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Section des sciences pharmaceutiques

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Quality of anticholinergic burden scales and their impact on clinical outcomes – a systematic review

A. Lisibach* [1, 2], V. Benelli [2], M.Ceppi [3,4], C. Csajka [1], M. Lutters [2]

[1] School of Pharmaceutical Sciences, Institute of Pharmaceutical Sciences of Western Switzerland, University of Lausanne, University of Geneva, Geneva, Switzerland, [2] Clinical Pharmacy, Hospital Baden, Baden, Switzerland, [3] Basel Pharmacoepidemiology Unit, Division of Clinical Pharmacy and Epidemiology, Department of Pharmaceutical Sciences, University of Basel, Basel, Switzerland, [4] Department of Neurorehabilitation, RehaClinic, Bad Zurzach, Switzerland

Introduction

Anticholinergic drug burden (ADB) is high in older people and increases with hospitalization. A practical way of assessing ADB is the application of an anticholinergic burden scale (ABS) usually ranking a specific drug into 4 levels, ranging from no (=0) to high (=3) anticholinergic activity. However, it is unclear how many of these scales are published, how they differ in quality and how they are associated with clinical outcomes.

Therefore, the **aims** of this systematic review were threefold:

(1) to identify all published ABS and their validation studies
(2) to compare the ABS systematically by using adapted tools
(3) to evaluate associations with clinical outcomes in patients

Methods

(1) Inclusion criteria for ABS:
- Existence of grading score for ADB
- A list with medications with their scores available
- ABS developed for adults (≥18 years)
- Language: German, French, English

Exclusion criteria for ABS: Equation for ADB

(2) Quality assessment of the ABS by using a self-adapted AGREE II tool[1].

(3) Identification of validation studies using an ABS by calculating the cumulative ADB with any clinical outcome. Assessment of their quality by using the Newcastle-Ottawa Scale [2] and the Cochrane Rob2.0 [3] and categorizing them into 6 different evidence levels with respect to their quality.

Conclusion

This review was able to identify all published ABS and their validation studies in order to assess their quality systematically by adapted tools. Though all ABS were recommended for use with modifications, they differentiate in quality. Though most ABS have been validated, we lack validation studies for newer scales and evaluation of the association for the four most investigated clinical outcomes showed contradicting results.

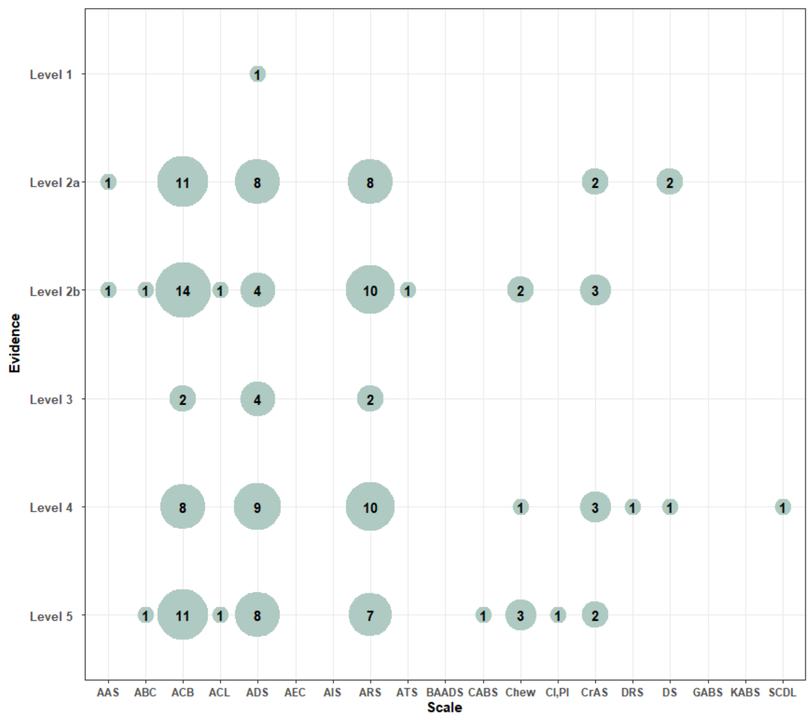
Hence, there is a need for good quality validation studies comparing multiple scales to define the best scale and to conduct a meta-analysis for the assessment of their clinical impact.

