Kantonsspital Baden
KSB Apotheke

Forschungsprojekt nationaler Tragweite 2017: Zwischenbericht 2019

Detection and prevention of delirium triggered by adverse drug events (DELIKT project)

1. Introduction:

Adverse drug events (ADEs) are frequent complications experienced during hospitalization, especially in the geriatric population. ADEs are still considered to be heavily underreported while half are classified as pADEs (preventable ADEs). Thus, the prediction of ADEs becomes more important every day to identify patient at high risk and alert the physician or a multidisciplinary care team to perform specific interventions.
A common ADE in elderly hospitalized patients is delirium having a huge impact on health outcomes, hospitalization length of stay, and health care costs. One of the many risk factors are drugs, especially anticholinergic (ACH) medications. Owing to multiple indications, prescription of these drugs increases with hospitalization. The most common method for determining the ACH burden in a person is an expert based list of medications with ACH properties, the so-called ACH scales. These scales assign a number from 1 (=low) to 3 (=high) to a specific substance according to its ACH properties. In a small study conducted in the intensive care unit (ICU) of our hospital, we observed that patients with delirium had a higher ACH burden compared to those without. As this drug-drug interaction was often unnoticed by interaction check programs, delirium may remain unrecognized. Hence, the ability to predict patients at high risk would enhance proper screening and be a potential source of prevention.

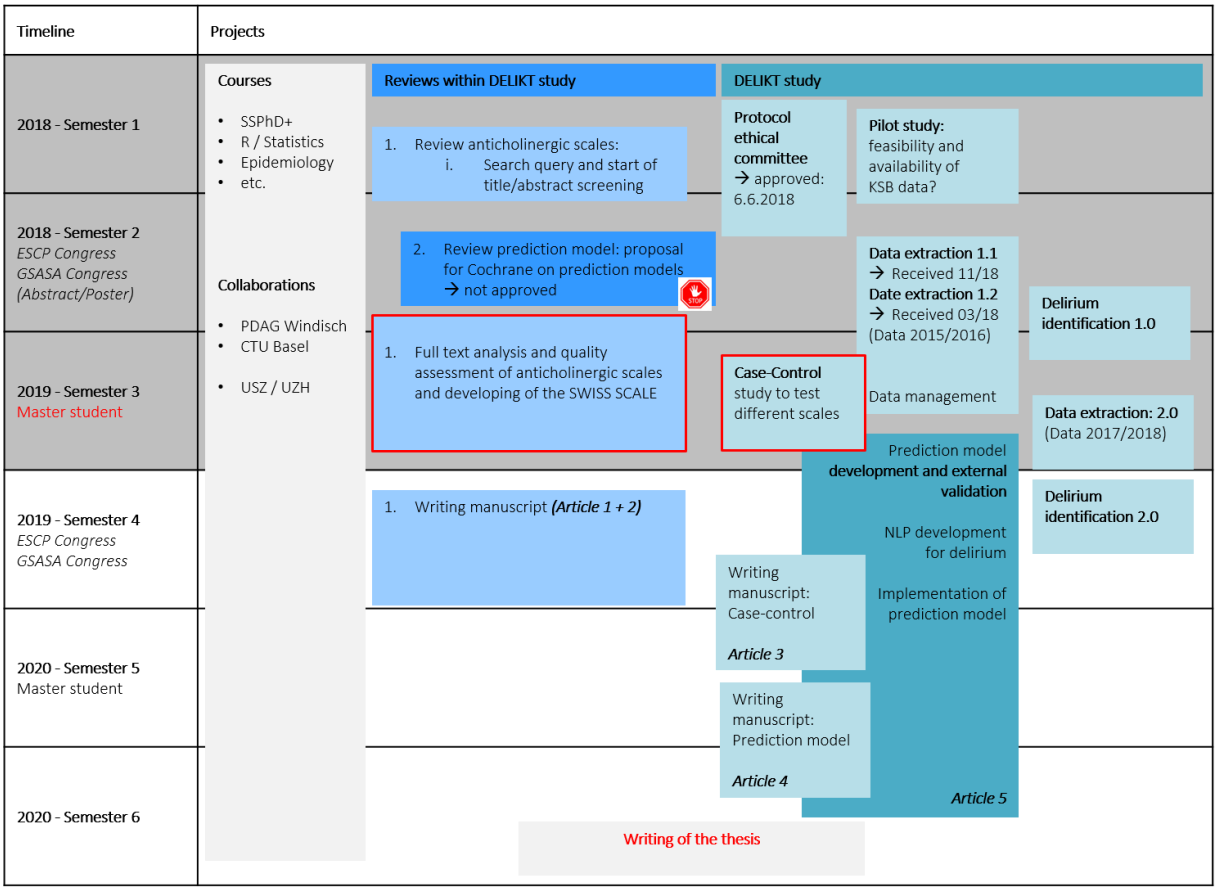
2. Aim:

To automatically predict delirium and identify risk factors using information available in patients' electronic records by developing, validating and implementing an algorithm into the hospitals CPOE.

3. Objectives:

1. To identify the best anticholinergic burden scales to develop the Swiss ACH burden scale (SABS)
2. To establish the association between delirium and the SABS
3. To develop and validate a prediction model to identify patient at high risk for delirium including the SABS
4. To decrease the incidence of delirium by implementing the prediction tool in the hospital's CPOE

4. Planning:



5. Project ad 1

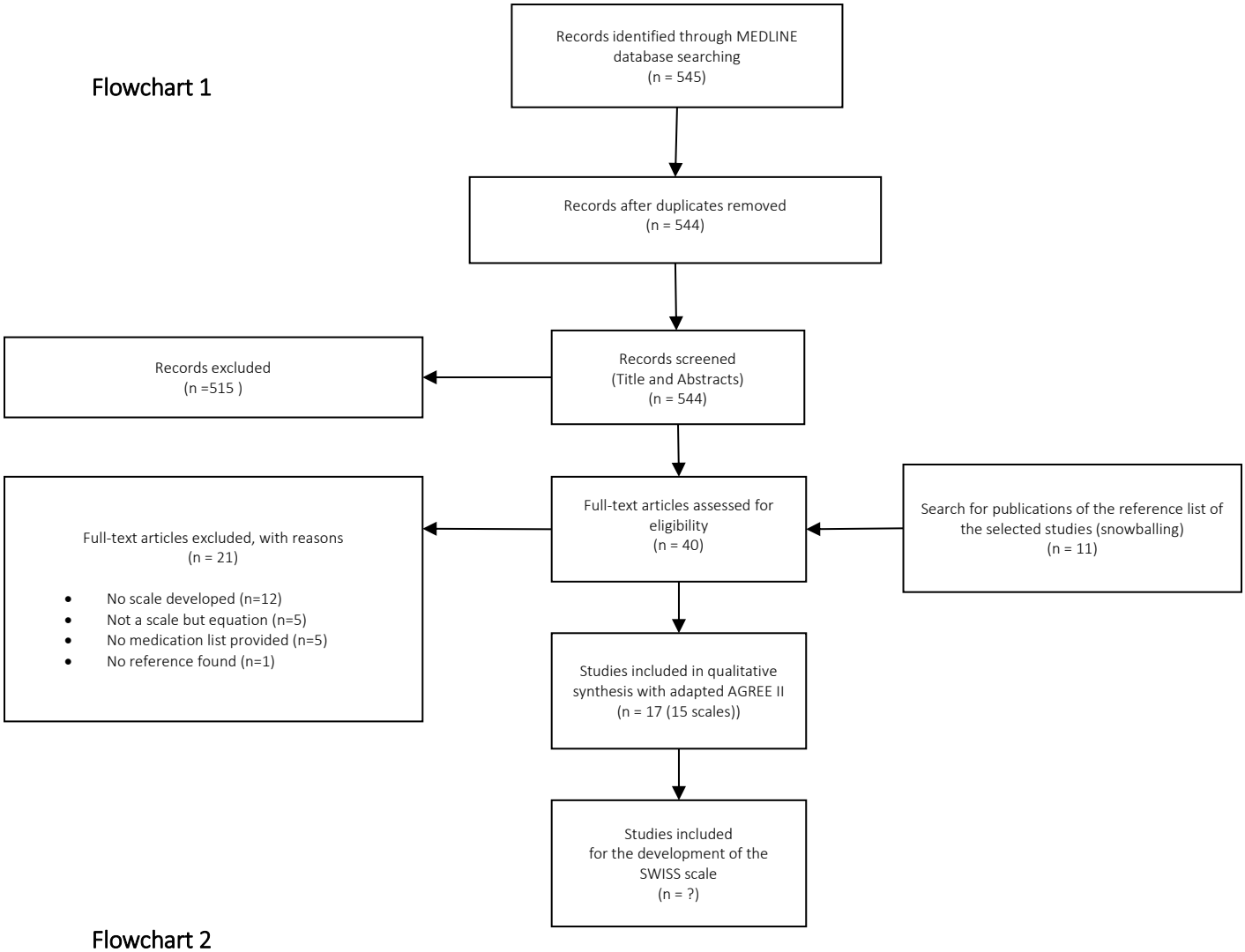
Methods ad 1:

- Systematic review to identify all existing anticholinergic burden scales and their validation studies (studies looking for an association between the anticholinergic score of the medication and clinical outcomes).
- Screening of retrieved records for inclusion by two independent researchers, discrepancies were resolved by a 3rd expert.
- Assessing quality of the scales using an adapted AGREE-II tool by 3 to 4 researchers
- Assessing quality of the validation studies through the Newcastle-Ottawa-Scale (NOS) for cohort and case-control studies, independently by 2 researchers
- Writing rules for Swiss drugs not included in the scales or only included in low quality scales
- Developing the Swiss Anticholinergic Burden Scale (SABS).

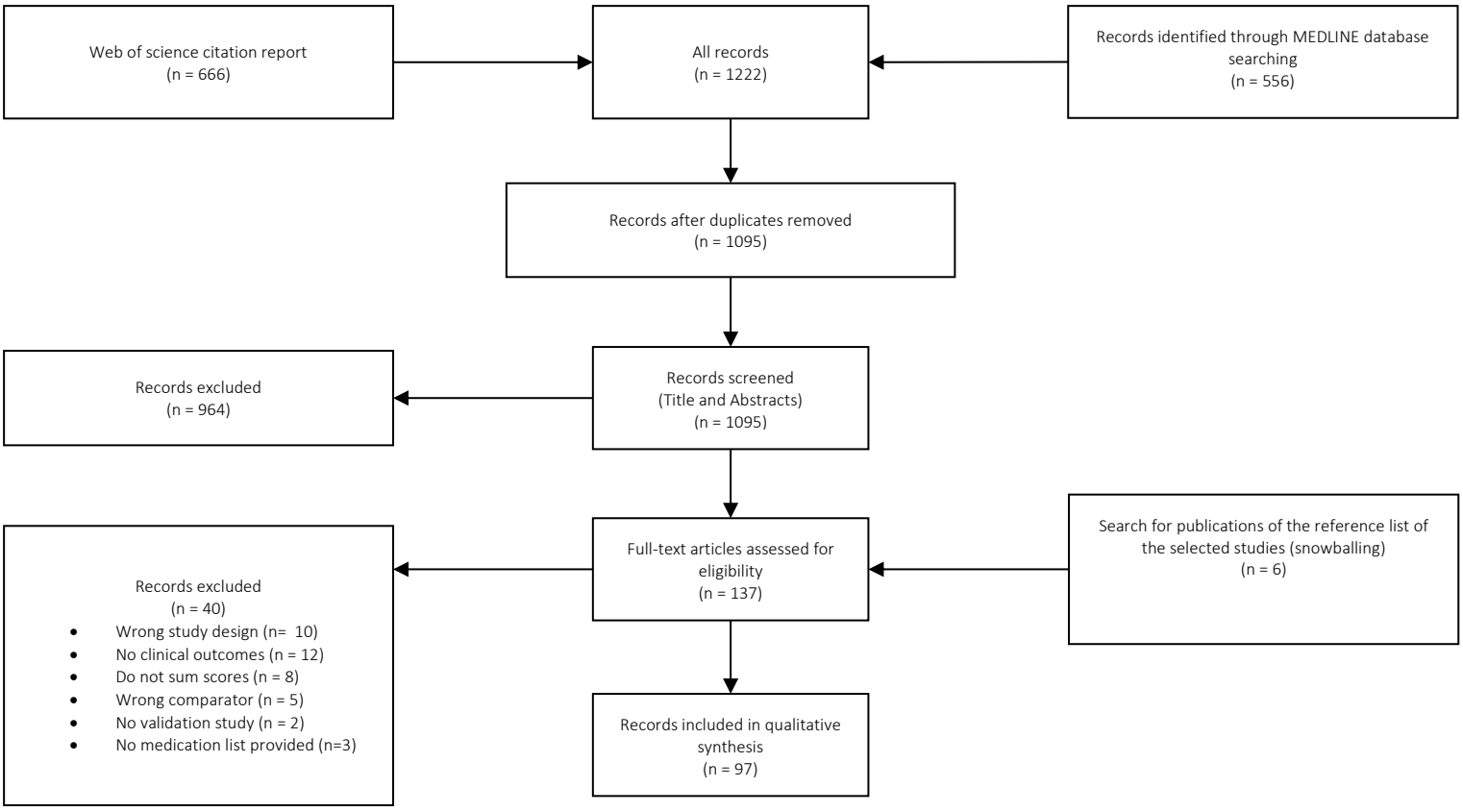
Results ad 1:

