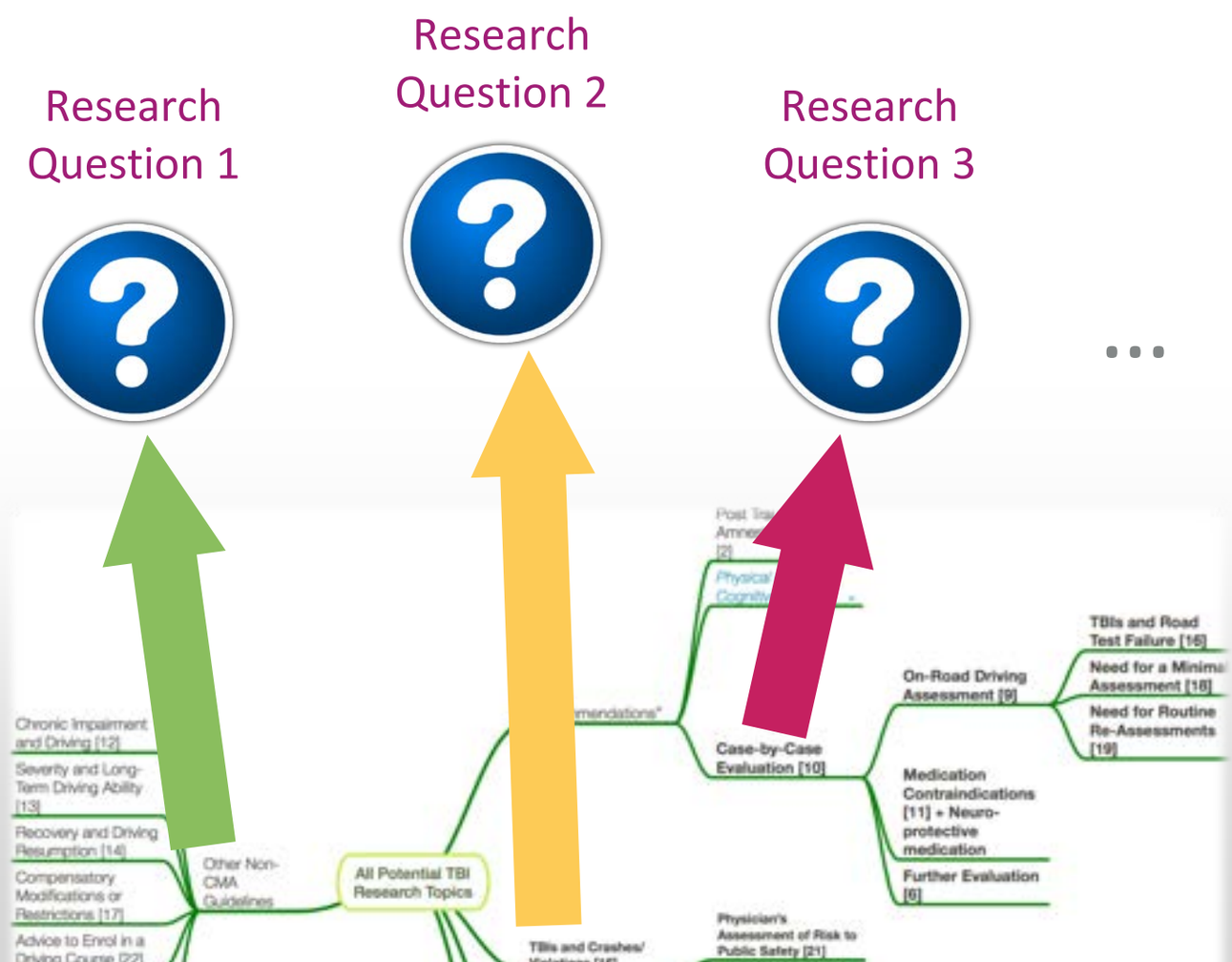
The content was re-grouped into topics areas by the working group members over a teleconference.

- Important topic areas were identified and prioritized.

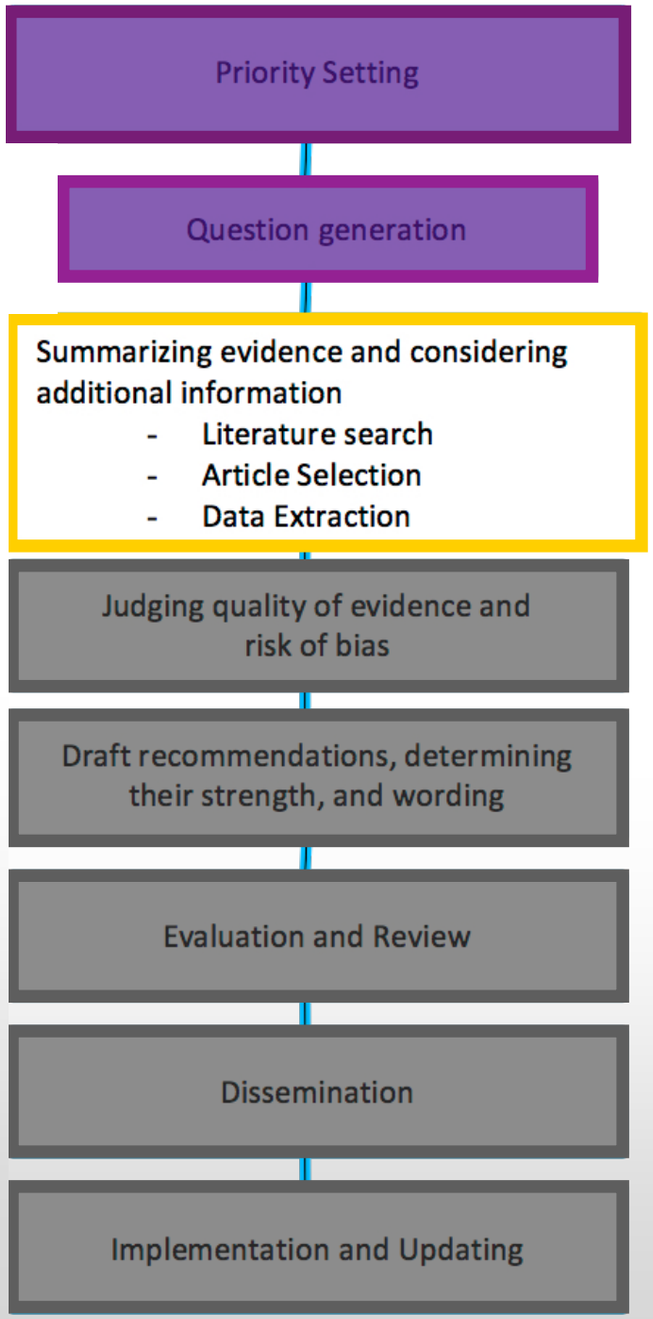
# KNOWLEDGE SYNTHESIS: METHODOLOGY




- 2. Question Generation: July - August 2015
  - Specific research questions for the knowledge synthesis were generated and refined by the working group based on the prioritized topic areas.