Results

(1) 19 ABS and 104 validation studies.

(2) The ACB scale and GABS have the best and SCDL the lowest quality (Table 1).

(3) 5 ABS have no validation studies (Figure 1, left).
Mostly cohort (level 2a, 2b) and cross-sectional studies (level 5).
Most investigated outcomes are cognition, delirium, falls, mortality with contradicting results (Figure 1, right).
Only 2 studies compared up to 8 ABS.
Great heterogeneity makes a meta-analysis impossible.



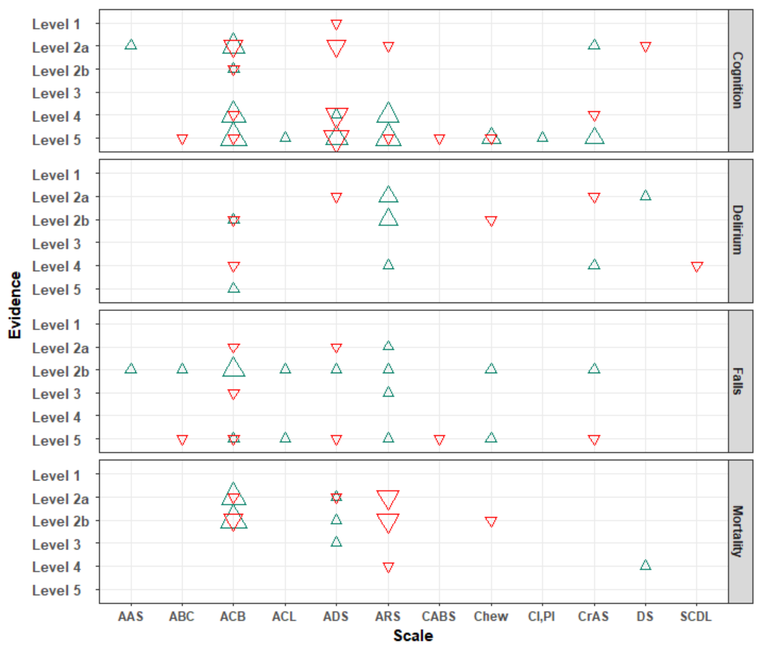


Figure 1: Number of validations per ABS (left) and found association (△ = positive, ▽ = negative) for the 4 most investigated clinical outcomes (right). Evidence levels: 1 = good quality RCT, 2a/2b = good quality cohort studies (pro- and retrospective), 3 = good quality case-control studies, 4 = poor quality case-control and cohort studies, 5 = good and poor quality cross-sectional studies.

