

Smart technology used in haemodialysis

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Introduction

In 2015, smart software was integrated into the electronic database system in some clinics of a dialysis network. This application intends to improve the management of anaemia medication for haemodialysis patients.

Objectives

To optimise drug prescription to manage secondary anaemia in CKD 5 patients.

Methods

A multitude of patient data, including general data, monthly laboratory test results, comorbidities, type of dialysis access, were entered into the database system.

The anaemia management application analyses each patient's data, evaluates how to maintain haemoglobin and ferritin levels within the target range [haemoglobin (10-12) g/dl, ferritin (450-650) µg/l]. The application predicts and suggests the best erythropoietin-stimulating agent (ESA) / iron drug therapy including dosage and scheduling.

Physicians can either issue the prescription according to the software indication or based on their personal experience.

Results

With more than 80% of ESA and iron, the suggestions of the drug software were confirmed by the physician, the clinic achieved very good results in terms of haemoglobin level and drugs consumption. 74.4% of the patients were on target regarding haemoglobin values (10-12 mg/dl) in September 2015 and 88.6% in October 2016, respectively.

At the same time, ESA consumption decreased from 1.17µ/kg/month in September 2015 to 0.81µ/kg/month in October 2016.

In June 2017 after almost two years since the anemia model application was implemented in clinic, 84.6% of the patients maintain the target regarding the same haemoglobin values (10-12mg/dl). In addition, the average iron consumption (mg/kg/month), shows a slight decrease from 2.569195 in September 2015 to 2.469855 in October 2016 and to 2.227656 in June 2017.

Conclusion

The anaemia management application is a predictive model based on real patient data and physician experience. The integration of intelligent software into clinic processes can be a step ahead to maintain patient safety and improve patient outcomes while reducing costs. Advanced computational intelligence and predictive modelling programmes, learn from historical data being able to make predictions and suggestions about the future and can be used successfully as smart support tools. More than this, the "medical predictive analytics proved to have the potential to revolutionize the healthcare around the world"².

References

1. C. Barbieri, E. Bolzoni et al - „An international observational study suggests that artificial intelligence for clinical decision support optimizes anemia management in hemodialysis patients” ResearchGate - June 2016.
2. Dr. Linda A. Winters - Miner - „Seven ways predictive analytics can improve the healthcare” Elsevier - October 2014

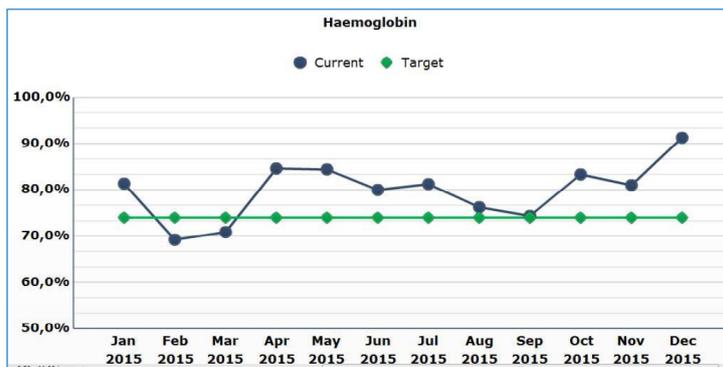


Figure 1: 2015, % off patient in target with Haemoglobin 10-12 mg/dl



Figure 2: 2016, % off patient in target with Haemoglobin 10-12 mg/dl

| Month | Average of ESA consumption per clinic [µg/kg/month] | Average of IRON consumption per clinic [mg/kg/month] |
|----------------|---|--|
| September 2015 | 1.177395 | 2.569195 |
| October 2016 | 0.818683 | 2.469855 |
| June 2017 | 0.960928 | 2.227656 |

Table I: Trend of ESA/IRON consumption