

Drug-Associated Risk Tool (DART) – Overview and manual

Background

The increasing complexity of drug regimens puts patients at risk for drug-related problems (DRPs). Hospital stays are an opportunity to perform medication reviews on the patients' pharmacotherapy to resolve potential or manifest problems whilst having access to medical records, laboratory results, and patients' opinions and experiences. Comprehensive drug therapy evaluations can reduce the number of days spent in hospital for selected patients, but require human resources not always fully available.

Purpose

The Drug-Associated Risk Tool (DART) is a questionnaire about risk factors associated with DRPs. The DART was developed to assist clinicians in stratifying their patients' risk of DRPs with a need for medication reviews and ultimately to improve the quality of healthcare. As a self-administered questionnaire for patients, the tool does not increase the workload of any caregivers and respects the patients' opinions and experiences.

Potential use

The DART can be used to stratify hospitalised non-acute older patients in groups of having low and high risk of DRPs. Distributed at the beginning of a hospitalisation, the DART can be completed by the patients themselves. The results can be used to tailor clinical pharmacy services and to allocate available resources to patients who most need them.

Validation status

We correlated the self-administered DART with 110 comprehensive clinical medication reviews, which included patient interviews, the Medication Appropriateness Index, and START/STOPP criteria version 2. The DART was able to discriminate between patients with high and with low numbers of drug-related problems.

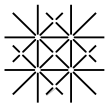
Limitations

Due to the validation procedure, the DART is limited in its external validity and generalisability:

- The study population consisted of patients with 76.9 ± 10.3 years of age and 11.0 ± 4.2 drugs
- Participants were recruited on rehabilitation wards as well. These wards generally treat less acutely ill patients. Hence, the validity is restricted to non-acute patients.
- The patient interviews prohibited the inclusion of patients with dementia.
- The questionnaire is currently only available in German. Researchers are invited to translate the questionnaire in concordance with us.

Interpretation

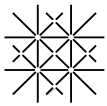
Table 1 lists items of the questionnaire with the services they may trigger. As triggers for comprehensive drug therapy evaluations (using medical records, laboratory measurements, and patient interviews), we suggest the eight items of the DART on heart insufficiency, tablet-splitting issues, use of anticoagulants or steroids, diabetes, polypharmacy (>5 medicines), adherence, and concerns about dependency. The additional eight items on the use of non-steroidal antirheumatic drugs, antidiabetics, digoxin, and restricted kidney function, concerns on dependency, concerns at having to use medicines, use of therapeutic skin patches, and preparation of medicines by homecare services may be used as indicators for patients who



benefit from a patient interview focusing on adherence problems, patients' knowledge, and handling problems. As the items of the original DART were carefully selected, the remaining items may still be used to shape the contents of a medication review or a patient interview.

Table 1 Combination of DART items and possible triggered type of medication review.

DART item (roughly translated from German)	Possible triggered clinical pharmacy service
I have a heart weakness/heart performance weakness.	Consider immediate MRT3 inclusive of a patient interview
I have trouble taking my medicine because of splitting tablets.	Consider immediate MRT3 inclusive of a patient interview
I use Marcoumar [®] (phenprocoumon), Xarelto [®] (rivaroxaban), Sintrom [®] (acenocoumarol), Eliquis [®] (apixaban), Lixiana [®] (edoxaban), or Pradaxa [®] (dabigatran) at home.	Consider immediate MRT3 inclusive of a patient interview
I use cortisone at home.	Consider immediate MRT3 inclusive of a patient interview
I have diabetes.	Consider MRT3 inclusive of a patient interview
I take more than 5 drugs every day, which are prescribed by my physician.	Consider MRT3 inclusive of a patient interview
Do you sometimes forget to take your medicine?	Consider MRT3 inclusive of a patient interview
I sometimes worry about becoming too dependent on my medicines.	Consider MRT3 inclusive of a patient interview
I use medicines against rheumatism/inflammation at home.	Consider patient interview (MRT2a)
I use insulin/medicines against diabetes at home.	Consider patient interview (MRT2a)
I use digoxin at home.	Consider patient interview (MRT2a)
I sometimes worry about the long-term effects of my medicines.	Consider patient interview (MRT2a)
Having to take this medicine worries me.	Consider patient interview (MRT2a)
I apply my medication in the form of skin patches.	Consider patient interview (MRT2a)
I have a restricted kidney function/kidney dysfunction/kidney disease.	Consider patient interview (MRT2a)
The preparation of my medicine is done by a homecare institution.	Consider patient interview (MRT2a)



Publications/ Further information

- Risk factors: Kaufmann CP, Stämpfli D, Hersberger KE, et al. Determination of risk factors for drug-related problems: a multidisciplinary triangulation process. *BMJ Open* 2015;5(3):e006376
- Questionnaire development: Kaufmann CP*, Stämpfli D*, Mory N, et al. Drug-Associated Risk Tool: development and validation of a self-assessment questionnaire to screen for hospitalised patients at risk for drug-related problems. *BMJ Open* 2018;8(3):e016610
- Validation: Stämpfli D, Boeni F, Gerber A, et al. Assessing the ability of the Drug-Associated Risk Tool (DART) questionnaire to stratify hospitalised older patients according to their risk of drug-related problems: a cross-sectional validation study. *BMJ Open* 2018;8:e021284
- Patienteninterviews: Stämpfli D, Boeni F, Gerber A, et al. Contribution of Patient Interviews as Part of a Comprehensive Approach to the Identification of Drug-Related Problems on Geriatric Wards. *Drugs Aging* 2018.

Disclaimer

“UNIBAS” shall mean: The University of Basel, Department of Pharmaceutical Sciences, Prof. Dr. Kurt E Hersberger, Klingelbergstrasse 50, CH-4056 Basel, Switzerland. „MATERIAL“ shall mean the patient-filled questionnaire “Drug-Associated Risk Tool (DART)” and accompanying explanations as developed and tested by UNIBAS. UNIBAS has developed MATERIAL in the course of academic research.

- UNIBAS permits researchers and clinicians the use of MATERIAL. Any commercial use is forbidden.
- UNIBAS keeps the right to apply for patents or other protection rights covering the MATERIAL or its uses.
- UNIBAS retains ownership of the MATERIAL.
- Adaptions and translations of MATERIAL are only permitted in a joint publication together with UNIBAS or with the written consent of UNIBAS. Adaptions and translations of MATERIAL must be performed according to accepted guidelines (e.g. Principles of Good Practice for the Translation and Cultural Adaptation Process for Patient-Reported Outcomes (PRO) Measures).
- Any MATERIAL is understood to be experimental in nature and may have hazardous properties. UNIBAS makes no representations and extends no warranties of any kind, either express or implied. There are no express or implied warranties of merchantability or fitness for a particular purpose, or that the use of the material or the manuscripts will not infringe any patent, copyright, trademark, or other proprietary rights.
- UNIBAS will not be liable for any loss, claim or demand, due to or arising from the use of the MATERIAL, except when caused by the gross negligence or wilful misconduct of UNIBAS.
- Place of jurisdiction shall be Basel (Switzerland).