# KNOWLEDGE SYNTHESIS: METHODOLOGY

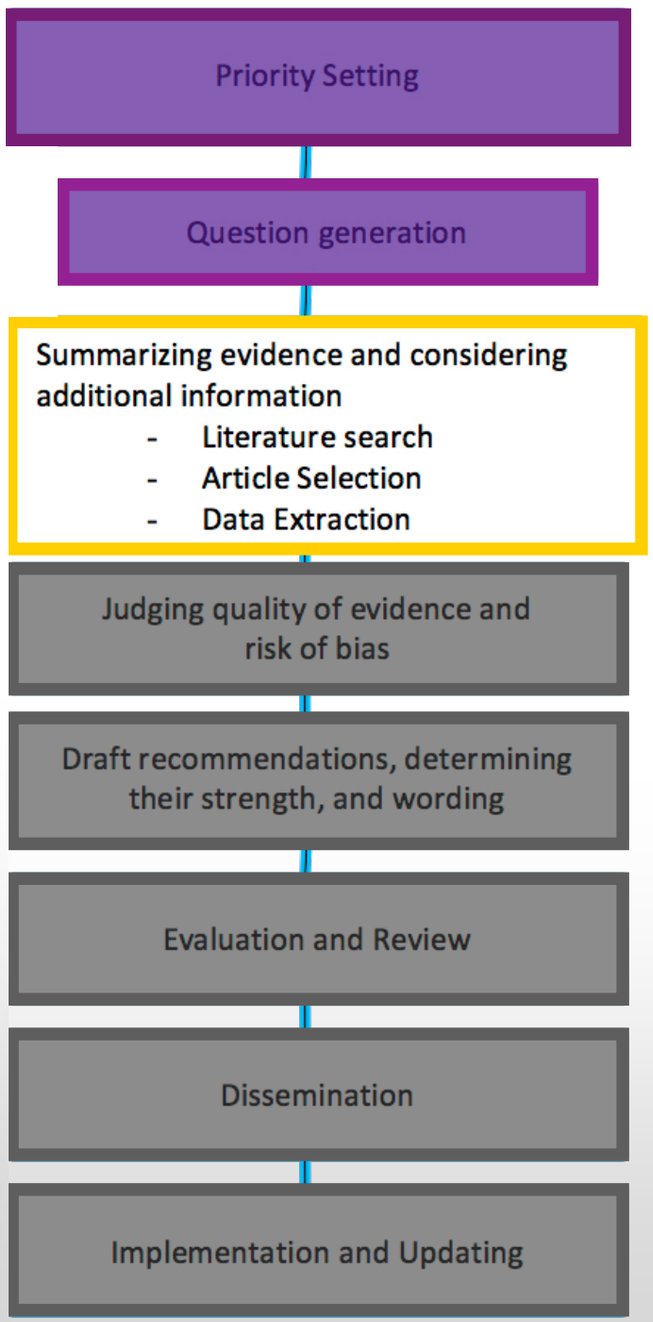



- 3. Summarizing Evidence: September 2015 - February 2016
  - Customized search strategies were developed to explore the research questions in the following research databases:

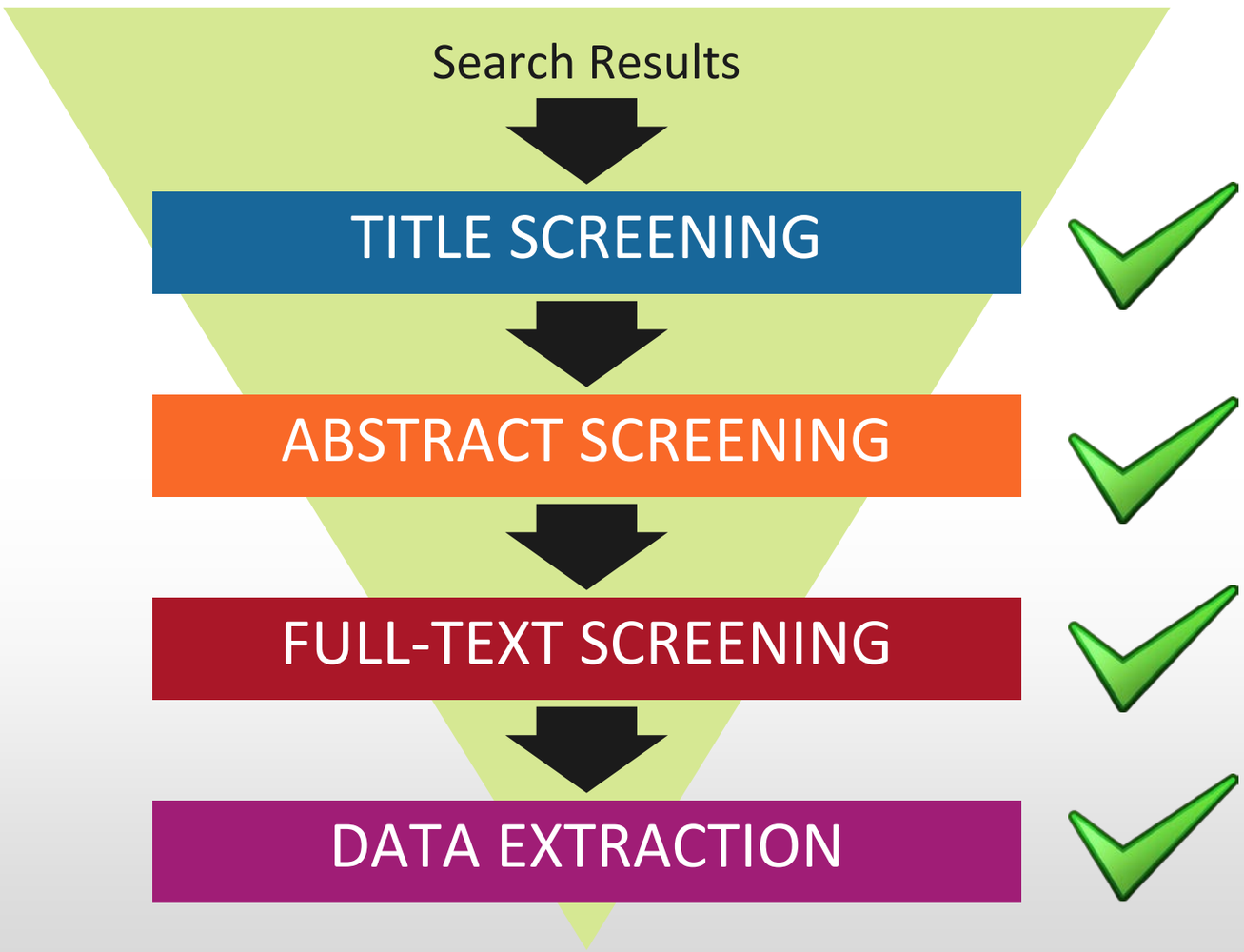
EMBASE
TRID the TRIS and ITRD database
Cochrane
APA ONLINE PsycINFO
MEDLINE
CINAHL Plus with Full Text Available via EBSCOhost
Scopus

  - Inclusion and exclusion criteria were selected by the working group to screen studies for eligibility.

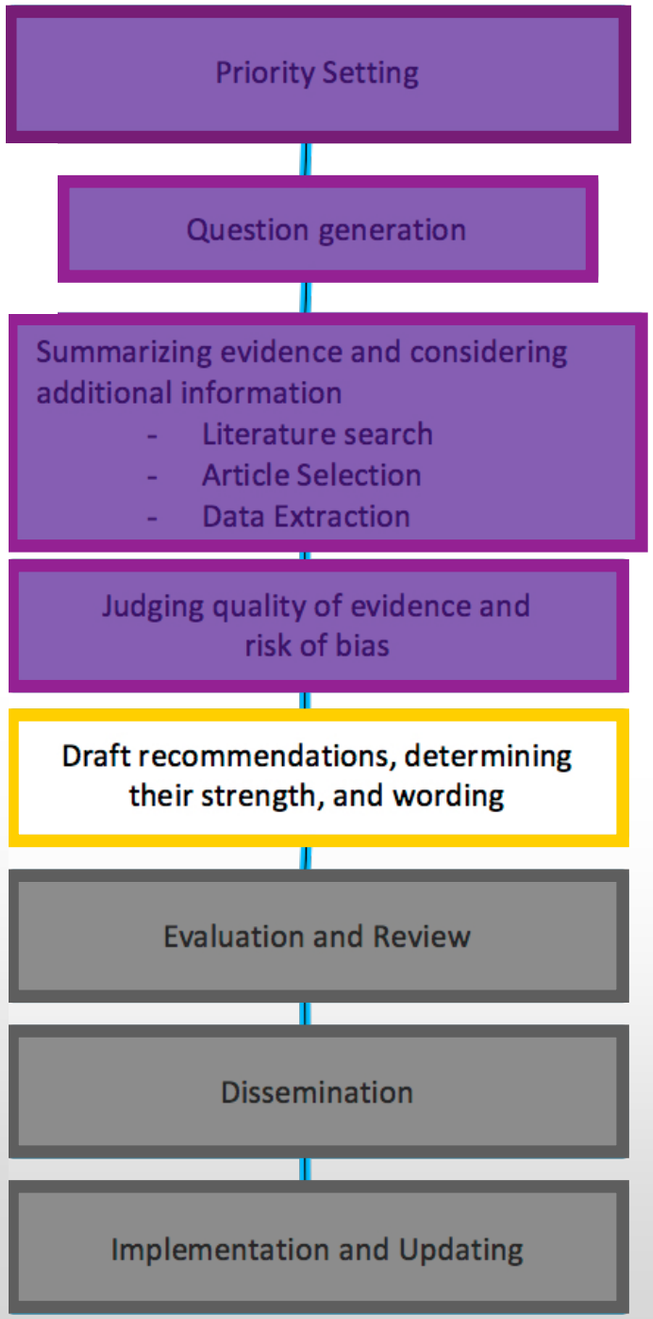
# KNOWLEDGE SYNTHESIS: METHODOLOGY




- 3. Summarizing Evidence: September 2015 - February 2016
  - Article selection was performed in several stages of systematic screening by two independent reviewers:

