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Editorial

Clinical prediction rules in primary care: what can be done to maximise their implementation?

Clinical prediction rules (CPRs) have become more prevalent in the published literature in recent years. Known by an array of synonymous terms including risk score, scorecard, algorithm, guide, and model, CPRs are clinical tools that quantify the contribution of a patient's history, physical examination, and diagnostic tests to stratify patients in terms of the probability of having a specific target disorder. Outcomes of CPRs can be presented as diagnosis, prognosis, referral, or treatment. Although not designed to replace clinical knowledge and experience, CPRs do offer a way to assist with the overall diagnostic and prognostic process.[1] Despite the value of these clinical tools, relatively few CPRs have been quantified and their utility validated. One CPR that has gained widespread acceptance is the Centor score,[2] which is based on four clinical features (tonsillar exudate, tender cervical anterior adenopathy, history of fever, and absence of cough) and is used to identify patients with group A beta-haemolytic streptococcal throat infections. What can be done to expedite implementation of other CPRs into routine primary care?

Before a CPR can be implemented in clinical practice, it is recommended that the rule passes through five stages of development that encompass derivation (broad and narrow), validation (broad and narrow), and impact analysis.[3] Impact analysis generally requires an RCT to determine the impact of a rule on changing physicians' behaviour, process measures, patient outcomes, and/or cost-effectiveness.[4] Impact analysis is, therefore, crucial because without it, clinicians and health policy makers do not know whether using the CPR will improve the process of care, cause more harm than good to patients, or be cost effective. Despite repeated calls for more research in this area, relatively few CPRs have ever reached impact analysis.[3]

Although increasing the volume of impact analysis research would go some way to facilitating acceptance of the CPR, this process would not address the difficulties associated with implementing and maintaining use of CPRs in routine clinical practice. Currently, CPRs are offered as one of several techniques to refine the diagnostic process. In a review of various diagnostic strategies used by general practitioners (GPs), CPRs were identified as the least likely diagnostic tool to be used relative to other strategies, such as 'pattern fit recognition' or 'restricted rule out' strategies.[5] Possible explanations for this relatively low preference for CPRs could be that, in some cases, implementation of CPRs may not be appropriate, or CPRs may not be readily available for that particular clinical context.[2] Nevertheless, of the CPRs that do exist and are appropriate to use, many are not implemented when they could be. For example, the Ottawa Ankle Rule is used to determine the need for an x-ray after an ankle injury and is one of the most well known and highly published CPRs, with several validation and impact analyses studies supporting its use.[6] Despite this body of evidence, one study indicates that, although 90% of physicians report using the rule when appropriate, only 42% base their decision to order an x-ray primarily on the rule.[7] Other factors (e.g., age) were also considered by clinicians when making their final decision. However, these factors were not considered to be relevant to the CPR, or did not add to the predictive value of the CPR.

The challenge that remains is how best to promote the use of CPRs in routine clinical practice. Several studies have investigated 'knowledge transfer' of best clinical evidence using electronic support systems.[8][9] Unfortunately, this body of work tends to focus primarily on changes in physician behaviour rather than patient outcomes.[8] Furthermore, the studies fail to report adequately the system design and implementation features associated with the outcome of the intervention, thus limiting the opportunity to learn from and to improve existing implementation strategies.[9]

Lang and colleagues have argued that the three domains of knowledge, attitude, and behaviour have a direct impact on changing clinical practice.[10] Each domain is associated with several barriers and, as such, highlight target areas for successfully implementing CPRs into routine practice. Specifically, barriers to knowledge acquisition include no or limited access to the literature, the high volume of information available, and the time investment required to interpret and understand the data presented. Barriers preventing change in attitude include lack of confidence in the literature, and uncertainty in the interpretation and application of the data. Barriers precluding changes in behaviour include environmental factors (such as time constraints), patient factors (such as expectations about treatments), fear of litigation, and institutional factors (such as lack of willingness for change at a departmental level).

With these barriers in mind, research is currently underway at the HRB Centre for Primary Care Research to develop two novel methods to assist with the 'knowledge transfer' of the clinical evidence embedded in CPRs into clinical practice. The first strategy consists of developing an international register of CPRs for use in primary care. This will be made publicly available through the Cochrane Primary Health Care Field. Given the increasing computerisation of medical practices, the web-based availability of the register will provide a user-friendly, searchable electronic resource that can readily be integrated into the workflow. Ongoing management and maintenance of the register will ensure that up-to-date information is easily accessible. Once established, each article on the register will be categorised according to several criteria, including the stage of development, clinical domains, methodological quality, clinical setting, and patient population. This will allow the user to judge the quality of the CPR, as well as the applicability of the CPR to their diagnostic or prognostic clinical question.

The second strategy consists of using computer-based Clinical Decision Support Systems (CDSSs) developed from original CPR algorithms that are designed to improve clinical decision making. For example, a computerised handheld decision support system based on the revised Geneva score for predicting the probability of pulmonary embolism was shown to improve diagnostic decision making for patients in an emergency department.[11][12] The current work at the HRB Centre focuses on supporting each CPR relevant to primary care by an electronic knowledge base that uses Bayesian reasoning to determine the relationship between the pretest probability of having a target disorder and the increase in probability of having that disorder with the presence of the relevant signs and symptoms. This will determine the post-test probability of having the disorder. The system will then provide patient-specific diagnostic and/or therapeutic recommendations based on up-to-date, evidence-based resources, such as that provided by Clinical Evidence. CDSSs overcome many of the barriers associated with 'knowledge transfer' because they can be integrated with the electronic patient record, are available at the point of care, are based on a computerised knowledge base, provide patient specific content, and include specific recommendations rather than generic recommendations.[9]

Although further evidence on the impact of CPRs is necessary, a mass publication of primary studies in this area is unlikely to change clinical practice and benefit patients unless this new knowledge is synthesised, regularly updated, and implemented by means of CDSSs and other implementation strategies. Barriers to putting CPRs into practice have been identified, and contingencies to overcome these barriers targeted to the specific clinical setting to which the CPR is being introduced should be built into any implementation process. We hope that generation of the Cochrane register of CPRs in primary care and the provision of CPRs through CDSSs offers new ways to implement CPRs in primary care to the benefit of patients.

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