A General Practice Audit Comparing the Rate of Pneumococcal Vaccine Uptake Among Patients with Diabetes Mellitus, Before and After Intervention

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Abstract

The pneumococcal polysaccharide vaccine was introduced for at-risk groups in Ireland in 1996 and it has been demonstrated that increased vaccination rates result in fewer hospital visits in at-risk groups. An audit was carried out from October 2017 until January 2018 in a rural general practice catering for just over 2,000 patients. It was hypothesised that, from direct observation, there was a lack of uptake of the pneumococcal vaccine in certain at-risk patient groups, such as patients with diabetes mellitus. The findings from this were used to guide intervention aimed at encouraging uptake of the pneumococcal vaccine. Data was collected to include the vaccination status of all patients with diabetes mellitus in the practice. The results showed 89 patients (59.3%) had never received the vaccine. In addition, a further 23 (15.3%) patients were due a booster. From the re-audit, following intervention to encourage uptake, which included direct advice and encouragement from the practice doctors and nurses, in addition to a text message reminder sent to patients, 22 patients attended for vaccination, giving an uptake rate of 19.6%. The ideal scenario is for all patients with diabetes mellitus to be vaccinated which would amount to improved quality of life for patients. Whilst a target of 100% is difficult to achieve, the expectation would be to have the majority of patients vaccinated according to current guidelines. In addition, the practice would ensure compliance with those guidelines and recommendations regarding vaccination and would also generate revenue, which is important in order to maintain a viable business model within general practice.

Introduction

Pneumococcal disease is a bacterial infection caused by Streptococcus pneumoniae, of which there are over 90 serotypes (Habib et al., 2014). S.pneumoniae can lead to significant morbidity and mortality and, in recent times, has become resistant to many antibiotics (Ortqvist et al., 2005). S. pneumoniae is the most common causative agent of pneumonia and also causes a variety of other infections including sinusitis, osteomyelitis, bronchitis and otitis media (Ortqvist et al., 2005). Prevention of disease in patients with diabetes mellitus (DM) through vaccination is recommended as patients with DM are at an increased risk of developing invasive pneumococcal disease compared to those without (Torres et al., 2015). An English record-linkage study identifying and measuring the risk of pneumonia and pneumococcal disease in hospitalised patients with DM found that those 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 (Seminog and Goldacre, 2013).

There are two main types of pneumococcal vaccines used in Ireland. The 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 (HSE National Immunisation Office, Health Service Executive, 2016). 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 and it is this vaccine which

is recommended for those aged 65 years and over and at-risk adults and children over two years of age (HSE National Immunisation Office, Health Service Executive, 2016). The PPV23 is the vaccine considered in this audit as it pertains to the study population. All patients with DM 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 (HSE National Immunisation Office, Health Service Executive, 2016). The algorithm for PPV23 administration (Figure 1). Many case control studies have shown the efficacy of the pneumococcal vaccine as being between 56% and 81% (Shapiro, 2012). In addition, a recent systematic review and meta-analysis highlighted significant vaccine efficacy. This study demonstrated vaccine efficacy against invasive pneumococcal disease (by any serotype) of 73% (95% CI: 10-92%) in four clinical trials, 45% (95% CI: 15-65%) in three cohort studies and 59% (95% CI: 35-74%) in three case-control studies. Pooled vaccine efficacy against pneumococcal pneumonia (by any serotype) was 64% (95% CI: 35-80%) in two clinical trials and 48% (95% CI: 25-63%) in two cohort studies (Falkenhorst et al., 2017).

It was hypothesised that, from direct observation, there was a lack of uptake of the pneumococcal vaccine in certain at-risk patient groups, such as patients with diabetes mellitus. Based on this, an audit was carried out from October 2017 until January 2018 in a rural general practice. The findings from this would be used to guide intervention aimed at encouraging uptake of the pneumococcal vaccine among this patient group. Direct advice and encouragement from the practice doctors and nurses, provided to patients during routine consultations, constitutes the primary intervention. In addition, a text message reminder sent to patients would further reinforce the importance of patients keeping their vaccination status up to date and would also capture any patient who was not attending for a routine appointment.

