Rubrivigilance in diabetes
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Abstract
Anaemia and diabetes have a multifaceted relationship. Their co-existence contributes to each other's etiopathogenesis, natural history, clinical presentation and prognosis. Anaemia may occur in autoimmune disease that coexists with type 1 diabetes, in erythropoietin deficient and in erythropoietin hypo-responsive states. Iron deficiency, haemolytic and megaloblastic anaemia occur in diabetes through various mechanisms. Anaemia is associated with, and contributes to, worsening of both microvascular and macrovascular complications. Altered red blood cell physiology may influence results of glycated haemoglobin. While certain glucose-lowering drugs and antihypertensive drugs may cause iatrogenic anaemia, others help in improving blood health. This review synthesizes all these relationships, and their underlying mechanisms, in a simple, reader-friendly format. This information should help the diabetes care professional to practice due rubrivigilance, i.e. keep a high index of clinical suspicion for anaemia in diabetes care.

Keywords: Anaemia, Iron deficiency anaemia, Type 1 diabetes, Type 2 diabetes.

Diabetes and Anaemia
Both diabetes and anaemia are major contributors to global morbidity. Primary care physicians handle the major burden of both diseases. While there may be a casual association, these conditions have multiple relationships with each other, which is often not appreciated.1,2 The health care professional must be

Table 1: Definitions.

- **Vigilance:** the action/ state of keeping careful watch for possible danger or difficulties (noun)
- **Rubrivigilance:** the action of maintaining high index of clinical suspicion for occurrence or worsening of anaemia, and worsening of health status due to anaemia, during diabetes care (noun).
- **Vigilant:** keeping careful watch for possible danger or difficulties (adjective)
- **Rubrivigilant:** a health care professional who maintains a high index of clinical suspicion for anaemia and its impact on health and disease (adjective)

Table 2: Rubrivigilance in diabetes.

**Overview**
- Anaemia is common in
  - Diabetes (type 1, type 2)
  - Diabetic nephropathy
  - Poorly controlled diabetes
- Anaemia contributes to
  - Poor control of diabetes
  - Progression of macrovascular and microvascular complications

**Etiopathogenesis**
- Autoimmune disorders may coexist with type 1 diabetes and contribute to anaemia
  - Auto immune gastritis
  - Pernicious anaemia
  - Coeliac disease
  - Thyroiditis
- Abnormalities of erythropoietin (EPO) may contribute to anaemia through
  - EPO deficiency
  - Nephropathy
  - Chronic inflammation
  - Metformin intake
  - Testosterone deficiency
- EPO hypo responsiveness
  - EPO deficiency
  - EPO functional impairment
  - Glycation of EPO receptors
  - *EPO resistance
  - DPP4 (dipeptidyl peptidase) over activity
- Iron deficiency anaemia may be caused by
  - Reduced intake
  - Increased hepcidin
  - Impaired absorption
  - Blood loss
    - *Gastro intestinal bleed
    - *Haemodialysis procedures
    - *Transferring catabolism and loss
- Haemolytic anaemia may occur due to
  - G6PD (glucose 6 phosphate dehydrogenase) deficiency
    - *Activation of protein kinase A
    - *Phosphorylation of G6PD
- Thiamine responsive megaloblastic anaemia (Roger’s syndrome) is an autosomal recessive disorder caused by SLC19 A2 gene mutation
  - Early onset diabetes
  - Anaemia
  - deafness
- Iron overload increases the risk of diabetes due to
  - *Iron accumulation in pancreas,
  - *Iron accumulation in liver, muscle, adipose tissue (Bronze diabetes)
Rubrivigilance

Diseases of the blood, especially anaemia, are highly prevalent, similar to diabetes. It is to be expected, therefore, that both conditions will coexist. This makes it important for diabetes care providers to maintain a high index of clinical suspicion for anaemia. Apart from the simple chance of coexistence, however, anaemia and diabetes share deep-seated etiophysical and clinical correlations. The presence of anaemia impacts the diagnosis, course and outcome of diabetes in many ways, and diabetes care professionals must be aware of these while ample focus is laid on the role of vascular complications in diabetes, the equally significant impact of anaemia is often neglected. Through the framework of rubrivigilance, we hope to correct this (Table-1).

The Latin word 'ruber' means red, and in a medical context, is taken to signify blood. The word "Rubrivigilance" suggests that diabetes care professionals should remain sensitive to the impact of diseases of the blood on diagnosis and management of diabetes. A rubrivigilant health care professional is one who keeps this impact in mind, while screening, diagnosing, preventing and managing diabetes.

This communication summarizes the multifaceted relationship between anaemia/disorders of iron metabolism and diabetes mellitus, in the form of an
exhaustive table (Table-2). It includes all relevant information that a primary care physician should be aware of, and is based on detailed reviews of the topic.\textsuperscript{1,2}

**Summary**

The concept of rubrivigilance must be made an integral part of diabetes care. All diabetes care professionals must be made aware of the need to screen, diagnose, prevent and treat anaemia in diabetes, while using safe medication.

**References**