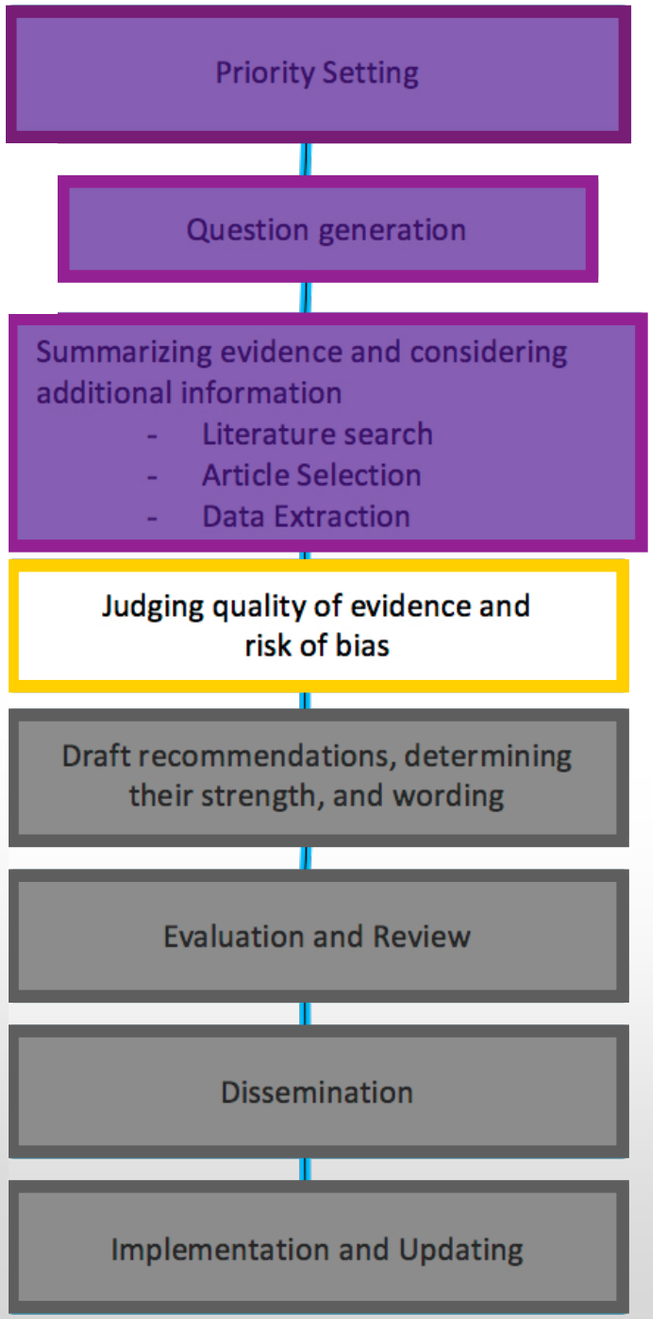


# KNOWLEDGE SYNTHESIS: METHODOLOGY




- April 2016
  - Evidence and Guideline Meeting: a 2-day face-to-face consensus meeting in Toronto, Canada
    - ★ Purpose: to synthesize the literature, draft new recommendations, and evaluate their strength.

# NEXT STEPS: EVALUATION OF EVIDENCE




- June 2016

- Risk of bias will be evaluated using:

Cochrane

Cochrane Collaboration Tool
for Randomized-Controlled Trials

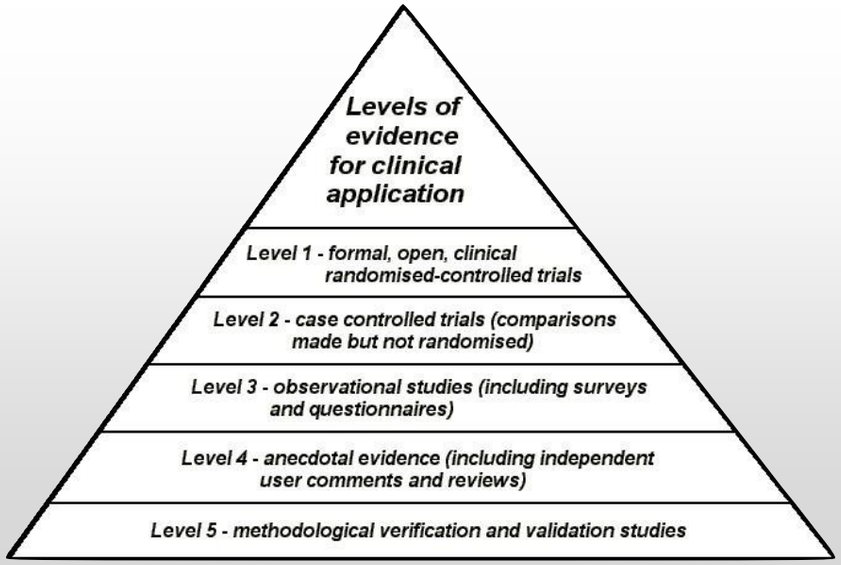
NOS
Newcastle-Ottawa Scale

The Newcastle-Ottawa Scale
for Case-Control and Cohort Studies

Critical Appraisal Skills Programme

Critical Appraisal Skills Programme
for Qualitative Research, and clinical prediction rules or studies.

- Quality of evidence will be rated by applying the Oxford 2011 Levels of Evidence Tool



# NEXT STEPS: EVALUATION AND REVIEW

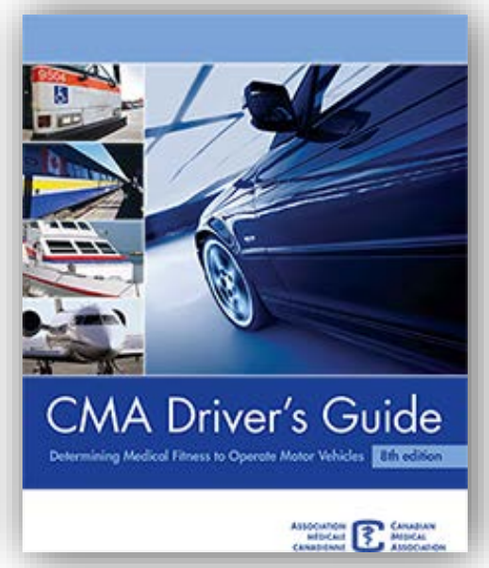

- July 2016
  - External Input: a group of multi-disciplinary physicians (e.g. geriatric psychiatrists, neurologists, etc.) and transportation knowledge users from outside the research team is being recruited
    - ★ Purpose: to provide feedback on the new recommendations developed by the research team, ensuring that they are clinically relevant and useful to the development of transportation policy.
    - ★ Electronic Survey: will be circulated to invite the external input group to:
      - Rank the recommendations by importance
      - Rate the strength of each recommendation based on its clarity, likelihood of uptake into practice, etc. using the ADAPTE finalization tools.