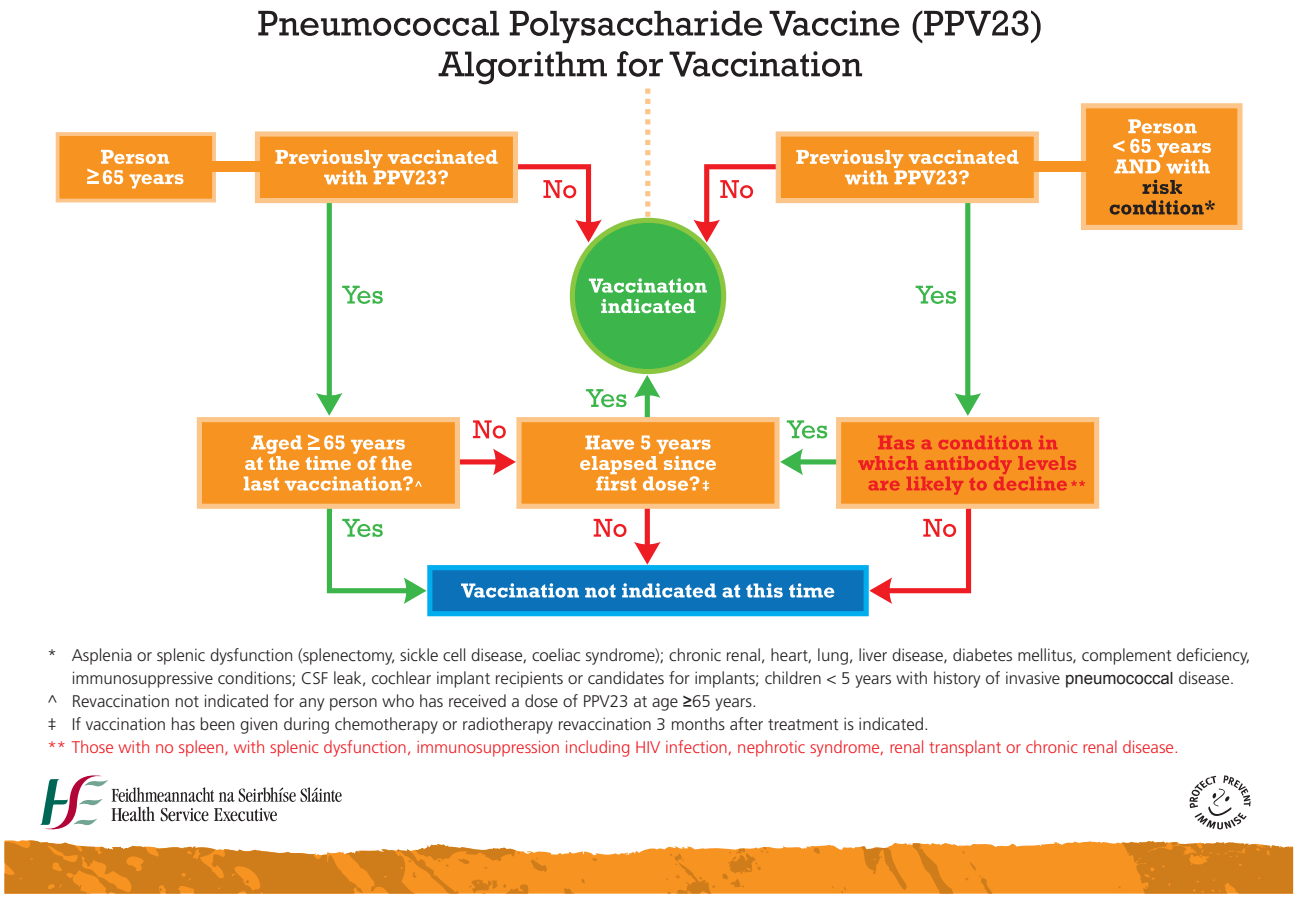

Figure 1: Pneumococcal polysaccharide vaccine (PPV23) algorithm for vaccination (HSE National Immunisation Office, Health Service Executive, 2016).

Methods

During October 2017, the patient list was searched to compile a list of the patients that both attend the practice and have DM. Only active patients in the patient list with type 1 diabetes mellitus, type 2 diabetes mellitus or gestational diabetes mellitus were included. All other patients were excluded. 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 vaccination history of each patient was examined. It was then noted if they had received the PPV23 in the past and whether they were they under or over 65 years of age at the time of administration.

Direct advice and encouragement from the practice doctors and nurses was provided to patients during routine consultations. In addition, a text message was sent to all patients of the practice with DM to remind those who had either never received the vaccination, or had 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 getting the vaccine, specifically relating to the health benefit of increased immunity, 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 intervention. 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 (3 with type 1 diabetes mellitus, 147 with type 2 diabetes mellitus and 0 with gestational diabetes mellitus), it was found that 61 patients had already received the vaccination, leaving 89 patients unvaccinated. Therefore, at the outset of the audit, before any intervention was performed, 40.7% of patients with DM 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 (Figure 2).