Out of 545 records identified in MEDLINE we retained 15 scales (Flowchart 1). In addition 97 validations studies were included after screening of 1222 records (Flowchart 2). For the development of ACH scales various methods were used such as experts opinion, serum anticholinergic activity, adverse drug effects or blood-brain-barrier permeability. Categorization of drugs into anticholinergic drug burden level showed many unexplained variations. The number of validation studies per scale ranged from 0 for the German scale (Kiesel et al.) to 38 for the ACB scale (Boustani et al.). 18 studies compared two or more scales showing a superior performance of the ARS scale. Study designs of the validation studies were mainly cohort and case-control studies with widely spread quality. Cognitive and functional impairment, mortality or dementia were the most often studied outcome with inconclusive results.

Flowchart 1



Flowchart 2



Status Mai 2019: Quality assessment of validations studies and scales is ongoing,

Next steps:
- Developing rules for Swiss drugs not included in the scales or only in low quality scales
- Developing the Swiss Anticholinergic Burden Scale (SABS).

6. Project 2 (objectives 2 & 3)

Methods ad 2+3:
- Creation of a review proposal for the Cochrane Collaboration on existing prediction models for delirium. It was not approved and hereafter stopped, as there was a new publication in 2018, which covered the topic entirely.

- Data extraction of all patient cases from KSB hospitalized during 2015-2016 with the following inclusion and exclusion criteria:

  Inclusion:
  - ≥ 65 years
  - ≥ 48 hours
  - 01.01.2015-31.12.2016

  Exclusion:
  - Patients with delirium at admission and / or delirium due to substance / alcohol misuse
  - Health-related personal data will not be used if clearly stated
  - ≥ 24 hours on intensive care unit

- Chart review of all included patient cases to (a) exclude patients with delirium at admission, and (b) identify the exact date of delirium diagnosis, which is necessary for any further analysis of the data set.

Preliminary results ad 2+3:

Reviewing 702 patient cases we identified the exact diagnosis date of 375 cases, 310 cases were excluded due to delirium at entry or identification was not possible and 17 cases switched to the control group as these cases were so called “Klammerfälle”.

Next steps:
- Case control study
- Development of the prediction model
- Validation of prediction model on a new data set

7. Project 3 (intervention study, objective 4):

⇨ planned for 2020/21

8. Collaborations:

- We established a collaboration with the CTU (Clinical Trial Unit) in Basel to develop the prediction model.
- We supervised a master student from the University Basel, who will finish at the end of Mai.

9. Presentations / Publications:

- The pilot study, which was described in the report form 2018, was presented as a poster at the ESCP and GSASA congress in 2018.
- An abstract on the systematic review of the scales was submitted on 10.5.2019 to the ESCP Symposium in Slovenia in October 2019.

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