

# Variation in the incidence of branded Ventolin dispensing for asthma by socioeconomic deprivation

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# ABSTRACT

PHARMAC (New Zealand's medication funding authority) currently funds three different brands of salbutamol aerosol inhaler for asthma symptom relief: Respigen, Salamol and Ventolin. Respigen and Salamol are fully-funded while Ventolin is partially-funded. Patients who are prescribed Ventolin are required pay an additional charge of ~\$4.00 per inhaler. Despite this increase in cost to the patient, Ventolin remains the preferred salbutamol inhaler in New Zealand. This study aimed to examine any preferences for Ventolin dispensing at the prescriber or the pharmacy levels, determine whether there is any variation in Ventolin dispensing rates by socioeconomic deprivation and better understand what the possible driving influences for Ventolin dispensing are.

This study was conducted in four components: 1. an analysis of pharmacy claim data, 2. identification of prescriber-driven salbutamol dispensing patterns, 3. a comparison of the way salbutamol prescriptions are handled at both the pharmacy and prescriber level and 4. a survey of prescribers' and pharmacists' opinions regarding generic salbutamol (Respigen and Salamol). We found rates of Ventolin dispensing varied greatly between different prescribers and different pharmacists. There were high rates of Ventolin dispensing in New Zealand, at all levels of socioeconomic deprivation. 40% of salbutamol dispensings for the most deprived group (NZDep06 score of 10) were for Ventolin, implying a loss of cost savings in a large group of people who may be the most financially affected. Pharmacists' and prescribers' opinions on generic salbutamol also varied greatly. Their influence on Ventolin dispensing rates and on patients' perception of generic medication is important and could potentially be the key to increasing the use of generic salbutamol brands in New Zealand, ensuring the best cost savings for their patients.

# INTRODUCTION

Asthma has a significant disease burden in New Zealand. According to the 2014/2015 New Zealand Health Survey, 11% of New Zealand adults over the age of 15, are medicated for asthma, which is an estimated 401,000 people. (1)

PHARMAC (New Zealand's medication funding authority) currently funds three different brands of salbutamol aerosol inhaler for asthma symptom relief: Respigen, Salamol and Ventolin. Respigen and Salamol are fully-funded while Ventolin is partially-funded, incurring a part charge of \$2.20 per inhaler at the pharmacy level. (2)

Despite this increase in cost to the patient, Ventolin holds a market share of approximately 55% while generic salbutamol, Respigen and Salamol, hold market shares of ~41% and ~4%, respectively.

This is an important discrepancy because each time a patient is dispensed Ventolin, they pay an additional charge of ~\$4.00 per inhaler (including the pharmacy mark up of approximately 86%) in addition to the standard \$5.00 pharmacy dispensing fee. In the 2014/2015 financial year (FYR), an estimated 970,000 Ventolin inhalers were dispensed. Based on this information, approximately \$4M was spent by New Zealand patients on this part-charge for Ventolin.

There are many possible reasons for this discrepancy. Patients are ideally the decision makers when it comes to choosing their medications. Therefore, their preferences and their perceptions of the generic medication need to be considered. However, pharmacists and prescribers play a key role in influencing patients' acceptance of generic medications as they, along with the media, are the main sources of knowledge for patients. (3) Therefore, it is possible that prescriber and/or pharmacist preference is a cause for increased Ventolin dispensing.

The purpose of this study was to examine any preferences for Ventolin dispensing at the prescriber or the pharmacy levels, determine whether there is any variation in Ventolin dispensing rates by socioeconomic deprivation and better understand what the possible driving influences for Ventolin dispensing are.

# MATERIALS AND METHODS

## 1) *Analysis of the Pharmaceuticals Collection Database*

Pharmacy claim data from the 2014/2015 FYR (1 July 2014 to 30 June 2015) was used in this analysis, using the Pharmaceuticals Collection database. This data provided information on the number of Ventolin scripts dispensed and the number of fully funded generic salbutamol scripts dispensed, per pharmacy. This data also provided anonymised patient demographics for each inhaler dispensing including age and socioeconomic deprivation scores (NZDep06).