# NEXT STEPS: DISSEMINATION AND IMPLEMENTATION

June – July 2016


## Clinical and Policy Applications

- **Update international clinical practice guidelines** to incorporate the new recommendations (e.g. the **Canadian Medical Association's Driver's Guide**)




## Research Applications

- Use results to guide **development** of **new empirical studies**
- Use processes as a **model** to conduct high quality knowledge syntheses on fitness to drive among **other patient populations**

# DEMENTIA & DRIVING

WHAT WE KNEW GOING INTO THIS PROJECT

OVERVIEW OF THE SEARCH RESULTS

WHAT WE

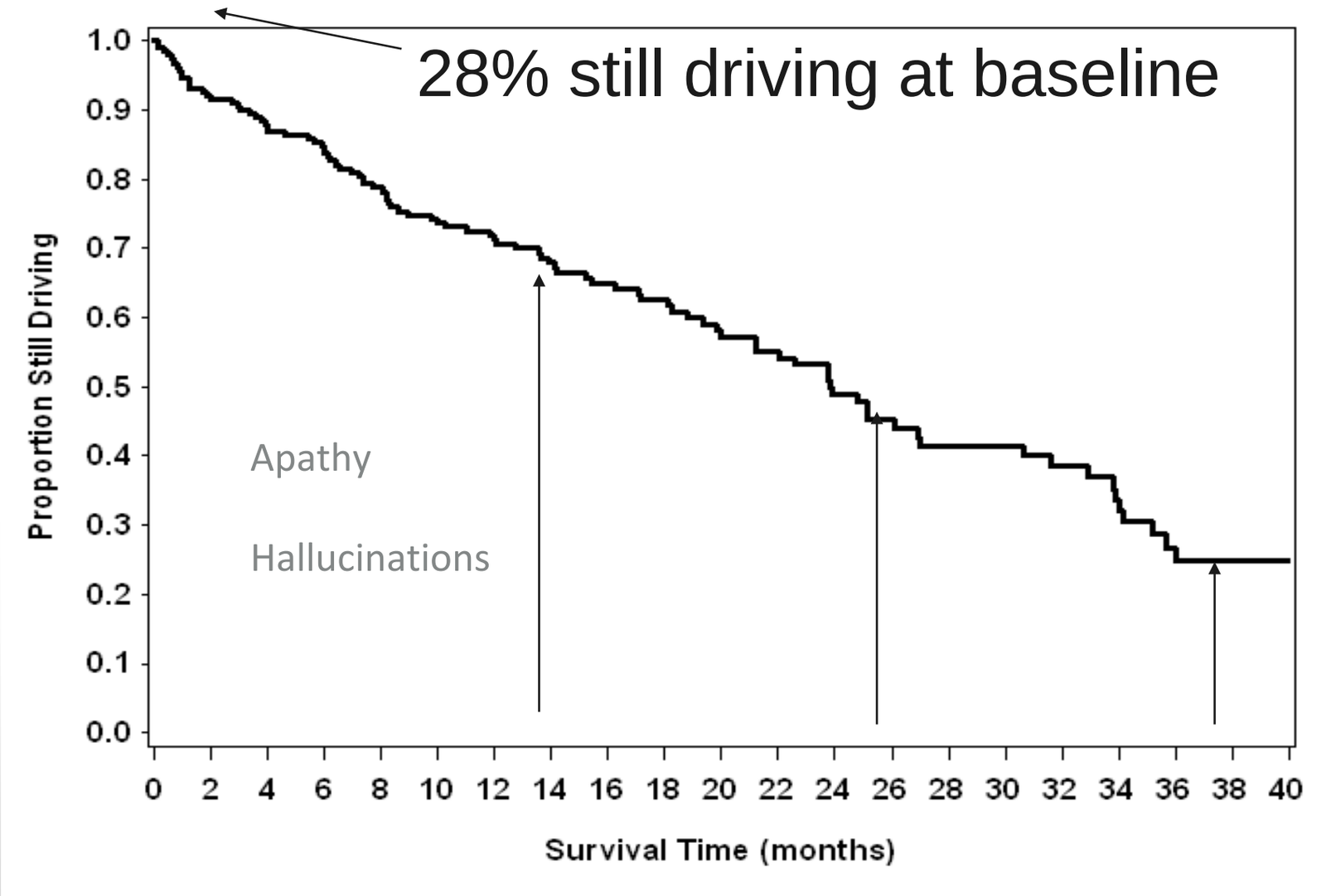
# DRIVING RISKS AND DEMENTIA

- Risks of driving with dementia
  - The precise **magnitude of the crash risk** in persons with **dementia** is **unknown** and, in spite of performance reductions, this population **does not exhibit *consistently* higher crash rates** than cognitively normal drivers.
  - Given the progressive nature of the disease, some advocate for **suspending driving privileges** for ***all*** persons with dementia; however, some research suggests that **driving can still be safe early on** in the disease course or with a **diagnosis of mild Alzheimer's disease**.

WHAT WE

# STUDIES OF CRASH RISK IN DEMENTIA

Proportion of Active Drivers with Mild-Moderate Dementia




Herrmann et al. (2006). *CMAJ 2006, 175 (6).*

## OVERVIEW OF THE SEARCH

# CONSOLIDATED RESEARCH QUESTIONS

- Four consolidated research questions were developed out of the topic prioritization process:

RISK OF MOTOR VEHICLE COLLISION

1. What is the absolute and relative risk of motor vehicle collision or driving impairment, as measured by on-road testing, associated with different severities of dementia (mild, moderate, or severe) and different diagnoses (e.g. common non-AD neurodegenerative dementias, including Frontotemporal Dementia, Vascular Dementia, Lewy body disease, etc.)?

SCREENING INSTRUMENTS FOR ASSESSMENT REFERRALS

2. Are there any new screening instruments with specific cut-offs in persons with dementia that would distinguish between patients who should be referred to a specialized driving centres for assessment?

SCREENING INSTRUMENTS FOR DEMENTIA SEVERITY

3. What methods are available to assist clinicians with rating dementia severity as it applies to the assessment and evaluation of driving fitness?

EVIDENCE TO SUPPORT CAREGIVER OPINION

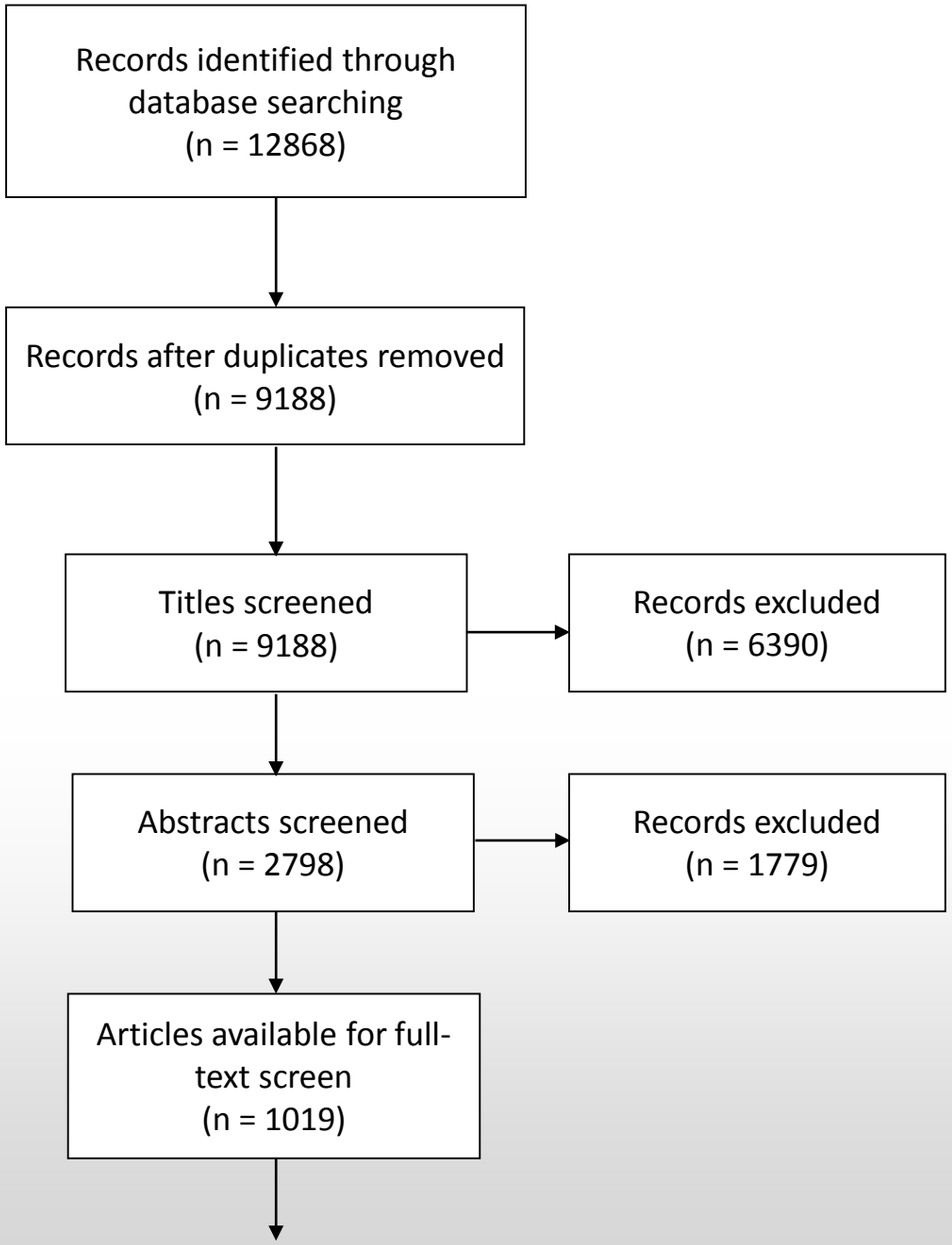
4. What evidence is available to support recommendations on the caregiver's opinion of driving performance and fitness to drive among persons with dementia?

