

An audit of pneumococcal vaccine uptake for patients with diabetes mellitus in a rural general practice

Abstract

The pneumococcal polysaccharide vaccine (PPV) was introduced for "at risk" groups in Ireland in 1996. It has been demonstrated that increased vaccination rates result in fewer hospital visits in those at risk groups, ultimately leading to a health benefit for the patient and also a cost benefit for the health service, in terms of reduced morbidity and therefore less demand for healthcare services.

An audit was carried out in October 2017 until January 2018 in a busy rural general practice catering for just over 2,000 patients. Data was collected to include the PPV23 administration status of patients in the practice with diabetes mellitus (DM). A text message was later sent to all patients with Diabetes Mellitus to remind those who had, (i) never received the vaccination, or (ii) received the vaccination when they were under 65 years of age and were due a booster, to attend for vaccination.

Introduction

Pneumococcal disease is a bacterial infection caused by *Streptococcus pneumoniae*, of which there are over 90 serotypes. *S.pneumoniae* can lead to significant morbidity and mortality and, in recent times, has become resistant to many antibiotics. Pneumococcal infection accounts for 50% of community-acquired pneumonia and bacteremia, which can have a mortality rate as high as 25%.⁽¹⁾ *S. pneumoniae* cause a variety of other infections including sinusitis, osteomyelitis, bronchitis and otitis media. Prevention of disease in patients with Diabetes Mellitus through vaccination is highly recommended. There are two main types of pneumococcal vaccines used in Ireland. Pneumococcal conjugate vaccine (PCV) contains polysaccharide from 13 of the most common capsular types and is recommended for the routine vaccination of all children born on or after 1st October 2010. The pneumococcal polysaccharide vaccine (PPV) contains purified polysaccharide from 23 of the most common capsular types of *S.pneumoniae*, thereby covering 85-90% of the serotypes of the bacteria. This vaccine is recommended for those aged 65 years and over and "at-risk" adults and children over two years of age. The PPV23 is the vaccine considered in this audit as it pertains to the study population, i.e. patients with DM. All patients with Diabetes Mellitus are recommended to receive the PPV23. If the PPV23 has been administered to a patient under the age of 65 years, it is recommended that they receive a once only booster five years after the first vaccination. If the PPV23 has been administered to a patient over the age of 65 years, no further booster is required.⁽¹⁾

Patients with DM are at an increased risk of developing invasive pneumococcal disease compared to those without.⁽²⁾ An English record-linkage study identifying and measuring the risk of pneumonia and pneumococcal disease in people hospitalised with Diabetes Mellitus found that patients admitted to hospital remain at increased risk of pneumococcal infection despite the fact that a national immunisation policy had been in place for more than a decade.⁽³⁾ Possible explanations for this include inadequate vaccine uptake.⁽³⁾ Many case control studies have shown the efficacy of the pneumococcal vaccine as being between 56% and 81%.⁽⁴⁾ An indirect cohort analysis reported an 84% efficacy in patients with DM.⁽⁵⁾ A later study using a cohort of 47,365 participants aged 65 years or older suggests an effectiveness of 44% against the bacteria.⁽⁶⁾

Methods

During October 2017, the general practice patient list was trawled to compile a list of the patients that both attend the practice and have Diabetes Mellitus. The software package used within the practice for patient record management is SOCRATES. The patient's name, age, date of birth and

their subgroup of disease (type 1 diabetes mellitus, type 2 diabetes mellitus or gestational diabetes mellitus) were recorded. The patient's names were individually entered into SOCRATES and a list of their previous immunisation records was examined. It was then noted if they had received the PPV23 in the past and, if so, were they under 65 years of age or 65 years of age and over, at the time of administration. A text message was sent to all patients of the practice with DM to remind those who had, (i) never received the vaccination, or (ii) received the vaccination when they were under 65 years of age and were due a booster, to attend the practice for vaccination at their earliest convenience. The advantages of the getting the vaccine were stated in the text message to encourage patients to attend.

In January 2018, the study population was re-audited to determine the uptake rate following the text message reminder. A list of those patients who had received the PPV23 between 5/10/17 and 12/1/18 was compiled and the uptake rate calculated.

