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Experiences in Teaching and Learning

The development and piloting of "ATTEND DR," a clinical teaching tool to identify and prioritize potential causes of adverse drug reactions☆

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ABSTRACT

Background: The identification, management, and reporting of adverse drug reactions are integral to clinical practice and education; however, undergraduate teaching related to adverse drug reactions may be inadequate for practice. Existing methods of causality assessment have a number of limitations in relation to clinical teaching, for example, they do not deal well with the concurrent use of other medications.
Objective: To develop and pilot a teaching tool to guide students through the process of identifying and prioritizing potential causes of an adverse drug reaction.
Setting: University-based School of Pharmacy, Australia: an undergraduate Quality Use of Medicines course.
Method: A contrived acronym (mnemonic) was developed from causality assessments and discussions with practitioners. The acronym ATTEND DR (abnormality, taken, timeline, evidence, nothing else?, dose, dechallenge, and rechallenge) was piloted in workshops that focussed on adverse drug reactions and their management. Students' responses to "What did you find most valuable about today's workshop?" and "How could we improve?" were analyzed.
Results: All attendees responded (65/65). Students indicated that the ATTEND DR acronym was easy to remember, and facilitated causality assessment in a clinical context, due to an easily followed, step-by-step, comprehensive process that was easy to remember. More practice case studies were requested.
Conclusion: The ATTEND DR acronym was designed to address limitations of the existing methods of causality assessment in relation to clinical teaching and preparation of students for future clinical roles. Students responded favorably to its introduction, commenting that it was easily remembered and provided a comprehensive, clinically orientated, step-by-step process.

What was done

A teaching tool in the form of a contrived acronym was developed to help students identify the most likely cause of an adverse drug reaction (ADR) or potential causes that could be modified to manage the ADR, or both. Edwards and Aronson[1] described an ADR in the context of clinical practice as "an appreciably harmful or unpleasant reaction, resulting from an intervention related to the use of a medicinal product, which predicts hazard from future administration and warrants prevention or specific treatment, or

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Table
How to apply the ATTEND DR acronym

Acronym	Description/application	Example
A—abnormality/ adverse effect	What is the ADR? Is the evidence behind it subjective (patient report) or is it objective (observable)?	Patient reports muscle pain (subjective). Raised creatine kinase indicates muscle breakdown (objective).
T—taken (suspected medication)	Did the patient take the medication? (Do not assume because a patient was prescribed a medication that they have taken it or taken the prescribed dose.)	Non-compliant patient.
T—timeline	Check whether there were symptoms of the ADR before or after the medicine was taken. (There may be a pre-existing condition.)	Patient has no previous history of muscle pain.
	Does the timing fit with the natural history of the adverse effect?	Seizures during the administration of an intravenous infusion are almost conclusive.[10] Exanthematous rashes usually appear within 14 days of initial exposure,[11] therefore a recent exposure is the most likely cause. Osteoporosis can take several years to become evident,[12] therefore a single recent exposure is unlikely to be the cause.
E—evidence	Do symptoms match with the ADRs noted in the literature?	The patient reports diarrhea which is a listed adverse effect of metformin.[13]
	What is the frequency in the literature?	The frequency of hepatotoxicity with methotrexate is common (> 1%) while with carbamazepine it is rare (0.1%),[13] therefore the cause is more likely to be methotrexate (although carbamazepine should not be completely ruled out).
N—nothing else?	Is there any other cause of ADR? (e.g., other medications, complementary/alternative medications, lifestyle, and underlying disease)	The patient has muscle pain and is taking a statin but has recently joined a gym.
	Is there a pharmacokinetic drug–drug or drug–disease interaction that could result in increased blood levels?	The patient is taking simvastatin and has started drinking grapefruit juice with breakfast.[13]
	Is there a pharmacodynamic drug–drug or drug–disease interaction that could result in increased symptom levels?	The patient is taking fluoxetine and commences domperidone and develops torsades des points due to a further increase in QT interval.[13]
D—dose	Does the side effect worsen if the dose is increased; or lessen if the dose is decreased?	The dose of statin is increased and the muscle pain worsens.
	Check if the dose is too high, especially if the patient is a child or elderly or has renal or liver impairment.	A patient with renal impairment (creatinine clearance: 10–15 ml/minute) is prescribed trimethoprim 300 mg daily when the recommended dose is 150 mg daily.[13]
D—dechallenge	Does the adverse effect cease if the medication is stopped? (An important aspect of this is to identify the medication most likely to have caused the ADR as its cessation or a decrease in its dose is often the first step in the management of the ADR.)	The patient ceases a statin and his muscle pain disappears and his creatine kinase returns to normal.
R—rechallenge	Does the recommencement of the medication result in the same symptoms? (This is avoided if possible when the ADR is serious or life-threatening especially when alternative medications are available. If the side effect is minor and the medication is considered to be a superior choice then a rechallenge might be appropriate.)	A patient reporting a penicillin allergy might be rechallenged (with appropriate emergency care available) if they have a life-threatening bacterial infection that is sensitive to nothing other than penicillin.

ADR = adverse drug reaction.

alteration of the dosage regimen, or withdrawal of the product."

The literature links ADR identification with algorithms for causality assessment and expert opinion.[2–9] Therefore to develop the tool, causality assessments[7–9] were reviewed to identify common or relevant factors, and the opinions of health practitioners with considerable experience in identifying ADRs were sought. Each practitioner had at least 20 years of clinical experience and held a senior or specialist clinical position at the time of the study. They comprised clinical pharmacists, who were also university academics, and a general practitioner with clinical teaching experience. Both authors had experience in clinical pharmacy or clinical pharmacology, and pharmacovigilance at a state or national level. The discussions with the health practitioners were also used to identify a potential process for determining possible causes of an ADR and discriminating between those causes.

The initial acronym, developed in 2012, was TRACED (timeline, rechallenge, abnormality, cannot be another cause, evidence, dechallenge/dose). Informal student feedback and observation of the students' application of the algorithm identified that the order of the letters needed to be altered. While most students could remember the factors, the order of the factors did not match with their importance or the experts' process resulting in poor application. Revision resulted in the acronym ATTEND DR (abnormality, taken, timeline, evidence, nothing else?, dose, dechallenge, rechallenge). Each word relates to a more detailed explanation for its application (Table).

The identification and management of ADRs was the focus of two ADR lectures lasting one hour each and an ADR workshop lasting two and a half hours in a Quality Use of Medicines course. The lectures presented the theory of causality assessment, the