Data analysis was conducted using Microsoft Excel 2010, using pivot tables on the underlying database to generate tables and graphs. To assess socioeconomic aspects of salbutamol dispensing, we aggregated patients' anonymised NZDep06 scores.

## 2) *Prescriber-driven salbutamol dispensing patterns through pharmacy claim data*

Because patterns of dispensings by individual prescribers could be influenced by the pharmacy, and vice versa, we next analysed by prescriber-pharmacy pairs. The pharmacy claim data was used to link the dispensing pharmacy to the specific prescriber who wrote the prescription; however the database did not provide information on prescriber intent, i.e. what was written on the scripts, but rather only what has been actually dispensed at the pharmacy level.

### **Selection criteria for prescriber-pharmacy pair analysis:**

- Provider/pharmacy pairings were excluded where they had dispensed salbutamol less than 200 times in the 2014/2015 FYR

These selection criteria aimed to focus on a sample of frequent salbutamol prescribing/dispensing numbers, to gain a better idea of behaviours around salbutamol prescribing. Example 1 shows how the data was categorised.

### **Example 1. The prescribing characteristics of prescriber/pharmacy pairing, A/B**

Prescriber ID	Pharmacy ID	No. of salbutamol dispensed through pairing A/B	Ventolin dispensing % through pairing A/B	No. of salbutamol dispensed through pharmacy B, independent of prescriber A	Ventolin dispensing % through pharmacy B, independent of prescriber A
A	B	244	62%	2663	40%

To help isolate the prescribing characteristics of the prescriber and indicate whether the prescriber had an effect on the rate of Ventolin dispensing, the following calculation was used:

$$X = [\% \text{ of Ventolin a pharmacy has dispensed through a particular prescriber} \\ - \% \text{ of Ventolin a pharmacy has dispensed independent of that prescriber}]$$

Where X = % of Ventolin dispensed through a prescriber in a prescriber/pharmacy claimant pairing

The more positive the value of X (%), the stronger the suggestion that in the selected prescriber/pharmacy pairing, if the prescriber is having an effect on what is dispensed, more Ventolin was being dispensed through the pharmacy than that pharmacy would normally dispense.

The more negative the value of X (%), the stronger the suggestion that in the selected prescriber/pharmacy pairing, if the prescriber is having an effect on what is dispensed, the prescriber tended to discourage Ventolin to be dispensed through the pharmacy than that pharmacy would normally dispense.

### 3) *Prescribed-dispensed matching of a selected sample of prescriber/pharmacy combinations*

To explore further the characteristics of particular prescriber/pharmacy pairings, a subsample of the pharmacy claim data was selected based on the following criteria:

#### **Selection criteria:**

- Provider/pharmacy pairings were excluded where they had dispensed salbutamol less than 200 times in the 2014/2015 FYR
- The data was further restricted to only include those pharmacy/prescriber pairings where the prescriber had prescribed salbutamol through two or more pharmacies.

#### **Example 2. Prescriber salbutamol dispensing characteristics through more than one pharmacy**

Prescriber ID	Pharmacy ID	No. of salbutamol dispensed through pairing	Ventolin dispensing % through pairing	Maximum difference in Ventolin dispensing % between pharmacies in group
A	B	223	92%	82%
A	C	370	10%	

Prescriber/pharmacies groups were flagged as interesting if the Ventolin dispensing (%) difference between the pharmacies was greater than 75%.

The selection criteria aimed to isolate examples where the way salbutamol prescriptions were dispensed in one pharmacy differed greatly to how they were dispensed in the other pharmacies.

These selection criteria resulted in a sample of two prescribers and four pharmacies. Prescriptions were requested through Sector Services (a part of the National Health Board involved in providing support services to the health sector) for any form of salbutamol aerosol inhaler dispensed through these select pharmacies from the time period of 1<sup>st</sup> January 2015 to the 30<sup>th</sup> April 2015. 1062 prescriptions were requested, 325 were received.

Prescribing/dispensing combinations were compared and categorised into the following groups.