## OVERVIEW OF THE SEARCH

# RESULTS OF TITLE AND ABSTRACT SCREENING STAGES

- Seven literature databases were systematically searched using comprehensive search strategies developed by a medical librarian: retrieved 12868 search results
- Screening of study titles produced 2798 results relevant to dementia and driving.
- Screening of study abstracts produced 1019 results relevant to the research questions.
- Our team decided to focus on **question one** for the subsequent full text screen.

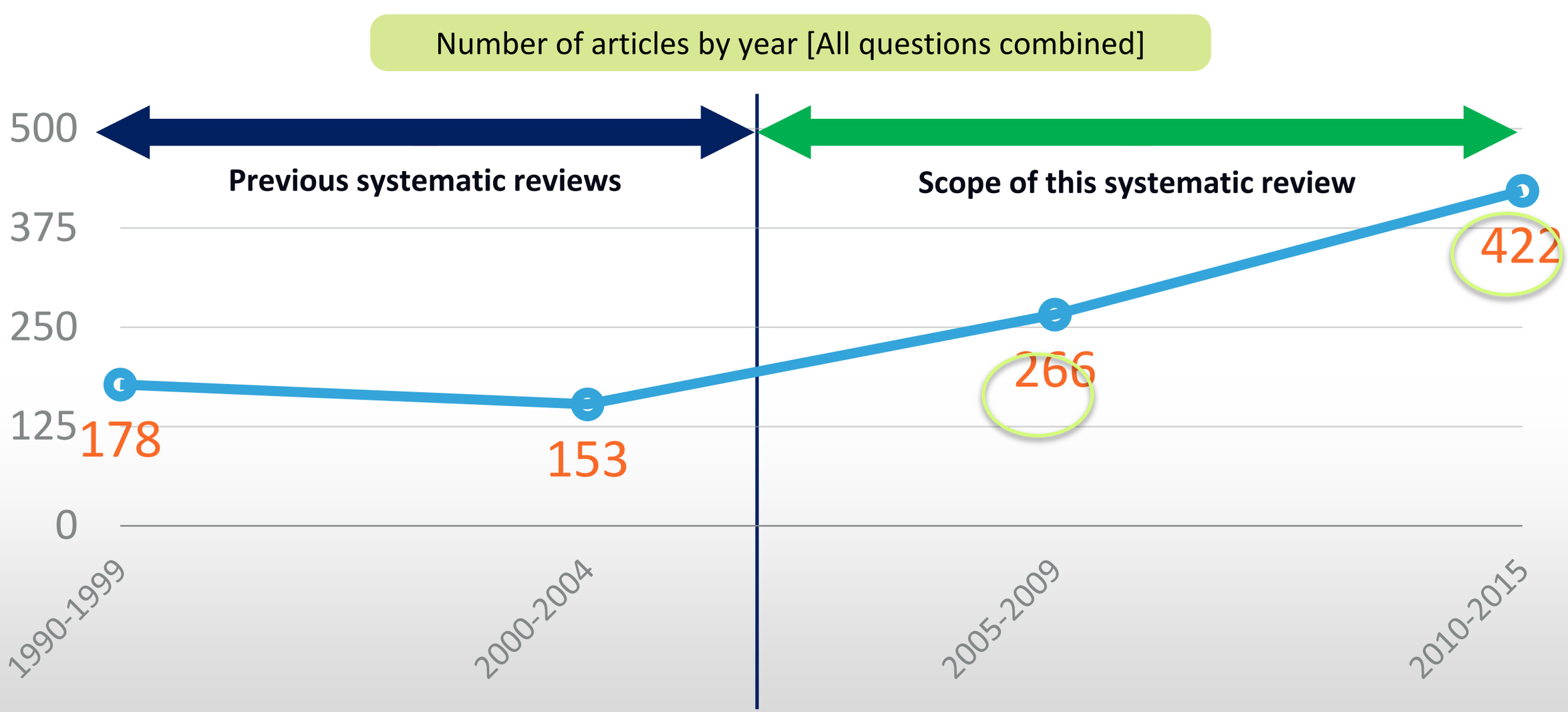
All Questions Combined



## OVERVIEW OF THE SEARCH

# AMOUNT OF EVIDENCE AVAILABLE FOR THE FULL-TEXT SCREEN

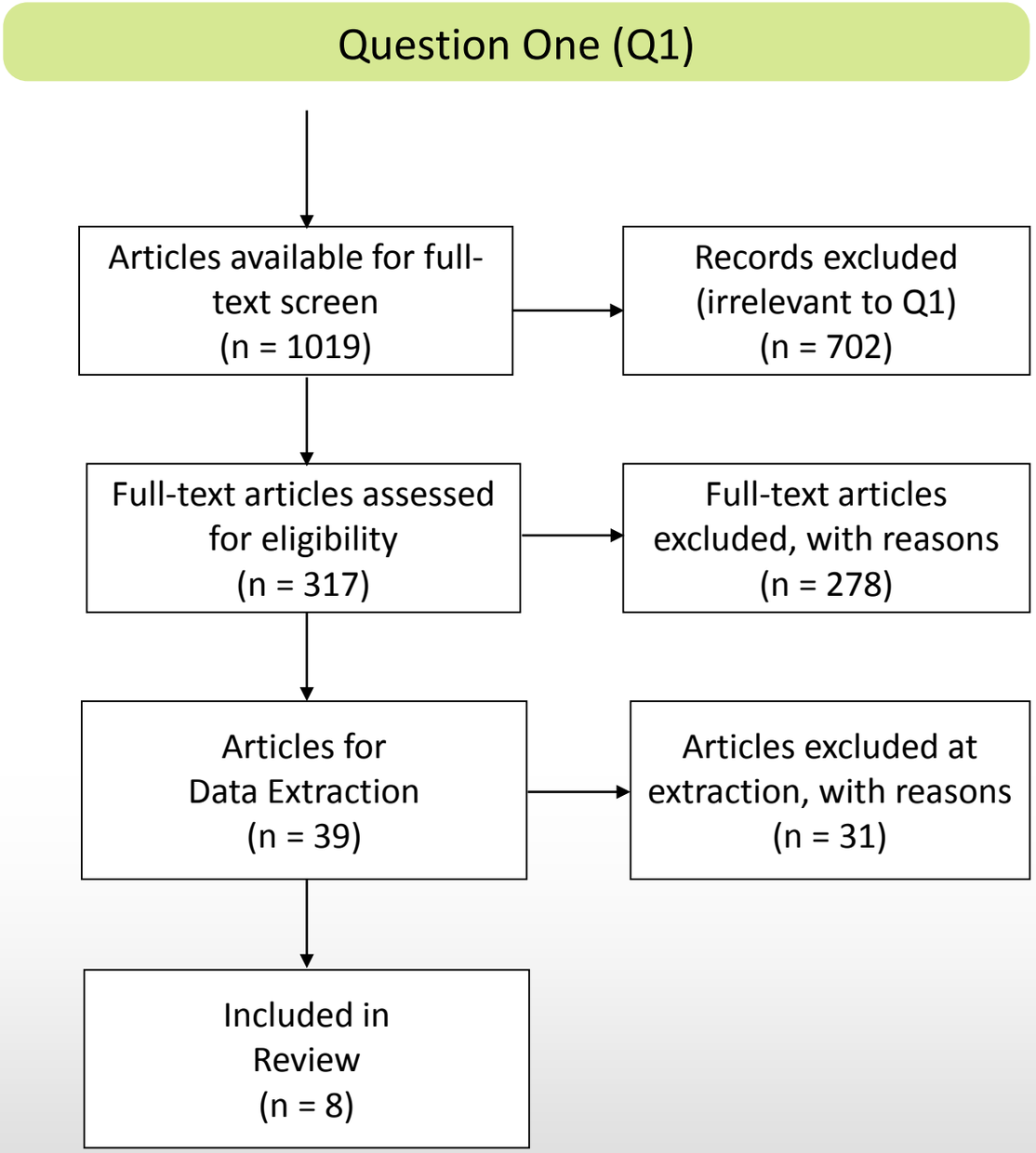
- Total number of full-text articles: 1019 → 688 studies after 2005



