Knowledge is power: harnessing clinical database for better informed laboratory medicine practice

There is a saying in the research community that if the world stops performing any laboratory-based research, it will still have enough data to be analysed over the next 5 years. The anecdote underscores two important issues that are at the heart of modern day research and is also applicable to laboratory medicine.

First is the speed and volume of data accumulation secondary to availability of high resolution and throughput laboratory methods. The use of electronic ordering system, laboratory automation and laboratory information systems have contributed to a wealth of healthcare information being generated and stored in laboratory databases. The laboratory database is a gold mine waiting to be exploited. Some examples of using laboratory database including deriving reference intervals and biological variation data for the pediatric population (1-3), which would be otherwise difficult to obtain using the conventional approach due to operational, resource and ethical considerations.

Moreover, the advent of next-generation electronic medical record system (EMRS), which promises to bring together all previously silo clinical databases, have provided laboratory practitioners with unprecedented access to clinical details that can allow interesting clinical questions to be answered (4). The ability to draw data from the clinical diagnosis, clinical notes, medication record, radiology report and laboratory results can allow laboratory practitioners to verify the clinical performance of their laboratory tests and reference values, examine the clinical utility of laboratory requests and performed outcome-based study of laboratory tests. Moreover, access to cost data also allows the laboratory to examine the impact of the tests on the overall healthcare cost and device cost-effective diagnostic strategies for patients. All these activities help laboratory medicine add value to the healthcare system (5).

Secondly, the large volume and complexity of clinical databases require equally sophisticated analytical skills to fully realise their potential. Indeed, the general lack of appropriate statistical and computational skills is a major hurdle to generating high quality data and evidence from the clinical databases to inform better laboratory medicine practice. This may be overcome by strong collaboration with our clinical colleagues (to better understand clinical context), data scientists and biostatisticians. The use of machine learning and artificial intelligence has the potential to transform the way laboratory medicine uses clinical database. Nevertheless, if care is not exercised, inappropriate conclusions can be easily drawn from erroneous application statistical or computational analysis. Some considerations in this area include standardisation of clinical database, minimum quality standards and appropriate clinical validation of the analysis—the cornerstones that define laboratory medicine.

With the above in mind, we are introducing a column devoted to the advancement and discussion of the use of clinical databases in laboratory medicine research. It is hoped that through this forum, skills can be shared and ideas can be refined to move this exciting area into practice. We look forward to developing a lively community with you.

Acknowledgments

Funding: None.

Footnote

Provenance and Peer Review: This article was commissioned by the editorial office, *Journal of Laboratory and Precision Medicine* for the series "Clinical Database in Laboratory Medicine Research Column". The article did not undergo external peer review.

Conflicts of Interest: The author has completed the ICMJE uniform disclosure form (available at http://dx.doi.org/10.21037/jlpm.2017.07.05). The series "Clinical Database in Laboratory Medicine Research Column" was commissioned by the editorial office without any funding or sponsorship. Tze Ping Loh served as Guest Editor of the series and serves as an unpaid

editorial board member of *Journal of Laboratory and Precision Medicine* from February 2017 to January 2019. The author has no other conflicts of interest to declare.

Ethical Statement: The author is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Received: 21 June 2017; Accepted: 16 July 2017; Published: 18 July 2017.
doi: 10.21037/jlpm.2017.07.05
View this article at: http://dx.doi.org/10.21037/jlpm.2017.07.05

doi: 10.21037/jlpm.2017.07.05
Cite this article as: Loh TP. Knowledge is power: harnessing clinical database for better informed laboratory medicine practice. J Lab Precis Med 2017;2:44.