1. Script written as Ventolin – pharmacist dispenses Ventolin
2. Script written as Ventolin – pharmacist dispenses generic
3. Script written as Ventolin (no substitution allowed) – pharmacist dispenses Ventolin
4. Script written as Ventolin (no substitution allowed) – pharmacist dispenses generic
5. Script written as Ventolin (with substitution allowed) – pharmacist dispenses Ventolin
6. Script written as Ventolin (with substitution allowed) – pharmacist dispenses generic
7. Script written as salbutamol – pharmacist dispenses Ventolin
8. Script written as salbutamol – pharmacist dispenses generic
9. Script written as generic brand (Respigen or Salamol) – pharmacist dispenses Ventolin
10. Script written as generic brand (Respigen or Salamol) – pharmacist dispense generic

#### ***4) Online questionnaire to explore prescribers' and pharmacists' opinions regarding substitution of Ventolin with generic brands.***

A draft questionnaire was developed by evaluating literature looking at the opinions and attitudes surrounding generic medications. (3–5) When the questionnaire was constructed, it was examined for content validity by a total of 10 people, four doctors (two of which were general practitioners), five pharmacists and one data analyst. The final questionnaire consisted of 12 questions including one demographic question on socioeconomic deprivation. Mixtures of open-ended and closed-ended questions were used. The open-ended questions were used to gain better understanding of pharmacists' and prescribers' personal thoughts and opinions while minimising the influence of the researcher's preconceived ideas of what the answers would be.

Two hundred pharmacies were randomly chosen (using Microsoft Excel randomisation software) from the pharmacy claim database. Emails were then found via the internet. Email addresses from 180 of the pharmacies were able to be found. The survey in the form of an online web link was sent to these pharmacies. This survey was conducted on the 17<sup>th</sup> December 2015 to the 11<sup>th</sup> January 2016.

General practitioners (GPs) was approached with the questionnaire through a notice included the Royal New Zealand College of General Practitioners (RNZCGP) weekly electronic newsletter, ePulse, with a link to the survey. This newsletter is sent to all NZ-registered doctors with membership from the RNZCGP, a total number of 4,714 individuals. This survey was conducted on the 19<sup>th</sup> January 2016 to the 26<sup>th</sup> January 2016.

Open-ended responses were categorised under different headings as similar themes emerged.

