

# Introduction and Evaluation of Beta D-Glucan Testing in the Mater Misericordiae Hospital

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## Background and Implementation

- Beta D-Glucan (BDG) testing has been introduced to MMUH following HSE Spark funding being awarded for the purchase of equipment.
- BDG is a serological test used in the diagnosis of fungal infections. Its use is evidence based, improves patient care by speeding up fungal diagnosis<sup>1-4</sup> and can be an antimicrobial stewardship (AMS) tool.
- While a positive test is useful to diagnose a fungal infection, another benefit is the high negative predictive value, meaning a negative test can out-rule a fungal cause of sepsis in an unwell patient.
- BDG testing was previously available as an external laboratory reference test and available to all clinicians with an average turn-around time (TAT) of 109 days.
- Data was collected on 259 BDG tests undertaken in-house from February to September 2020.

## Funding and Cost Saving

- Spark funding covered €12,500 of the equipment purchase, with the MMUH paying the remainder of €2,743. Previously BDG was available as an external referral test. To process these 259 tests externally would have cost €26,677 but instead they were processed in-house for €10,007.76.
- The saving to MMUH by processing in-house was €16,669.24, or €13,926.24 deducting outlay for equipment (table 1).
- In addition to this, there was a saving of at least €81,064 in antifungal therapy directly attributable to the AMS impact of a negative BDG. Other savings in antifungal therapy were likely by avoiding empiric antifungals but difficult to estimate.

Table 1: Cost of testing

| Costs per test             | Cost External for 259 tests | Cost In-House for 259 tests |
|----------------------------|-----------------------------|-----------------------------|
| Reagents per test (€38.64) |                             | €10,007.76                  |
| Assay cost (€75)           | €19,425                     |                             |
| Carriage (€28)             | €7,252                      |                             |
| <b>Total</b>               | <b>€26,677</b>              | <b>€10,007.76</b>           |
| <b>Saving</b>              |                             | <b>€16,669.24</b>           |

| Results               |   |            |
|-----------------------|---|------------|
| BDG RESULT            | INTERPRETATION  | #          |
| POSITIVE              | Contributed to early diagnosis of fungal infection                                    | 25         |
|                       | Repeat tests following response to antifungal therapy                                 | 61         |
|                       | False positive  | 1          |
|                       | Patient died before result available  | 1          |
|                       | <b>Total positive</b>   |            |
| NEGATIVE              | Antifungal stopped or not prescribed based on result – direct saving apparent         | 32         |
|                       | Antifungal avoided as part of out-ruling fungal infection from differential diagnosis | 87         |
|                       | Negative result did not result in de-escalation of antifungal                         | 21         |
|                       | Patient died before result could be actioned  | 3          |
|                       | Repeat tests for screening or follow up   | 26         |
|                       | False negative  | 2          |
| <b>Total negative</b> |   | <b>171</b> |
| <b>Overall Total</b>  |   | <b>259</b> |

### Expected outcomes:

#### a. Improve diagnosis or out-ruling of fungal disease for patients

✓ **Achieved:**

**Sensitivity 92.9%**

**Specificity 99.3%**

**Positive Predictive Value 96.3%**

**Negative Predictive Value 98.6%**

#### b. Improve turn around time from current 109 days to less than 3 days

✓ **Achieved:**

**TAT now average 1 day, range <1-7 days with only 21 of 259 results taking >2 days**

#### c. Reduce unnecessary antifungal use

✓ **Achieved:**

**€81,064 saved as a direct result of BDG**

## Results and Conclusions

- 1. BDG contributes to confirming the diagnosis of fungal infection:**
  - 25 patients had a positive BDG result which contributed to early diagnosis and treatment of a fungal infection. Early diagnosis and treatment of fungal infections can reduce morbidity and mortality.
- 2. BDG contributes to out-ruling fungal infections and rationalising therapy therefore is a valuable AMS tool:**
  - 32 patients had anti-fungal therapy rationalised based on a negative BDG result leading to a direct cost saving of €81,064.
  - 87 results contributed to a patient not being prescribed an empiric antifungal. This protected these patients from any potential adverse events that may have occurred. While there would be a cost-saving attributable to this, it is difficult to quantify.
- 3. With Spark funding for equipment, we were able to process the tests in-house for €16,669.24 cheaper than sending externally. TAT for results improved from an average of 109 days to 1 day. Repatriation of BDG long term is cheaper for the laboratory as well as providing an improved service.**
  - ✓ **In conclusion, the introduction of BDG testing into MMUH has been a successful initiative that both improves patient care as well as being a financially worthwhile endeavor.**

### References:

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