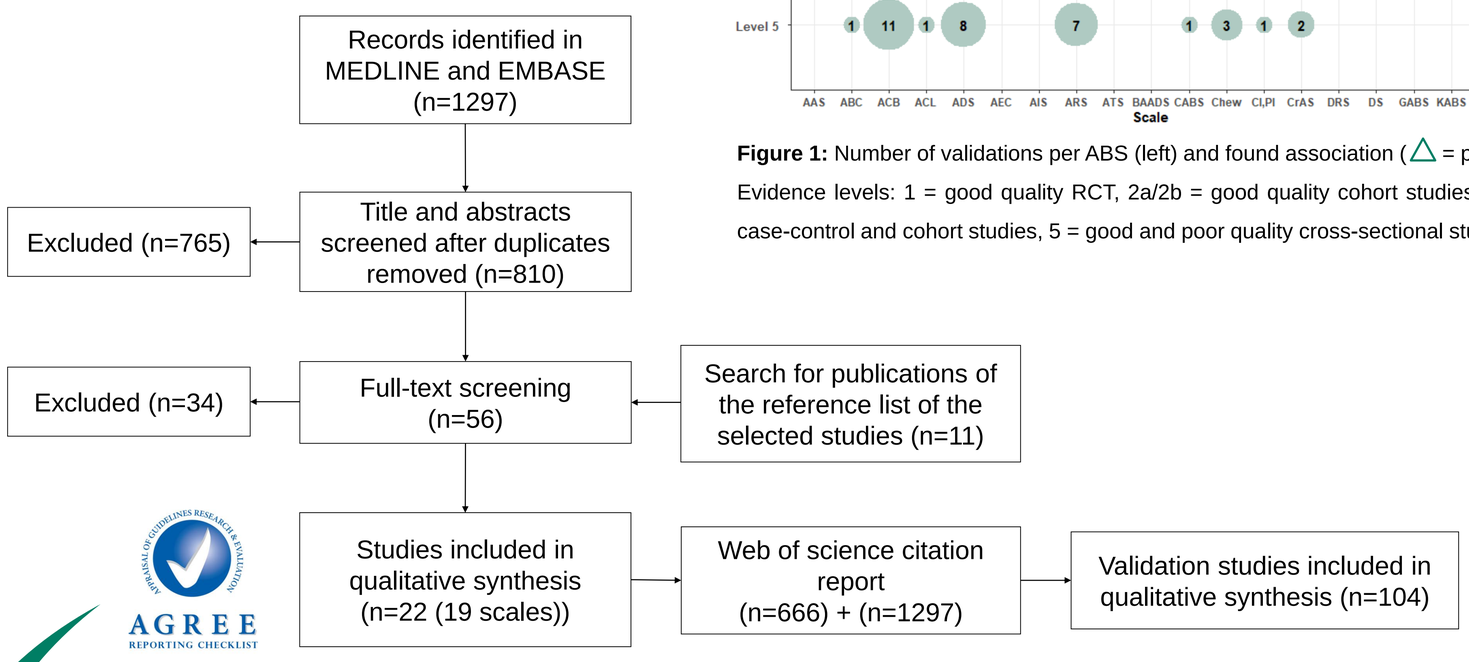


Table 1: Quality assessment of the include ABS by 3 researchers using a self-adapted AGREE II tool (numbers in %)

Domain	AAS	ABC	ACB	ACL	ADS	AEC	AIS	ARS	ATS	BAADS	CABS	Chew	CI, PI	CrAS	DRS	DS	GABS	KABS	SCDL
Domain 1: Scope and Purpose	59	52	67	61	65	70	65	70	74	61	54	67	74	57	67	63	67	56	39
Domain 2: Stakeholder involvement	28	36	64	56	56	64	50	75	31	25	2	42	39	44	28	39	83	75	8
Domain 3: Rigour of development	31	25	62	38	51	49	25	58	40	30	23	38	30	54	31	52	45	42	16
Domain 4: Clarity of presentation	28	8	89	28	42	78	42	67	39	50	14	47	25	31	44	33	81	42	25
Domain 5: Applicability	17	6	72	17	33	56	39	33	6	28	6	22	6	22	17	33	72	28	11
Domain 6: Editorial independence	65	70	89	4	94	87	48	50	87	46	31	54	35	61	11	91	85	72	6
Overall	33	25	75	28	61	72	25	67	36	31	17	47	28	53	33	72	75	56	11

[1] Brouwers et al., *"Development of the AGREE II tool"* Part 1, Part2, Canadian Medical Association Journal, 2010

[2] Wells et al., The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomized studies in meta-analysis, available at: http://www.ohri.ca/programs/clinical_epidemiology/oxford.asp

[3] Sterne et al., RoB2.0 a revised tool for assessing risk of bias in randomized trials, 2019, available at: https://sites.google.com/site/riskofbiastool/welcome/rob-2-0-tool

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