## OVERVIEW OF THE SEARCH

# RESULTS OF THE FULL TEXT SCREEN AND DATA EXTRACTION (Q1)

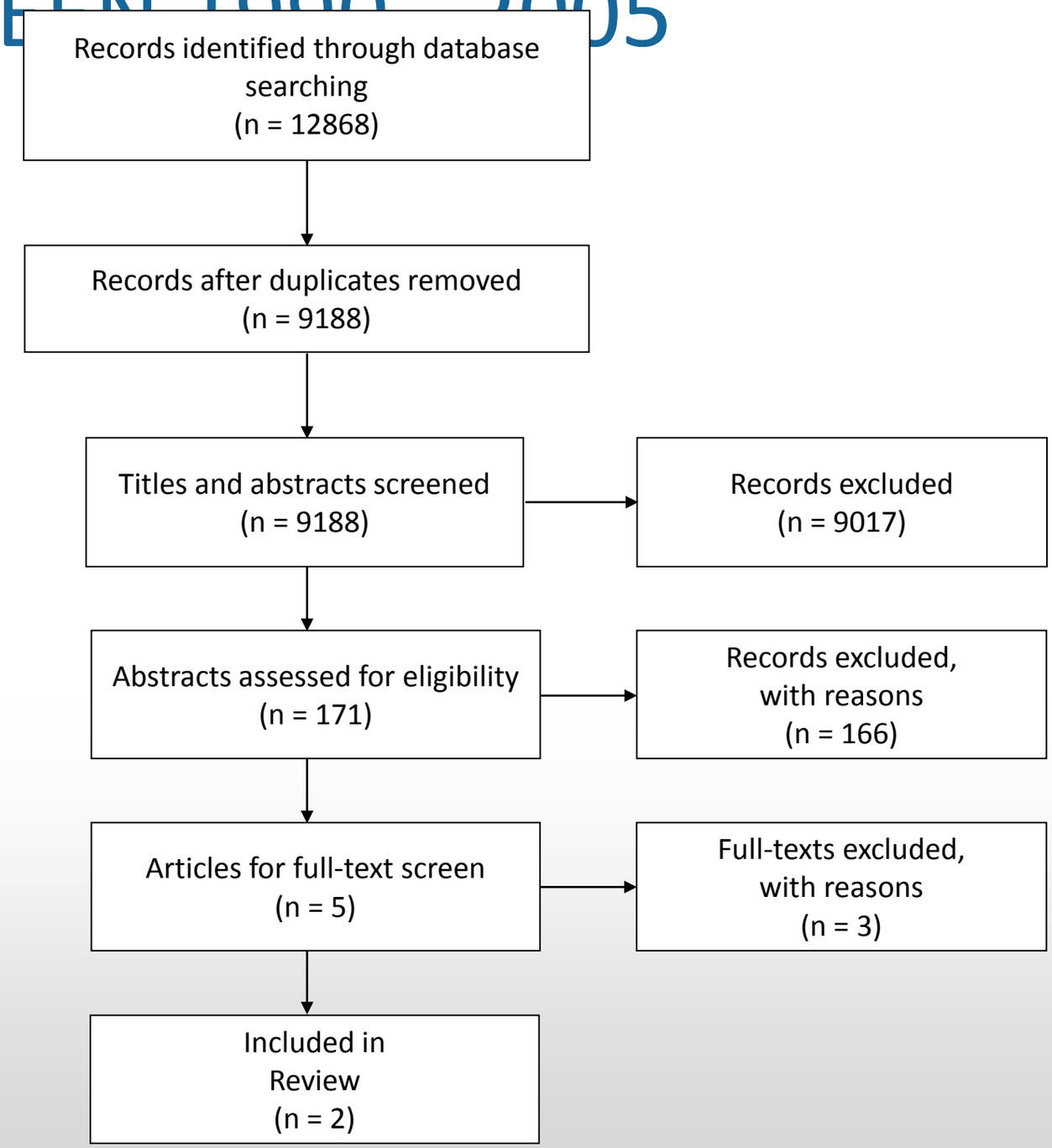
- After 2005, there were **317 studies** that were relevant to question one.
- **Full-text screening** of these studies produced 39 results that were eligible for data extraction.
- Data extraction was successfully performed on **8 studies**, which we included in our knowledge synthesis.



## OVERVIEW OF THE SEARCH

# NUMBER OF SYSTEMATIC REVIEWS EXAMINING THE LITERATURE BETWEEN 1990 – 2005

- This figure shows how we determined the **number of systematic reviews** that examined the literature relevant to **question one** in the years before our review.
- An initial **title and abstract screen** revealed that only 171 results contained the word "systematic".
- After screening the **abstracts** for **relevance** to question one, only **5 results** moved on to the full-text screen.
- In the end, only **2 systematic reviews** were deemed relevant to include.



# DEMENTIA & DRIVING

KNOWLEDGE SYNTHESIS RESULTS

DRAFT GUIDELINE RECOMMENDATIONS

## KNOWLEDGE SYNTHESIS

# SUMMARY OF INCLUDED SYSTEMATIC REVIEWS [1990-2006]

### ★ 1) Driving Test Failure

**Iverson (2010)**: 1970 - 2006

**AMSTAR* RATING: 3 / 11**

- **Risk of Failing a Driving Test**:
  1 study compared dementia to controls
  - **Very mild dementia** (CDR = 0.5): higher risk of failure [in 1/1 study]
    - Brown (2005): RR = 82.7 (95% CI: 5.1-1333)
  - **Mild dementia** (CDR = 1.0): higher risk of failure [in 1/1 study]
    - Brown (2005): RR = 88.67 (95% CI: 5.4-1444)

**Man-Son-Hing (2007):** 1966 - 2006

**AMSTAR* RATING: 5 / 11**

- **Risk of Failing a Driving Test**:
  2 studies compared dementia to controls
  - **Alzheimer's Disease (AD)**: more patients with AD failed [in 2/2 studies]
    - Cushman (1996): more patients with AD failed, no other pertinent details reported
    - Hunt (1997): 41% with very mild AD failed, vs 19% with mild AD failed, vs. 3% of controls failed ($p < 0.001$)

