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MICROBIOLOGY

Choosing wisely in infectious serology: the merits of triaging send-away tests

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Summary

Over-utilisation of pathology requests can incur unnecessary costs and be detrimental to patient care. The choosing wisely campaign has helped to reduce the use of tests with limited or no value. This report describes the estimated benefits and costs of implementing a triage process of infectious serology requests in a single mixed hospital and community laboratory.

Data analysis of triaging of send away infectious serology was conducted from 1 November 2016 to 31 October 2017. A total of 618 tests were triaged over a 1-year period. Of these 379 (61.3%) were declined. The total gross savings was $45,066. The total cost for implementing this change was estimated to be $4220 per year. The total saving was $40,846.37. There was significant cost saving secondary to this intervention, with other more difficult to measure tangible benefits including fostering communication between laboratory staff and clinicians.

Key words: Choosing wisely; triage; send away infectious serology; cost saving.

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INTRODUCTION

Laboratory testing is the single largest volume health care activity. Over 4 billion tests are performed each year in the US alone.[1] Moreover, growth in request numbers outstrips the already staggering increase in other medical areas.[2] Outside of avoidable costs, over-utilisation can have significant negative consequences ranging from unnecessary blood draws to further downstream expenditure on unwarranted patient concerns, investigations and treatment.[3] There is large inter-requester variation in the utilisation of testing which may only be partly explained by different population epidemiology and disease states: the requestor's level of experience and training and patient need for reassurance also influence test requests.[2] However, a culture of intolerance of uncertainty has been implicated as a key driver for over-utilisation.[4] Choosing wisely campaigns have been instigated worldwide to reduce the use of tests with limited or no value.[5,6] We believe there is an opportunity for collaboration between the physician and laboratory staff to improve patient care before the test is performed, if not before being requested.

Specifically, there is an opportunity to contain costs and improve patient care by triaging of high-cost and low-value tests.[2] The aim of this report is to describe the estimated benefits and costs of implementing a triage process of infectious serology requests in a single mixed hospital and community laboratory, Wellington Southern Community Laboratories. We targeted low volume, send-away tests, as these lend themselves to individual request triage. The purpose of the program was to improve patient care through a combination of reducing unnecessary tests and provision of requestor support.

METHODS

The laboratory research governance group determined that formal ethical review was not required as this was undertaken as a quality improvement audit of routinely collected laboratory data.

Wellington Southern Community Laboratories (Wellington SCL) is the sole provider for community and hospital laboratory services for the Capital and Coast, Hutt Valley and Wairarapa District Health Boards. The population served is approximately 500,000. It is a moderate sized laboratory, processing 13,900 infectious serology samples per month.

Send-away tests are infectious serology tests that are performed outside of the main laboratory (see Table 1). A triaging strategy of 'assess, with a decline and hold' was introduced from the 1 November 2016, with prospective collection of data. Requests were assessed by a microbiology registrar for supporting information. Tests requests were declined if there were insufficient clinical details or insufficient clinical justification supplied for testing or if disease aetiology was identified by an alternative reported result (see Table 2). This was predominantly performed by a single microbiology registrar with close consultant support. An in-house algorithm was instigated to ensure consistency.

Analysis was conducted on collected data from 1 November 2016 to 31 October 2017. Data were extracted from the triaging log collected as part of routine activity by a senior scientist on all specialist infectious serology requests meeting the triage requirements. Available data included order number, test request, clinical details and triaging pathologist and request response. A comment offering an explanation of the reason for the decline and a direct contact number was included with the report for all declined requests. The samples declined were stored for a period of 4 months.

Cost savings were calculated as per the reported item test fee.[7] Time spent per triaging session was measured over a 2-week period, from 9 to 22 October 2017 and this measurement was used to calculate the total time spent for the audit period. Salary costs were calculated as per year 6 urban scale category F registrar working 40 hours per week.[8] The scientist cost was calculated as per merit 4 on the scientist scale.[9] The initial salary costs of developing the triage process were not included, and would have been more expensive because a senior clinical microbiologist performed the triage.

RESULTS

A total of 618 tests were triaged over a 1-year period. Of these 379 (61.3%) were declined and 239 (38.7%) were approved. One *Bartonella* and six parvovirus requests that

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Table 1 Test request, volume, percentage declined, clinical indication for decision and laboratory savings

Serology test	Request	Declined (%)	Key reason	Estimated savings[a] ($NZ)
Arbovirus[b]	120	82 (68.3%)	In the setting of normal platelets, result is unlikely to influence clinical management[13]	21,027
B. pertussis	8	8 (100%)	No serological cut-off to indicate immunity.[14] PCR recommended for acutely unwell cases[11]	493
Bartonella	40	24 (60%)	Insufficient clinical details	2,712
Brucella	10	7 (70%)	Travel history required as not endemic in NZ.[15] Serology unreliable	210
Cytomegalovirus avidity	2	2 (100%)	Not recommended because of alternative diagnostic approaches	260
Chlamydophila	10	8 (80%)	Serology unreliable, PCR recommended for acutely unwell cases	565
Hepatitis delta	12	8 (66.7%)	No serological evidence of hepatitis B infection[16]	113
Hepatitis E	12	8 (66.7%)	Insufficient clinical details	1,144
Legionella	82	65 (79.3%)	PCR recommended for acutely unwell cases[12]	4,336
Leptospira	66	31 (47%)	No supporting history such as animal or water contact[17]	876
Lyme	42	35 (83.3%)	No history of travel to endemic region, tick bite, rash with clinically compatible symptoms[18]	4,221
Parvovirus B19	157	74 (47.1%)	Insufficient clinical justification (e.g., non-pregnant patient or clinically inconsistent syndrome)[19]	4,474
Ross river	3	3 (100%)	No travel history (not endemic in NZ)[20]	102
Yersinia antibodies	9	9 (100%)	Serology unreliable	685
Zika testing	45	15 (33.3%)	Clinically well non-pregnant patient.[21] Strict criteria around funded tests only available for symptomatic patients	3,846
Total	618	379 (61.3%)		$45,066