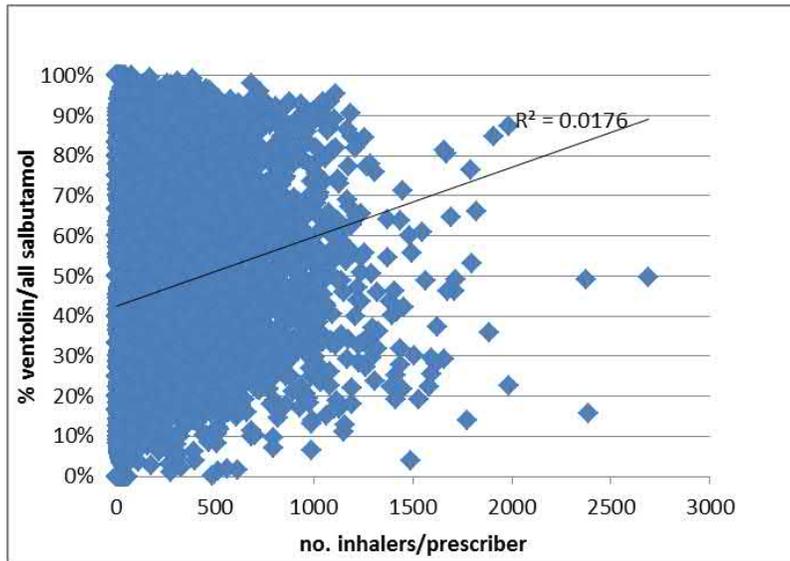
## RESULTS

### 1) *Analysis of the Pharmaceuticals Collection Database*

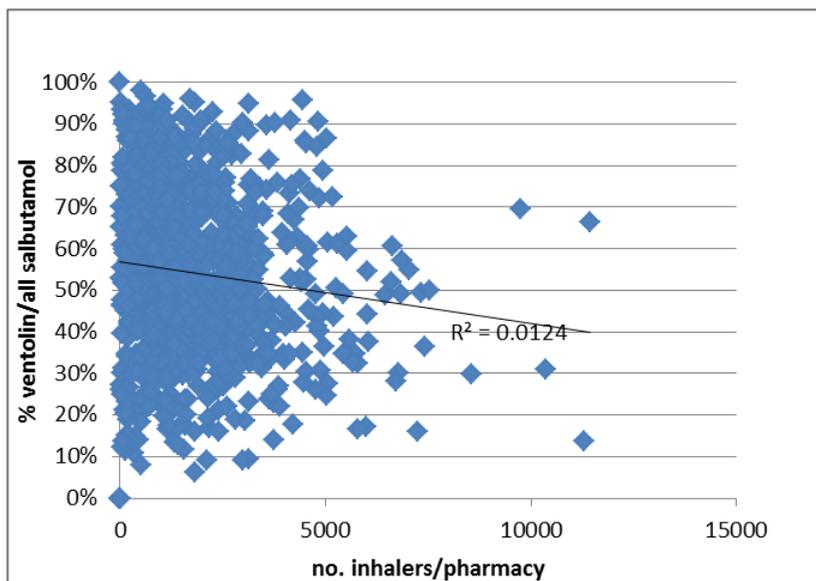
During the 2014/15 FYR there were 1,861,102 salbutamol inhalers dispensed, including 974730 Ventolin inhalers (52% of all salbutamol inhalers). These dispensings were for 442,536 patients, including 96,621 children aged 0-9 (see table 1).

<b>Table 1. Age of patients who were dispensed salbutamol inhalers during the 2014/2015 FYR</b>	
10-year age band	No. of patients
0-9	96621
10-19	52776
20-29	44981
30-39	46242
40-49	56597
50-59	55786
60-69	49312
70-79	32778
80-89	15771
90+	2886
Unknown	1
Total*	453751
*includes patients in 2 age bands	

There were 11336 prescribers and 1030 pharmacies involved in this database. Of the 969 pharmacies that dispensed more than 200 salbutamol inhalers in the 2014/2015 FYR, 544 (56%) dispensed greater than 50% Ventolin (as a percentage of all salbutamol). Of the 4,702 prescribers who wrote prescriptions for more than 50 inhalers in the 2014/2015 FYR, 2451(52%) had greater than 50% of prescriptions dispensed as Ventolin. There were low-correlated associations between the proportion of Ventolin inhalers (as a percentage of all salbutamol) and numbers of inhalers prescribed or dispensed, with for instance, a notable trend towards prescribers who prescribed higher numbers of inhalers being more likely to prescribe branded Ventolin (see figure 1).

