

Summary Report: Review of NHSGG&C paediatric haemato-oncology data (October 2019)

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About this release

This is a summary report of the review of NHSGG&C paediatric haemato-oncology data undertaken by Health Protection Scotland.

Introduction

In October 2019, NHS Greater Glasgow and Clyde (NHSGG&C) requested that Health Protection Scotland (HPS) provide independent expert support to review the data being used to inform their risk assessment and decision making in relation to wards 6A and 4B at Queen Elizabeth University Hospital (QEUH) and Royal Hospital for Children (RHC). The purpose of this report is to provide a summary of the work undertaken, the findings and the recommendations.

Background

Yorkhill Hospital (YH) relocated into the newly built RHC in June 2015. To allow refurbishment works to be carried out in RHC wards 2A/2B, patients were transferred to wards 6A and 4B at QEUH in September 2018. Admissions to ward 6A have been restricted since 1st August 2019 because of a suspected increase in bloodstream infections. NHSGG&C set up an Incident Management Team (IMT) to investigate the situation. As part of these investigations, HPS were asked to undertake an independent, expert, epidemiological review of NHSGG&C datasets to make an assessment as to whether numbers of positive blood samples were higher than expected.

The objectives of this review were agreed as:

1. To describe the differences in the datasets being used by GG&C to investigate cases of bacteraemia in patients cared for in paediatric haemato-oncology wards in NHSGG&C.
2. To review the environmental Gram-negative blood cultures in the paediatric haemato-oncology population.
3. To identify whether there is a change in the type of reported environmental Gram-negative blood cultures in the paediatric haemato-oncology population.

Methods

Case identification

Blood samples were included in the investigation if the patients had been cared for in the paediatric haematology oncology (child cancer) specialty in NHSGG&C. Cancer and certain treatments increase the risk of developing infections, meaning some infections cannot be avoided

in this high-risk population. Data prior to the move from Yorkhill until September 2019 were reviewed to make an assessment as to whether numbers of positive blood samples were higher than expected since the move to 6A/4B.

Dataset selection

Four datasets were considered by the review. Three were provided by NHSGG&C and one by HPS.

- NHSGG&C Central Line Associated Bloodstream Infection (CLABSI) surveillance data
- NHSGG&C Enhanced Communication of Surveillance in Scotland (ECOSS) local extract
- NHSGG&C microbiology laboratory information management system (LIMS) surveillance data
- HPS ECOSS national extract

Grouping of positive blood samples

The positive blood samples reported were from a wide range of different bacteria and with some samples reported having more than one type of bacteria. To take account of samples with more than one type of bacteria the samples were considered in four broad groups. As these groups can overlap some types of bacteria may be included in more than one group. The four groups were as follows:

- Gram-positive bacteria
- Gram-negative bacteria
- Environmental bacteria
- Environmental bacteria including enteric bacteria (bacteria that may be found in the gut)

Patients who had multiple positive blood samples with the same group of bacteria and within the same 14-day period were counted only once (in line with national case definitions), since the positive tests were assumed to be related to the same episode.

Incidence rates and charts

Examining trends in the rates of positive blood samples is an appropriate method of identifying periods of time where rates are higher or lower than the range expected simply by random variation. However, they depend on having a stable period to establish an expected baseline level. The analysis took into account the number of patients in a unit by calculating rates in relation to total occupied bed-days (TOBDs). Statistical analyses were performed to examine any unexpected level of positive blood samples. A benchmarking comparison was undertaken with two other paediatric hospitals in Scotland.

Verification of analysis

The data were independently analysed by HPS and then peer reviewed by a Professor of Public Health Epidemiology in order to verify the results.

Results

1. Dataset differences

CLABSI data were of good quality, however, due to only including central line associated samples the data were considered to be too restrictive for complete monitoring. When comparing the other two NHSGG&C data sets, they were found to be broadly consistent with the data held nationally.