AMSTAR = A Measurement Tool to Assess Systematic Reviews

## KNOWLEDGE SYNTHESIS

# SUMMARY OF INCLUDED SYSTEMATIC REVIEWS [1990-2006]

### ★ 2) Driving Performance

**Iverson (2010)**: 1970 - 2006

**AMSTAR* RATING: 3 / 11**

- **Risk of Being Judged Unsafe**
  3 studies compared dementia to controls
  - **Very mild dementia** (CDR = 0.5): higher risk of being judged unsafe [in 1/2 studies]
    - Hunt (1997): RR = 9.67 (95% CI: 2.3-40.7)
    - Duchek (2003): RR = NS [on 6 month road test follow-up]
  - **Mild dementia** (CDR = 1.0): higher risk of being judged unsafe [in 2/2 studies]
    - Hunt (1997): RR = 12 (95% CI: 2.8-50.1)
    - Duchek (2003): RR = 2.68 (95% CI: 1.5-4.8) [on 6 month road test follow-up]
  - **Very Mild or Mild dementia** (CDR = 0.5 or 1.0): higher risk of being judged unsafe [in 1/1 study]
    - Grace (2005): RR = 25 (95% CI: 1.5-384)

**Man-Son-Hing (2007):** 1966 - 2006

**AMSTAR* RATING: 5 / 11**

- **Worse Performance on Driving Test**:
  9 studies compared dementia to controls
  - **Dementia**: worse performance [in 4/4 studies]
    - Fitten (1995), Wald (1998), Whelihan (2005): no other pertinent details
    - Lincoln (2006): 27% of dementia considered unsafe vs. 0% of controls
  - **Alzheimer's Disease (AD)**: worse performance [in 5/5 studies]
    - Rebok (1994): slowed reaction times, more false alarms, more pedal errors
    - Duchek (1998): especially visual attentional skills
    - Bieliauskas (1998): more driving errors
    - Uc (2005): impaired visual searching, recognition of road signs
    - Carr (1998): poorer ability to name traffic signs

KNOWLEDGE SYNTHESIS

# SUMMARY OF INCLUDED SYSTEMATIC REVIEWS [1990-2006]

★ **3) Crash Risk**

**Man-Son-Hing (2007):** 1966 - 2006

**AMSTAR* RATING: 5 / 11**

- **Crash Risk according to State Records:**
  3 studies compared dementia to controls
  - **Dementia**: Likelihood of having a crash in the previous 5 years is **2 times greater** [in 1/1 study]
    - Cooper (1993): Patients with dementia are 2 times as likely to have had a crash (in the previous 5 years)
  - **Alzheimer's Disease (AD):** No difference in crash rates in the previous 5-7 years [in 2/2 studies]
    - Trobe (1996): 0.08 crashes per person per year in both AD and control groups (in the previous 7 years)
    - Carr (2000): 9.7 crashes per million miles driven in very AD group vs. 10.6 in mild AD vs. 9.1 in controls ($p > 0.05$) (in the previous 5 years)

- **Crash Risk according to Self-Report:**
  4 studies compared dementia to controls
  - **Mild dementia**: **more-frequent crashes** in patients with dementia (period not specified) [in 1/1 study]
    - Ott (2003)
  - **Dementia**: No difference in crash rates in the previous 3 years [in 1/1 study]
    - Zuin (2002): 20% of patients with dementia vs. 6% of controls ($p=0.12$) (in the previous 3 years)
  - **Alzheimer's Disease**: Likelihood of having a crash in the previous 5-10 years is **2-5 times greater** [in 2/2 studies]
    - Drachman (1993): Patients with AD 2 times as likely to have had a crash (in the previous 10 years)
    - Friedland (1998): Patients with AD 5 times as likely to have had a crash (in the previous 5 years), 47% for AD vs. 10% for controls ($p<0.001$)

## KNOWLEDGE SYNTHESIS

# SUMMARY OF INCLUDED STUDIES [2005-2015]

★ **Study Characteristics** [8 studies]

| Road Test Setting | Driving Protocol | Driving Examiner | Measures of On-Road Impairment | Measures of Crash Risk |
|---|---|---|---|---|
| 3 **Naturalistic** Assessments<br><br>1 **Naturalistic** and **Standard** Assessments<br><br>2 **Standard** Assessments | **Naturalistic Protocols** [3/8 studies]<br>**RIRT and Naturalistic** [1/8 study]<br>**mWURT** [2/8 studies]<br>**NNDA** [1/8 study]<br>**RIDE** [1/8 study] | **Researcher** [1/8 study]<br>**Research Assistant** [1/8 study]<br>**OT-CDRS** [1/8 study]<br>**Driving instructor/examiner** [4/8 studies]<br>**Video analysts** [1/8 study] | **8/8 Studies** (e.g. driving skills) | **2/8 Studies** (e.g. crash and violation rates) |

Abbreviations
RIRT: Rhode Island Road Test
mWURT: Washington University Road Test
NNDA: Nottingham Neurological Driving Assessment
RIDE: Rhode Island Driving Evaluation
OT-CDRS: Occupational Therapist, Certified Driver Rehabilitation Specialist

## KNOWLEDGE SYNTHESIS

# SUMMARY OF INCLUDED STUDIES [2005-2015]

★ **Participant Characteristics** [8 studies]

| Control Group | Experimental Group | Dementia Severity |
|---|---|---|
| 8/8 studies with **healthy older adults**<br><br>Aksan (2015); Barco (2015); Eby (2012); Davis (2012); Barrash (2010); Ott (2008); Lincoln (2006); Whelihan (2006) | 5/8 studies with **Alzheimer's Disease**<br><br>1/8 study with **Early Stage Dementia**<br><br>2/8 studies with **Dementia** | 5/8 studies with **Very Mild to Mild Dementia**<br><br>1/8 study with **Very Mild Dementia**<br><br>1/8 study with **Mild Dementia**<br><br>*1/8 study **Not Provided*** |

| Sample Size (n) [range] | | Age (years) [range] | | Gender (% Male) [range] | | Education (years) [range] | |
|---|---|---|---|---|---|---|---|
| Controls | Dementia | Controls | Dementia | Controls | Dementia | Controls | Dementia |
| n = 23 - 77 | n = 17 - 84 | 64.5 - 74.4 | 71 – 78.2 | 30 – 74% | 52 – 84% | 12 – 16.3 | 10 – 16.2 |

## KNOWLEDGE SYNTHESIS

# SUMMARY OF INCLUDED STUDIES [2005-2015]

★ **Crash Risk Outcomes** [2 studies]

| | Crash Risk Outcomes | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | -3.0 Years Preceding the Baseline Visit | | -1.0 Year Preceding the Baseline Visit | | +1.5 Year Following the Baseline Visit | | +3.0 Years Following the Baseline Visit | |
| Author (Year) | Crash Risk Variable | Control Group | Expt. Group | Control Group | Expt. Group | Control Group | Expt. Group | Control Group | Expt. Group |
| Davis et al (2012) | Crash in Past Year (%) | | | 13.6 | 8.5 | | | | |
| | Crashes Per Year/10,000 miles driven [mean (SD)] | | | 0.2 (0.4) | 1.4 (7.5) | | | | |
| | History of Violations in Past Year (%) | | | 13.6 | 5.1 | | | | |
| Ott et al (2008) | Number of traffic violations per 1000 miles driven | 1.52 | 1.6 | | | 0 | 0 | | |
| | Total MVAs per 1000 miles driven | 1.86 | 8.78** | | | 5.63 | 1.85 | | |
| | % of Persons with MVAs | | | | | 11 | 1*** | | |
| | MVA Rate per Driver per Year | 0.04 | 0.06 | | | | | 0.06 | 0.01 |
| | Total # of MVAs | | | | | | | 5 | 2 |

*** $p < 0.05$
** $p < 0.01$

## KNOWLEDGE SYNTHESIS

# SUMMARY OF INCLUDED STUDIES [2005-2015]

★ **Road Test Findings** [4 studies]

| | Road Test Findings | | | |
|---|---|---|---|---|
| Author (Year) | Time Point Post Baseline Visit | Specific Road Test Variable | Control Group Mean (SD) or % | Expt. Group Mean (SD) or % |
| Barco et al (2015) | 0 Months | Road Test Failure | 3% | 62% |
| Davis et al (2012) | 0 Months | Road Test Failure | 0% | 1.70% |
| Ott et al (2008) | 0 Months | Washington University Road Test | 6.0 (4.5) | 13.1 (8.1)*** |
| | | *Global Rating on Road Test* | | |
| | | Safe (%) | 57% | 19%[a] |
| | | Marginal (%) | 38% | 66%[a] |
| | | Unsafe (%) | 5% | 15%[a] |
| | 18 Months | Road Test Failure | 5% | 15% |
| Lincoln et al (2006) | 0 Months | Road Test Failure | 0% | 27% |
| | | NNDA: Definitely Safe (%) | 84% | 46%[a] |
| | | NNDA: Probably Safe (%) | 16% | 27%[a] |
| | | NNDA: Probably Unsafe (%) | 0 | 16[a] |
| | | NNDA: Definitely Unsafe (%) | 0 | 11[a] |