NZ, New Zealand.
[a] Rounded to the nearest dollar.
[b] The majority of these requests were for dengue.

Table 2 Reasons to decline and hold

Reasons to decline and hold
• Insufficient clinical details • Incompatible clinical syndrome or travel history • Alternative diagnosis evident from available results • Result unlikely to alter management • More appropriate testing modality available • Result cannot be used to infer immunity

were initially triaged as decline and hold were subsequently sent following discussion with requestor. The total gross savings was $45,066.

The time cost for triaging, including phone calls to and from requestors, for the microbiology registrar was rounded up to 40 minutes per week. There was an average of 2.1 calls per week, equivalent to rate of approximately one call for every 3.7 tests declined. This equates to 35 hours per year. The cost in registrar time was $1,745. The time for the scientist per week was measured and rounded up to 75 minutes per week. The time per sample for the scientist was approximately 6 min 20 seconds. This equated to 65 hours per year. The cost in scientist time was calculated to be $2,475. The total cost was $4,220 per year. The total saving was $40,846.37.

DISCUSSION

Choosing Wisely balances maximising testing utility against minimising patient harm through inappropriate testing and containing ever expanding pathology costs. We adopted an 'assess, decline and hold' triaging policy with the assessment of impact over a 1-year period. Although there were significant savings made, it is expected that the savings quoted in absolute numbers are underestimated as it is likely that requestor behaviour changed in response to the intervention and associated education. This will have reduced the number of tests requested and the measured quantity saved. The triaging decisions were based on passing simple barriers such as the introduction of the requirement for a suitable travel history for requests for non-endemic pathogens (e.g., arboviruses, *Brucella* and Lyme disease[10]). Other infections required details of a clinically compatible syndrome. Triaging also granted the opportunity to update requestors on the other available and preferred tests. For certain clinical conditions, serology is being replaced by nucleic acid amplification techniques. For *Bordetella pertussis* there are questions about the utility of serology testing, especially in a vaccinated cohort.[11] Similar to *Legionella*, testing is migrating to nucleic acid amplification testing.[12]

Serology triaging for a wide range of samples occurs in Wellington Southern Community Laboratories. This includes triaging acute serology requests for diseases of public health significance, such as vaccine preventable illnesses, infrequent requests and samples sent to other laboratories for processing. This report only details the impact of triaging on send-away requests. Triaging of other requests is likely to have a lower financial impact but is expected to have a significant impact on patient care. It is granted that send-away and low volume tests are easier targets for Choosing Wisely. More robust and potentially automated processes are required to reduce other high volume inappropriate requests.

Furthermore, the daily triage as part of the routine bench round has helped foster stronger links within the laboratory between pathologists and laboratory scientist and technicians. Although not directly measured, it is expected that patient management will have improved through targeted comments and direct contact with requestors. In some cases, the requestor was guided towards more appropriate but more expensive diagnostic tests such as *Legionella* and *B. pertussis* nucleic acid amplification tests which would reduce savings.

The cost of this intervention depends mainly on the salaries of those performing the triage. The costings in this report

were based on senior staff and are likely overestimated for most institutions that may wish to emulate this approach. There are potential risks when adopting this approach. It imposes a barrier to requests and may delay appropriate testing. The risks of delay have less impact on send-away tests which can take many days for the results to return. The provision of a direct dial contact number has been useful as it often generates a telephone discussion with the requestor, improving diagnostic workup and clinical management. It was not possible to quantify this in the audit. However, anecdotal reports from requestors of the inconvenience of a declined request was minimised by providing a direct contact number. A generic laboratory number that does not directly connect to the registrar or clinical microbiologist often causes frustration and potential patient harm.

Although Choosing Wisely is beneficial, maintaining a good relationship with requestors is also important. It is acknowledged that declining certain requests, including dengue serology, can be potentially contentious, especially as a positive result may stop further investigation and guide future travel advice to endemic areas. The approach outlined at the introduction of this intervention was to provide minimal subsequent barrier if contacted by a clinician. This intervention was surprisingly well received by requestors and only a small number of the declined samples were subsequently sent. This acceptance may partly reflect the open discussion approach and easy access to the triaging team. The low number may be in part explained by a change in requestor behaviour. This is supported by the observation that the amount of clinical details per request increased significantly from the time of introduction of the intervention.

Finally, it is vital that a consistent approach is maintained between staff change overs as ordering may return to pre-intervention behaviour.[2] The provision of an algorithm and internal triaging record with pre-approved comments will minimise the variation between staff members, and lead to consistent and appropriate serology testing.

CONCLUSION

The adoption of a decline and hold policy maximised testing utility while helping to contain costs through a supported Choosing Wisely approach.

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