Editorials

Electronic patient records research to aid diagnostic reasoning for possible cancer in primary care

In this issue of the *BJGP*, Koshiaris and colleagues present a primary care electronic health records study that examines the combined predictive value for multiple myeloma of presenting symptoms and blood tests commonly used in primary care.[1] Building on previous related research,[2] this study reports important new evidence that could help doctors to both shorten diagnostic intervals in patients with this (very hard-to-suspect) cancer and minimise the need for specialist assessment in those unlikely to have the disease. A key finding is that in patients with persistent back or bone pain the combination of normal full-blood count and normal erythrocyte sedimentation rate/plasma viscosity can help to reasonably rule out the risk of multiple myeloma.[1]

THE CURRENT EVIDENCE BASE

Research about the prognostic value of presenting symptoms for cancer based on primary care patient records has been accumulating since the mid-2000s.[3] Currently (mid-2018) there is a body of about 50 studies from different research groups, chiefly but not solely from England. Much of this expanding evidence base has underpinned the publication of the 2015 NICE guidelines for the referral or investigation of 157 common symptomatic presentations in adults.[4] Taken together, these collective research efforts (many of which have been published in the *BJGP*) represent a commendable achievement that has enhanced medical knowledge very substantially. Certain limitations in the current evidence should nonetheless be considered and addressed by future research.

Most relevant evidence thus far examines the value of presenting symptoms during 'fixed' pre-diagnostic periods (typically of 1–3 years) which are considered en bloc, ignoring the fact that the predictive value of a given symptom will vary during different periods before diagnosis. Said differently, most current studies are dominated by 'picture' as opposed to 'video' evidence, resulting in undesirable loss of valuable information that, if it were available, could better support clinical decision-making, as shown in the present and other studies.[1,5,6]

With some notable exceptions including the present study,[1,7] most evidence thus far does not report negative predictive values or negative likelihood ratios, focusing on positive values/ratios alone. It will be reasonable to suggest that all future studies should aim to report both positive and negative predictive values and likelihood ratios. Such considerations could also inform future revisions of clinical practice guidelines, particularly when presenting symptoms and findings of investigations are considered in combination.[4]

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The timeliness of current evidence on the prognostic value of symptoms is a concern, as it mostly relates to patients who were diagnosed with cancer before 2010. Evidence from these historical cohorts may over-estimate the current predictive values of symptoms as public health awareness campaigns (such as Be Clear on Cancer) are thought to have altered the mix and severity of presenting symptoms and associated levels of cancer risk in patients who seek help for new symptoms. Time trends in symptom coding in primary care and improvements in record completeness are two additional factors that make attempts to replicate (if not update) previous evidence in current cohorts desirable.

Current evidence mostly examines the prognostic value of specific symptoms, often ignoring the value of much other information captured in electronic patient records. As highlighted by Koshiaris and colleagues and other research, this may include the number and pattern of primary or secondary care consultations, the use of primary or secondary care investigations and the use of prescribed medications during different pre-diagnosis periods.[1,5,8] However, while all patients will have presenting symptoms, not everyone will have been investigated or prescribed medication, a potential limitation that needs to be born in mind.[1] Moreover, with few exceptions,[9,10] the available evidence is concentrated on the predictive value of symptoms for cancer ignoring their predictive value for consequential non-neoplastic disease. A perhaps far greater limitation is that most available evidence does not encompass chronic morbidity status, although emerging evidence indicates that specific morbidities variably moderate diagnostic timeliness in patients subsequently diagnosed with cancer.[11] Lastly, there is currently little empirical appreciation of the disease stage (of cancer) associated with different symptomatic presentations.

FUTURE DIRECTIONS

All the above considerations indicate that while our understanding of risk levels for cancer among patients presenting to primary care has been radically improved during the past 15 years, the job is far from over. Research efforts are needed to overcome the described limitation of the current evidence.

There are also critical policy and implementation questions. Enabling

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information governance arrangements for using anonymous primary care data in population health research are paramount, if more evidence of direct patient benefit is to be produced in the coming years. This includes the conduct of validation studies, which may require ethically-assured access to free-text information included in electronic health records. Reliably using the evidence base about the predictive value of symptoms and other pre-diagnostic events during a primary care consultation is not straightforward, and evidence from qualitative studies and randomised controlled trials of decision-support tools are both needed and sparse.[12,13] Important improvements in diagnostic timeliness can be obtained by automated regular identification in patients with abnormal investigation findings that are not being acted upon.[14] Active communication and engagement with and/or by patients during the consultation is another critical but under-studied aspect of the diagnostic process.[15] The same can be said about appropriate help-seeking. One-third of all patients with cancer who are diagnosed as emergencies have not previously seen their GP, and while in some instances this may reflect tumours without appreciable prodromal symptoms, in others it may reflect psychosocial barriers to timely help-seeking.[16]

CONCLUSION

The study by Koshiaris and colleagues is a worthy addition to the expanding evidence base that quantifies the risk of cancer in patients who present to primary care. In spite of the transformational progress in our understanding of the predictive value of symptoms during the past 15 years, there is a need to amplify the current evidence. This can be achieved by examining symptomatic presentations and related pre-diagnostic events in combination in contemporary patient cohorts, taking into account the evolving natural history of cancer and other disease processes, and the patients' comorbidity status. Nonetheless, although more diagnostic research based on electronic health records could enable further substantial gains in improving diagnostic quality and safety in primary care, it is unlikely to obviate the need for innovative and disruptive point-of-care diagnostic technologies.

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