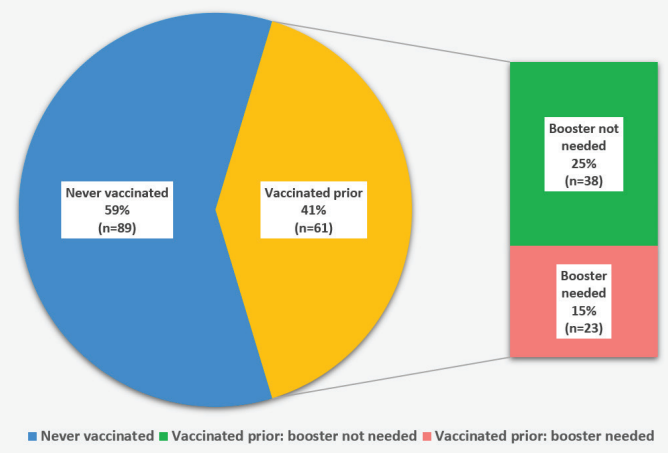

Figure 2: Audit showing percentage of all patients with DM (n=150) who have never been vaccinated with PPV23 prior and also those vaccinated prior and i) not needing a booster and ii) needing a booster.

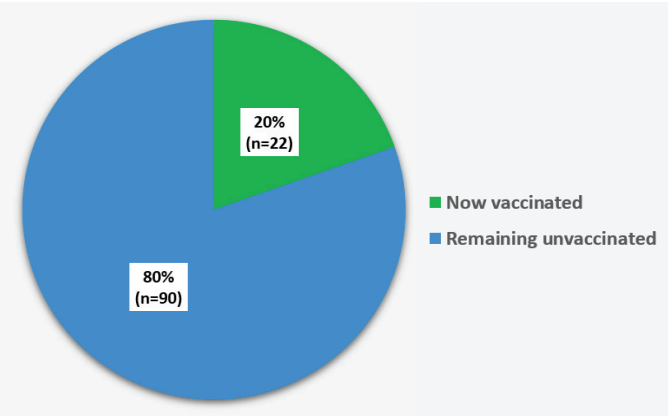

Figure 3: Re-audit showing percentage of patient cohort needing vaccination (n=112) who have or have not been vaccinated with PPV23 following the initial audit and intervention.

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. Therefore, from the 112 patients eligible for vaccination, there was a response rate to the initial intervention of 19.6% (Figure 3).

Discussion

The ideal goal is a 100% vaccination rate with PPV23 for patients with DM as 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. Whilst a target of 100% is difficult to achieve, the expectation would be to have the majority of patients vaccinated according to current guidelines. At the outset of the audit, 40.7% of the study

population had never received the PPV23. However, 22 people from the patient cohort of 112 patients attended to receive the PPV23 after intervention, giving a 19.6% response rate to initial targeting of this patient group. This uptake within a short space of time indicates an improvement and a willingness of the patients to receive the vaccine. 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 compliant with the guidelines and recommendations concerning vaccination, in addition, the practice would generate revenue, which is important in order to maintain a viable business model within general practice in Ireland.

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. A 2015 study identified two significant predictors which affect the likelihood of vaccination: (i) patients with a greater number of co-morbidities and (ii) vaccine recommendation from general practitioners (Gorska-Ciebiada et al., 2015). Reasons cited by those patients unvaccinated included a lack of information about vaccination and low perceived benefits. An Irish study surveyed patients with DM attending an outpatient clinic regarding their vaccination status and stance (Clancy et al., 2012). This 2012 study demonstrated that vaccine recommendation offered by general practitioners was a significant predictor of pneumococcal vaccine uptake, along with the comorbidity of chronic kidney disease. Both studies therefore demonstrate a key issue relating to vaccine uptake, i.e. recommendation and encouragement by general practitioners. Doctors and nurses within the practice should therefore 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 positive outcome in terms of increasing PPV23 uptake rate and offers a straightforward approach which is easy to implement during the patient consultation.

As a recommendation for the future, it would be advisable to send another message to the patient cohort. Equally, it is important to ensure all patients with DM are advised of the benefits of vaccination during visits to the practice as part of their routine diabetic checks. If there was a levelling off of uptake or it failed to progress at an acceptable speed, it would be important to consider why this is and perhaps identify barriers to patients availing of the vaccination and develop novel ways to encourage uptake.

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 practice 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. A further limitation was the lack of a target for the desired response rate. Setting a target for further intervention and re-audit would guide intervention and track progress over time.

Conclusion

This audit provides an easy method to target key performance indicators within general practice with a relatively quick turnaround. It was possible to readily identify those patients with DM who had not received the PPV23 at the outset of the audit and then monitor the uptake rate over time. On success of this audit and intervention, this model could easily be adapted to other key targets, including other vaccinations for a range of medical conditions, blood testing, blood pressure monitoring and so on, both at a local and national level.

Acknowledgements

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Conflict of interest

The authors declare there are no conflicts of interest.

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