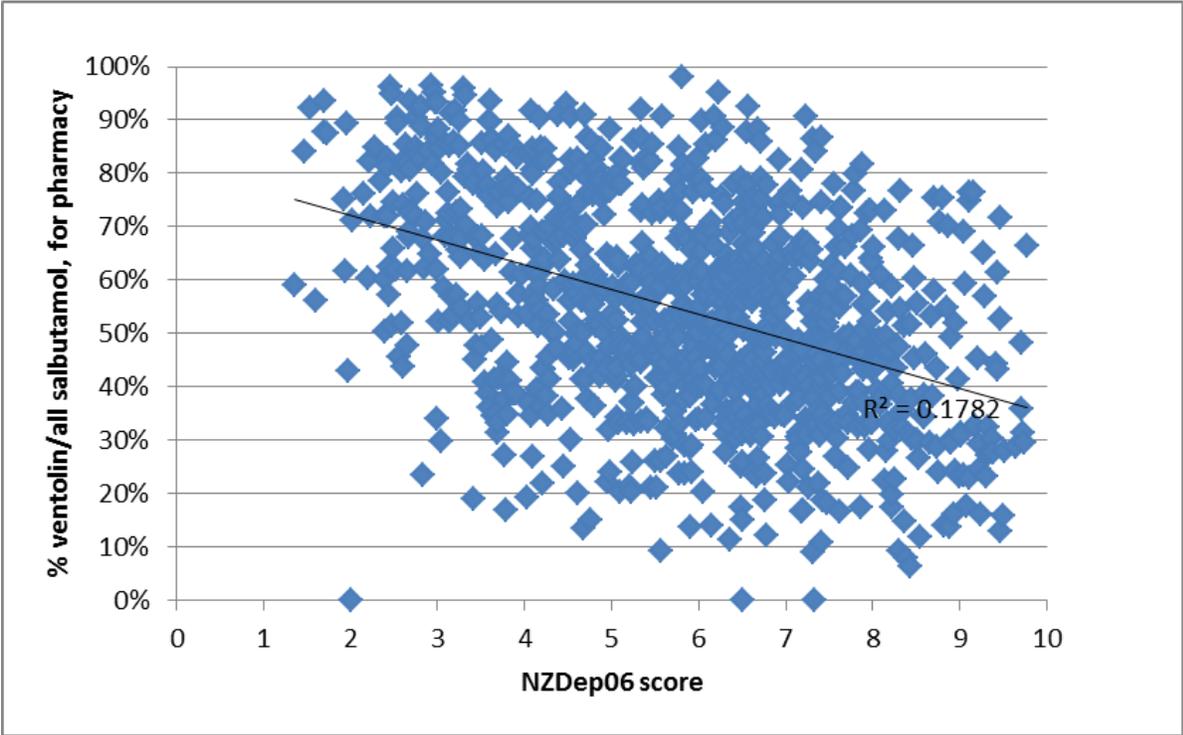


**Figure 1: Proportion of salbutamol dispensings that were for the Ventolin brand in the 2014/15 FYR, by individual prescribers**