*** $p < 0.05$

[a] Significance not determined for group differences

## KNOWLEDGE SYNTHESIS

# SUMMARY OF INCLUDED STUDIES [2005-2015]

★ **Driving Performance Outcomes** [6 studies]

| Driving Performance | | | | |
|---|---|---|---|---|
| | | Control Group | Expt. Group | Effect Size |
| Author (Year) | Specific Error | Mean (SD) | Mean (SD) | Evaluation |
| Aksan et al (2015) | Total Baseline Safety Errors (e.g. Lane observance, stop signs, etc.) | 2.03 (.71) | 2.21 (.64)[a] | Medium effect |
| | Total On-Task Safety Errors | 3.63 (1.57) | 4.30 (1.95)[a] | Medium effect |
| | Route Following Behaviour | 0.04 (0.07) | 0.13 (0.13)[a] | Large effect |
| | Landmark/Sign Identification | 0.27 (0.76) | -0.50 (0.69) | Large effect |
| Barco et al (2015) | Driving Situation Errors | 6.0 (4.9) | 12.0 (7.5)* | Small effect |
| | Errors when Driving Straight | 1.16 (1.51) | 2.06 (2.42)*** | Small effect |
| | Errors when Turning Right | 0.38 (0.83) | 1.04 (1.54)*** | Medium effect |
| Eby et al (2012) | Number of Likely Lost Trips | 0.0 (0.0) | 0.4 (0.4)** | Large effect |
| | Miles Belted (%) | 98.8 (2.3) | 88.3 (11.6)** | Small effect |
| | Miles driven with short headway (%) | 6.1 (3.4) | 2.9 (1.6)*** | Medium effect |
| | Miles drive 10mph or more slower than surrounding traffic (%) | 1.8 (0.5) | 3.9 (1.2)** | Large effect |
| | Miles driven within 5 miles of home (%) | 43.0 (6.5) | 70.2 (10.4)** | Medium effect |
| | Miles driven within 10 miles of home (%) | 60.3 (8.3) | 84.2 (9.5)** | Medium effect |
| | Miles driven during daylight hours (%) | 86.2 (6.1) | 93.2 (5.1)*** | Medium effect |
| Davis et al (2012) | RIRT Error Score | 0.04 (0.03) | 0.08 (0.06)* | Large effect |
| | CDAS Error Score | 0.10 (0.08) | 0.19 (0.13)* | Large effect |
| Barrash et al (2010) | Driving Errors[c,d] | 37.3 (13.8) | 40.0 (16.8) | NA |
| Whelihan et al (2005) | RIDE[g] Error Score | 46.1 (34.5) | 130.4 (84.1)* | Small effect |

* $p < 0.001$
** $p < 0.01$
*** $p < 0.05$
[a] Significance not determined for group differences
[b] Significant group differences, p value not provided
[c] Driving errors are defined by the Iowa Dept. of Transportation
[d] Background differences between groups were not adjusted for as the purpose of the study was not to compare the groups.

## DRAFT GUIDELINES (MAY 3,

# DRAFT GUIDELINE RECOMMENDATIONS

1. Dementia often has a direct effect upon fitness to drive, and clinicians must not neglect any indications of possible cognitive compromises of fitness to drive. (Level C)

2. Diagnosis of dementia alone is not sufficient to withdraw driving privileges. (Level A)

3. Severe dementia is an absolute contraindication to driving. (Level C)

4. It unlikely that safe driving can be maintained in the presence of moderate dementia (ie any basic ADL impairments) due to cognition, and driving is to be strongly discouraged. If patients wish to continue to drive, they should be formally assessed and monitored very carefully for delirium or any progressive loss of cognition and function that would mandate holding off driving until reassessment can occur. When in doubt it is recommended to err on the side of public safety . (Level C)

## DRAFT GUIDELINES (MAY 3,

# DRAFT GUIDELINE RECOMMENDATIONS

5. People with dementia with progressive loss of two or more IADLs due to cognition (but no ADL loss) are at higher risk of driving impairment. (Level A.) A formal assessment and ongoing monitoring of fitnes to drive is recommendedin this situation if the patient wishes to continue driving. (Level C)

6. No in-office test or battery of tests including global cognitive screens (e.g. MMSE, MOCA) have sufficient sensitivity or specificity to be used as a sole determinant of driving ability in all cases. (Level A,).

   - However, abnormalities on these tests may indicate a driver at risk who is in need of further assessment. (Level B)
   - Substantially impaired scores that are typically associated with moderate to severe dementia may preclude safe driving (Level B).
   - *If concerns or uncertainty still exists, a specialist opinion should be sought (Level C).*

## DRAFT GUIDELINES (MAY 3,

# DRAFT GUIDELINE RECOMMENDATIONS

7. Patients with dementia who are deemed fit to continue driving should be re-evaluated every 6 to 12 months or sooner, if indicated. (Level B)

8. 8a. Any clinician who has concerns but is uncertain whether a patient's cognitive problems may adversely effect driving, should refer the patient for a functional driving assessment, either through an occupational therapy evaluation or directly to the licensing authority. (Level C ).

   8b. If there are clear aspects of the history, physical examination and cognitive examination that place the patient and public at high risk for crash or impairment, the patient and informant/caregiver should be advised not to drive, and this conversation should be documented in the clinical record. (Level C)

   8c. Clinicians should be aware of the legal reporting requirements in their jurisdiction (Level C, Unanimous).

## DRAFT GUIDELINES (MAY 3,

# DRAFT GUIDELINE RECOMMENDATIONS

10. Dementia does not occur in isolation. It is most common among older adults, in whom medical comorbidities, physical frailty and the use of multiple medications are also factors that must be taken into consideration when assessing fitness to drive (Level C).

11. Behavioural disturbances, including agitation, personality change and psychosis, are common over the course of dementia and can impair driving (Level C).

12. Patients with prominent language impairment, eg primary progressive apahsia or other aphasia in the context of dementia , cannot be adequately screened with typical language-based tests and require a specialized assessment, functional assessment (IADL's, ADL's) and/or a functional driving evaluation (Level C).

13. As with many disabling progressive diseases that lead to driving cessation, conversation regarding eventual retirement from driving should be held as early as possible (Level C)

## DRAFT GUIDELINES (MAY 3,

# EARLY STAGE RECOMMENDATIONS

14. Driving cessation has been associated with social isolation, depression and other adverse health outcomes (Level Pending). Therefore, after a person with dementia has stopped driving, it is important to monitor for these problems longitudinally (Level Pending).

9. 9a. For patients with dementia, it has been shown that caregiver s are able to predict driving safety more accurately than can the patients themselves , but in some circumstances, the caregivers may have a vested interest in preserving the patient's driving autonomy beyond a safe window (Level C ). Hence, caregiver concern about driving impairment should be taken seriously (Level B), and the possiblility of a conflict of interest in preserving driving authonomy must be taken into consideration if such caregiver concern is absent. (Level C)

   9b. Recent crashes and voluntary self- restriction of driving to less complex situations are also considerations that should raise concern that a patient with dementia may be no longer safe to drive.(Level C )

# CONCLUSIONS

A well-executed knowledge synthesis incorporating knowledge-user input will increase confidence of clinicians using the guidelines, inform transportation policy, and improve driving safety.

- This process will be used as a model to inform future guideline updates on driving with dementia and with other health conditions.

# IMPLICATIONS

- Existing medical fitness to drive guidelines and transportation policies are currently in need of revision.
- There is potential to improve driving safety if the available new evidence is incorporated, particularly in the areas of high priority (e.g. risk of collision and driving impairment, insight into deficits, in-office tests of cognitive functioning).

# DISCUSSION


## DEMENTIA AND DRIVING: AN INTERNATIONAL APPROA KNOWLEDGE SYNTHESIS

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