2. Types of positive blood samples

HPS (ECOSS) data were used to count positive blood samples among paediatric haemato-oncology patients under 18 years of age between July 2013 and September 2019. Based on the four broad groups described above, there were 176 samples in the Gram-negative bacteria group, 390 in the Gram-positive bacteria group, 70 in the environmental bacteria group and 132 in the group made up of environmental including enteric bacteria.

Rates of positive blood samples due to Gram-positive bacteria did not significantly increase following the move to RHC. However, there were significant increases in rates in some months, including January 2016, January 2017, April 2017 and June 2017, and levels above the trigger point (requiring further investigation) in some other months. There have been no data points above the trigger point since December 2017.

For the Gram-negative group there was an upward shift in rates between March and December 2017, identified by a run of 10 months with rates above the average (mean). This occurred after the opening of RHC but before the move to wards 6A/4B at QEUH. There have been three months above the trigger point since the move to RHC, most recently in September 2019. For the environmental group of bacteria, the trigger point was crossed for one month in June 2018.

For the environmental including enteric group of bacteria, the trigger point was crossed in two months; March 2018 and March 2019.

When comparing the overall RHC rate with the combined rate of the two largest paediatric hospitals, the rate (June 2015 to September 2019) was higher in RHC for environmental including enteric group but lower for Gram-positive group. There was no difference in Gram-negative group or environmental group.

The same comparison was also made using data following the move to ward 6A/4B QEUH, October 2018 to September 2019 and there was no difference in Gram-negative group, environmental including enteric group or environmental group however the rate was lower for the Gram positive group. The numbers were small and interpretation of this data should be made with caution.

3. Change in organism type

Analysis also showed some changes in the types of bacteria found within positive blood samples over time, however the number in each group are small. Therefore, the significance of this is not fully understood and should be part of the ongoing monitoring.

Limitations of analysis

The HPS (ECOSS) results may include interim results, contaminants or positive results which may not be true blood samples. Information about the location of samples may be incorrect and therefore some cases may have been missed. Data on Gram-negative bacteria may be incomplete for September 2019. Some of the bacteria included in this analysis are normally present in some humans, making it difficult to conclude that they were definitely the cause of an infection.

Conclusions

1. The review compared different sources of data on positive blood samples among children being treated for cancer in NHS GG&C. The results suggest that the datasets provided by NHS GG&C are broadly consistent with the data held nationally by HPS and therefore are suitable for ongoing monitoring.
2. The statistical analysis highlighted months in which rates of positive blood samples were higher than would be expected. The purpose of these analyses is to prompt further investigation and to ensure that any appropriate action is taken.
3. Analysis of different types of bacteria showed some changes, however the number in each group are small. Therefore, the significance of this is not fully understood and should be part of the ongoing monitoring.

In conclusion, the analyses presented in this report do not provide evidence of a single point of exposure causing bloodstream infections. They also suggest that measures to restrict clinical services for newly diagnosed patients should now be reconsidered. However, they also underline the need to continually monitor risk in this patient population.

Recommendations

The following recommendations should be considered:

- NHS GG&C should systematically collect clinical data on cases to describe risk in this patient population and ensure ongoing monitoring is in place.
- NHS GG&C should further characterise cases in terms of “person” and “place” to support identification of when there are more cases than normally expected.
- NHS GG&C should consider the epidemiological characterisation of cases in the context of environmental risks and incidents e.g. water testing results, ventilation testing results.
- NHS GG&C should consider the data provided in the context of the findings from the action plan
- NHS GG&C should consider current control measures around restriction on services for newly diagnosed patients as there is no evidence from the HPS review of the data to support the continued restriction of services.
- HPS will review the categorisation of environmental organisms following the literature reviews for Chapter 4 of the [National Infection Prevention and Control Manual](#).
- HPS will further support the development of an appropriate trigger for ongoing monitoring.
- HPS should consider these findings when developing methods to support other boards in monitoring infection risk associated with environmental organisms.

Contact

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Further Information

For more information please see the [full report](#). For related topics, please see the [HPS](#) pages.