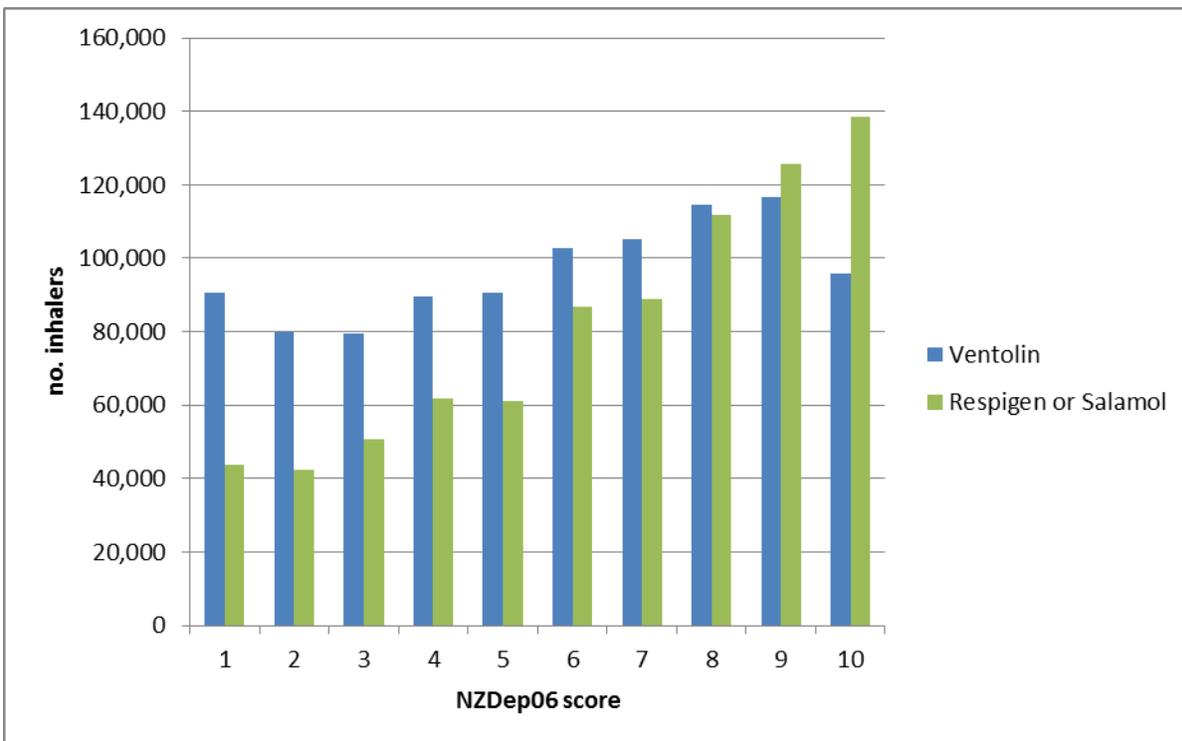


**Figure 2: Proportion of salbutamol dispensings that were for the Ventolin brand in the 2014/15 FYR, by individual pharmacies**

By socioeconomic status, there was a weak association ( $R^2 = 17\%$ ) between the extent of Ventolin dispensings and NZDep06 score, but a trend towards proportions of Ventolin prescribing being greater for less socioeconomically deprived patients and less for more deprived patients (see figure 3)

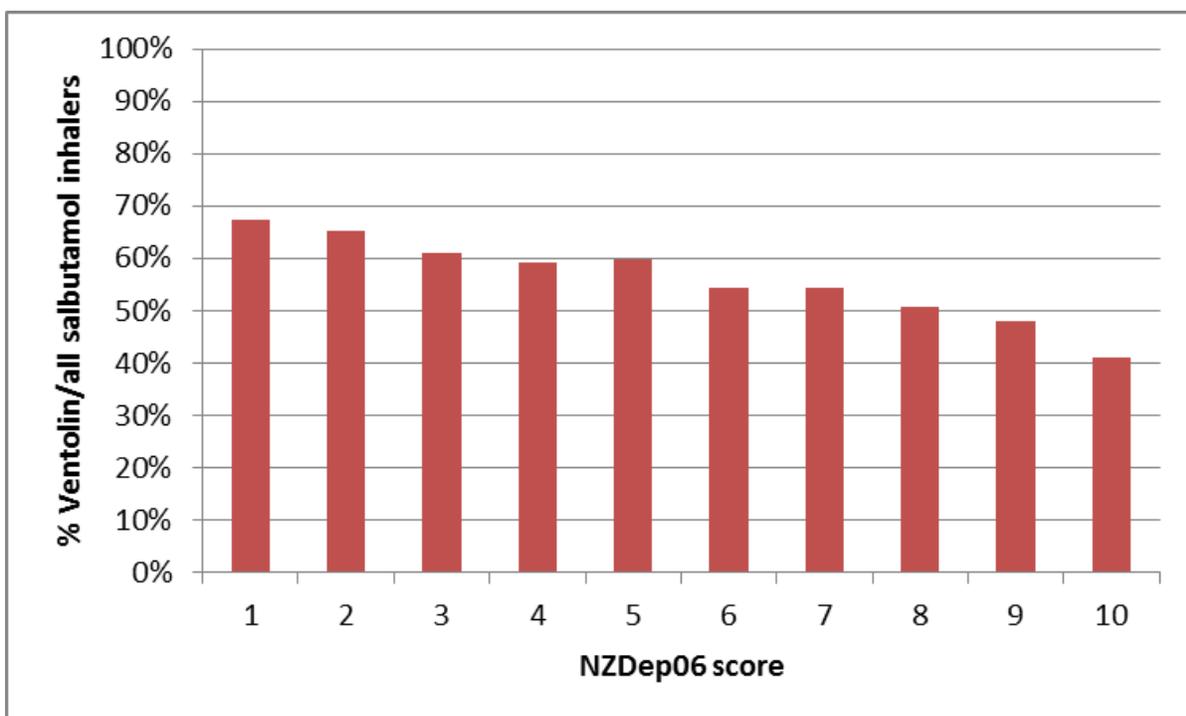


**Figure 3: Proportion of salbutamol dispensings that were for the Ventolin brand 2014/15, according to the average NZDep06 score for patients dispensed salbutamol within each pharmacy (NZDep06 1= least socioeconomically deprived, 10 = most deprived)**



