An Audit of the Beta D Glucan Test

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Background

- Beta-D-glucan (BDG) is a panfungal marker which can be a useful tool in the diagnosis of invasive fungal disease.
- Overall, the BDG test sensitivity is 75 to 83% and specificity is 63 to 87%(1).
- The assay was introduced to the Mater Misericordiae University Hospital (MMUH) in 2021 as an inhouse test.
- The aim of this audit was to evaluate the appropriateness of BDG test use by the department of Infectious diseases (ID) in the MMUH and to assess the impact on antifungal stewardship.

Methods

- All BDG tests taken on patients in the MMUH between January 2021 and December 2021 were examined via retrospective analysis of patient digital records (patient centre).
- Information gathered included:
  - Indications for testing,
  - Risk factors for fungal infection,
  - Sepsis at time of test,
  - Tests ordered by the ID team for their own patient or for a patient they consulted on,
  - Person ordering tests,
  - Alternative microbiology samples sent,
  - Fungal infection confirmed,
  - Antimicrobial stewardship guidelines considered and rationalisation of therapy.
- The test indications were further reviewed to determine if the tests were appropriate and antimicrobial stewardship guidelines were considered.
- The standard our practice was measured by included: "*European Confederation of Medical Mycology and the European Respiratory Society Joint Clinical Guidelines*" and "*Clinical Practice Guideline for the Management of Candidiasis: 2016, Infectious Disease Society of America.*"

Indications for testing were categorised as follows:

1) Investigation of sepsis in ICU,
2) Follow up for known fungal infection,
3) Investigation of intraabdominal infections,
4) Query PCP,
5) Investigation of probable invasive pulmonary fungal infection,
6) PUO/investigation of fever,
7) Malignant otitis externa,
8) Inappropriate

Patients in category 1 were managed in conjunction with the ICU and clinical microbiology teams.

Categories 1, 2 and 3 were supported by the guidelines to be appropriate clinical indications for the use of BDG testing and we considered category 4 and 5 to be appropriate also.

Results

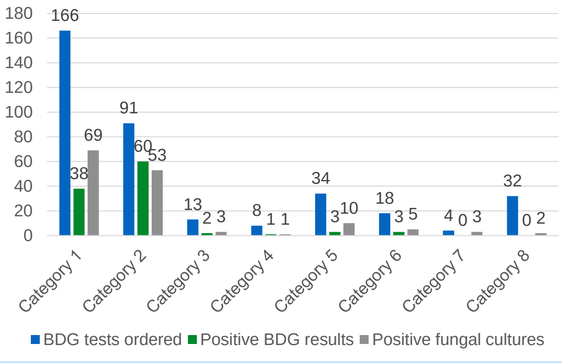
- Total number of BDG samples 760 ordered from a total number of patients 412.
- Total number of positive samples 180 with a proportion of 24% positive test results overall.
- 353 BDG tests were under the guidance of the ID team – 182 were ordered under the direct care of the ID team and 171 were ordered when the ID team consulted on a patient for another medical team.
- Total number of patients seen by the Infectious Disease team who had tests sent was 174 (by Infectious Disease team 79 and Infectious Disease involved 95).
- The proportion of tests sent by the Infectious Disease team which were positive was 30%.

The number of BDG tests ordered by ID, positive BDG results and positive fungal cultures for each category are compared as shown in Table 1 and Figure 1.

Table 1

Test Indication	Positive results (%)	No of beta D glucan tests with confirmed fungal cultures
Investigation of sepsis in ICU	38/166 (23%)	69
Follow up for known fungal infection	60/91 (67%)	53
Investigation for intraabdominal infections	2/13(15%)	3
Query PCP	1/8 (12.5%)	1
investigation of probable invasive pulmonary fungal infection	3/34(9%)	10
PUO/investigation of fever	3/18 (16.7%)	5
Malignant otitis externa	0/4 (0%)	3
Inappropriate	0/32 (0%)	2

Figure 1



Conclusion

- 46% (353/760) of BDG tests conducted in 2021 were under the guidance of the ID Department. Half of the BDG tests are being ordered by or with the guidance of an appropriate medical speciality.
- 95% (336/353) of BDG tests ordered by the ID Department were for appropriate clinical indications. This audit shows that BDG tests were being utilised with intentional evidence base practice within appropriate clinical scenarios.
- BDG testing for inappropriate indications could be reduced or prevented with conscious reference to the guidelines. This in turn would be more cost effective by eliminating unnecessary costly testing.
- There were many positive BDG tests outside of ICU shown in this audit. This demonstrates that the clinical indications for BDG testing outside of ICU were also appropriately upheld by the guidelines.

References:

1. He S, Hang JP, Zhang L, Wang F, Zhang DC, Gong FH. 2015. A systematic review and meta-analysis of diagnostic accuracy of serum 1,3-beta-D-glucan for invasive fungal infection: focus on cutoff levels. *J Microbiol Immunol Infect* 48:351–361.