Results

Of the 150 patients with diabetes (three with type one diabetes mellitus and 147 with type two diabetes mellitus – see chart 1), it was found that 61 patients had already received the vaccination, leaving 89 patients unvaccinated. Hence, at the outset of the audit, before any intervention was performed, 40.7% of Diabetes Mellitus patients in the practice had received the PPV23 and 59.3% had never received the PPV23. In addition to those never vaccinated, 23 of those previously vaccinated were under the age of 65 when they received the vaccination, meaning that these patients would be eligible for a booster five years after receiving the initial vaccination. This gives a total of 112 patients who were either immediately eligible to receive the PPV23 or who would be eligible soon. (Chart 2)

From the re-audit, it was found that 22 people from the patient cohort attended the practice to receive the PPV23 between 5/10/17 and 12/1/18. This increased the number of patients with Diabetes Mellitus having received the PPV23 vaccine to 52.67%. From the 112 patients eligible for vaccination – there was a response rate to the initial SMS message of 19.6%. (Chart 3)

Discussion

The hope and target is that 100% of patients with Diabetes Mellitus would be vaccinated with PPV23. Over time, this would amount to improved quality of life for patients in terms of reduced morbidity and mortality, reduced general practice visits and decreased hospital admissions. At the moment 47.3% of the practice patients with Diabetes Mellitus have never received the PPV23. However, the 19.6% response rate to initial targeting of these patients indicates a movement in the right direction. There are also benefits for the practice in achieving the target of 100% vaccination among this patient population. In doing so, the practice would become fully compliant with the guidelines and recommendations and, in addition, the practice would generate revenue, which is important in order to maintain a viable business model within General Practice.

Without surveying the local study population, it is difficult to determine the exact reasons for lack of uptake of the PPV23, however, previous studies suggest a number of factors. Alongside determining the rates of influenza and pneumococcal vaccination uptake, Gorska-Ciebiada et al. also aimed to identify predictors which affect the likelihood of vaccination.⁽⁷⁾ Analysis ultimately demonstrated two significant predictors of pneumococcal vaccine uptake: (i) patients with a greater number of co-morbidities and (ii) vaccine recommendation from GPs. Reasons cited by those patients unvaccinated included a lack of information about immunisation and low perceived benefits. An Irish study by

Clancy et al. questioned patients with DM attending an outpatient clinic regarding their vaccination status and stance.⁽⁸⁾ This Irish study demonstrated that vaccine recommendation offered by GPs was a significant predictor of pneumococcal vaccine uptake, along with the comorbidity of chronic kidney disease. Both studies therefore demonstrate the same two key issues relating to vaccine uptake. Doctors within the practice should be encouraged to educate patients on the benefits of receiving the PPV23, thus providing the patient with the relevant information, allowing them to make an informed decision. This has the potential to generate a significant positive outcome in terms of increasing PPV23 uptake rate and is a relatively straightforward approach and easy to implement during the patient consultation.

The immunisation records used for the patients in this audit are those available from the general practice data which dates back to 2002. Unless the patient has informed the practitioner of having received the vaccination in a different clinical setting, this would not be accounted for in the patient notes and represents one drawback of the audit database.

As a recommendation for the future, it would be advisable to send another reminder message to the patient cohort and to repeat the audit in a further three months. Equally it is now important to ensure all diabetic patients are advised of the benefits of vaccination upon visit to the practice as part of their routine diabetic checks. On success of this audit and intervention, this model could easily be adapted to other key targets, including further vaccinations, blood testing, BP monitoring and so on.

References

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Chart 1:

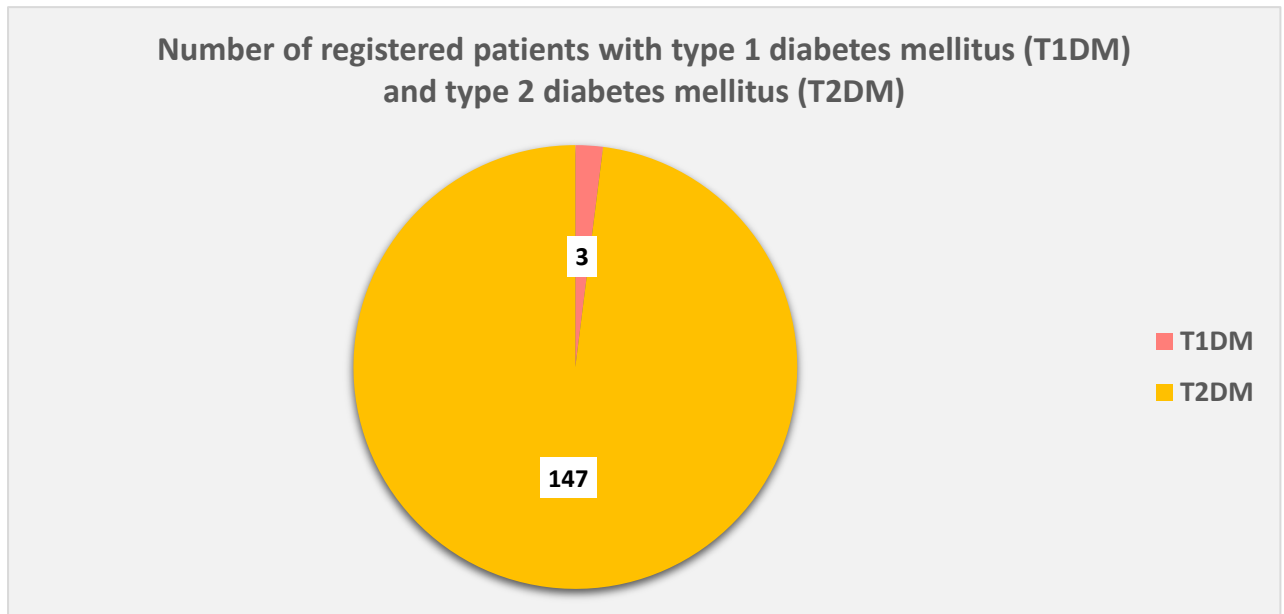


Chart 2:

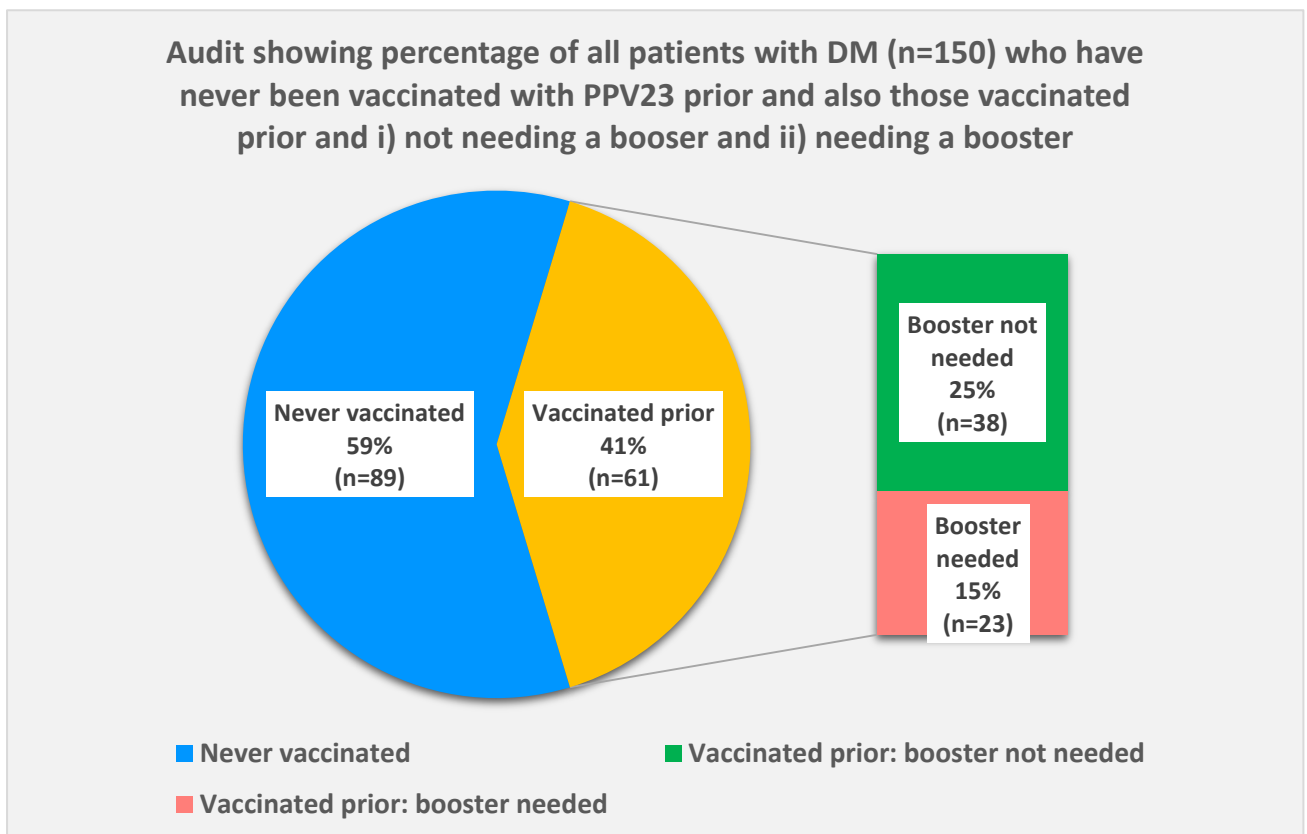


Chart 3:

Re-audit showing percentage of patient cohort needing vaccination (n=112) who have or have not been vaccinated with PPV23 following the intervention

