Improving Efficacy of Hydroxycarbamide Prescriptions in Paediatric Sickle Cell Disease

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INTRODUCTION

- Hydroxycarbamide is a cytotoxic agent that blocks the ribonucleotide reductase system resulting in inhibition of DNA synthesis. By stimulating fetal haemoglobin (HbF) synthesis, hydroxycarbamide leads to reduction of HbS concentration which in turn reduces HbS polymerisation.
- Hydroxycarbamide is recommended for prevention of vaso-occlusive disease. Its use in children with sickle cell anaemia is on the increase.
- Close monitoring and careful dose titration is required, as overdosing can lead to myelosuppression. Underdosing would lead to missed opportunity to optimise medication efficacy in reducing further sickling.

AIMS

- Our QI project was to introduce a reliable, sustainable method of monitoring blood results to facilitate decision-making by the paediatric consultant with haematology expertise with regards to hydroxycarbamide dose adjustment.

METHODS

- This is a retrospective cohort study which included all paediatric sickle-cell patients on the paediatric department register from 1 January 2018 until 1 March 2019.
- Data of patient demographics, medication, formulations, and dates of dose adjustments of hydroxycarbamide were retrospectively collected by the paediatric pharmacist.
- Data of blood testing in terms of dates were collected by the paediatric registrar from the hospital's pathology results electronic system.
- Blood tests performed during acute admissions were excluded as those results were not intended as part of the hydroxycarbamide-surveillance programme.
- Results were consolidated and analysed using Excel.

FIGURE 1:

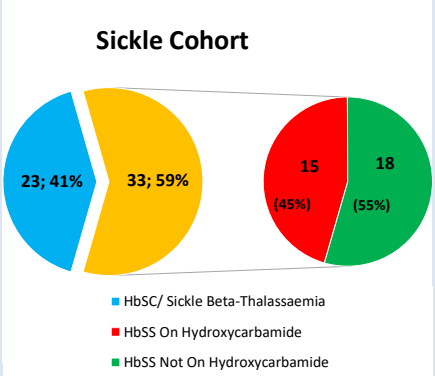
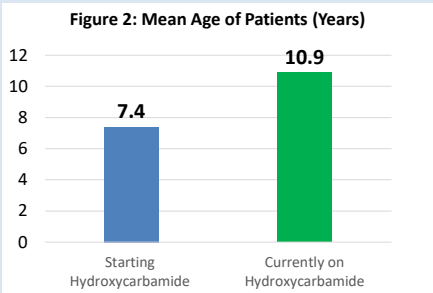


FIGURE 2:



CONCLUSIONS

- In conclusion, this new prescribing chart had improved patient safety via a well-regulated, double-gated surveillance system (pharmacist-clinician).
- Improved patient monitoring had maximised the drug efficacy and enhanced quality of life of these children with reduced hospital presentation from painful crisis.

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RESULTS

- Out of a total of 56 sickle-cell patients, 33 (59%) had HbSS disease.
- 15 (45%) of HbSS patients were on hydroxycarbamide (Figure 1). Of the 18 HbSS not on hydroxycarbamide, 3 started hydroxycarbamide in 2019 and hence were excluded, 8 were considering commencing hydroxycarbamide, 5 were receiving regular blood transfusions, and 2 were less than 1 year old.
- 8 hydroxycarbamide patients were male (53.3%), while 7 were female (46.7%).
- Mean age of sickle cell patients on hydroxycarbamide at 1 March 2019 was 10.9 years. Mean age of patients when commenced on hydroxycarbamide was 7.4 years (Figure 2).
- Average hydroxycarbamide dose as of 1 March 2019 was 21mg/kg/d (median 17mg/kg/d).
- As a result of this QI project, there was an observable 75% increase in frequency of testing post-introduction of this new monitoring system from 4 times to 7 times per year. This is suggestive of better compliance to monitoring, allowing better dose optimisation. Prior to the new hydroxycarbamide prescribing chart, the frequency of outpatient monitoring had been less, possibly due to more difficulty keeping track of patients, previous test results and dose adjustments.
- 67% of hydroxycarbamide patients showed an increase in HbF% to >25% within 1 year of using the new prescription charts, indicating maximal haematological response and reduction of pain scores and hospital attendances.
- Our paediatric department's total patients on hydroxycarbamide increased by 27%, from 15 to 19 over the subsequent 18 months since the new prescription chart was introduced.
- This reflects improved quality of care for patients with sickle cell for the region. There have been no reported prescription errors since introduction of the new charts.