**Figure 4: No. salbutamol dispensings 2014/15, by NZDep06 decile and brand type (NZDep06 1= least socioeconomically deprived, 10 = most deprived)**

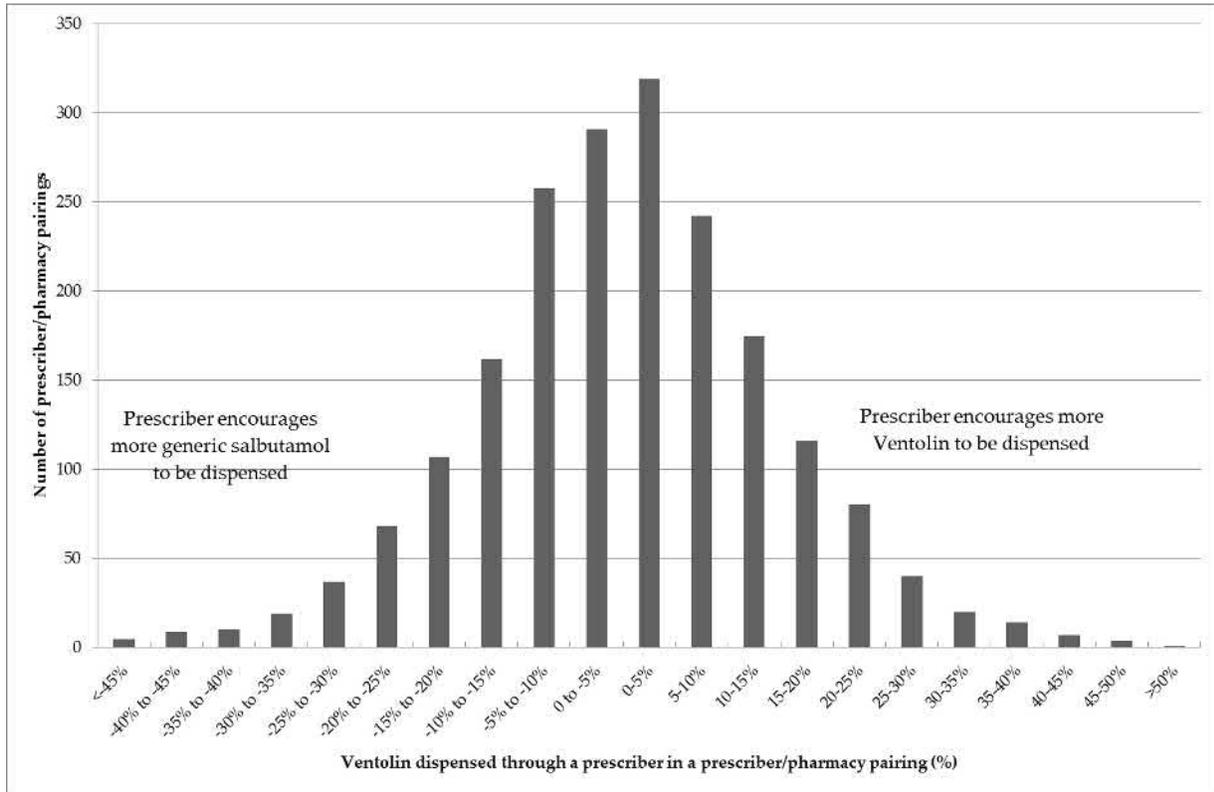
40% of salbutamol dispensings for the most deprived group (NZDep06 decile 10) were for Ventolin.



**Figure 5: Proportion of salbutamol dispensings that were for the Ventolin brand 2014/15, by NZDep06 decile (NZDep06 1= least socioeconomically deprived, 10 = most deprived)**

2) *Prescriber-driven salbutamol dispensing patterns through pharmacy claim data*

Of the 11336 prescribers and 1130 pharmacies, 1,984 prescribers-pharmacy pairings met the criteria, which were then analysed to examine dispensing patterns. This consisted of 550,000 salbutamol inhaler claims through 597 pharmacies and 1,856 prescribers.



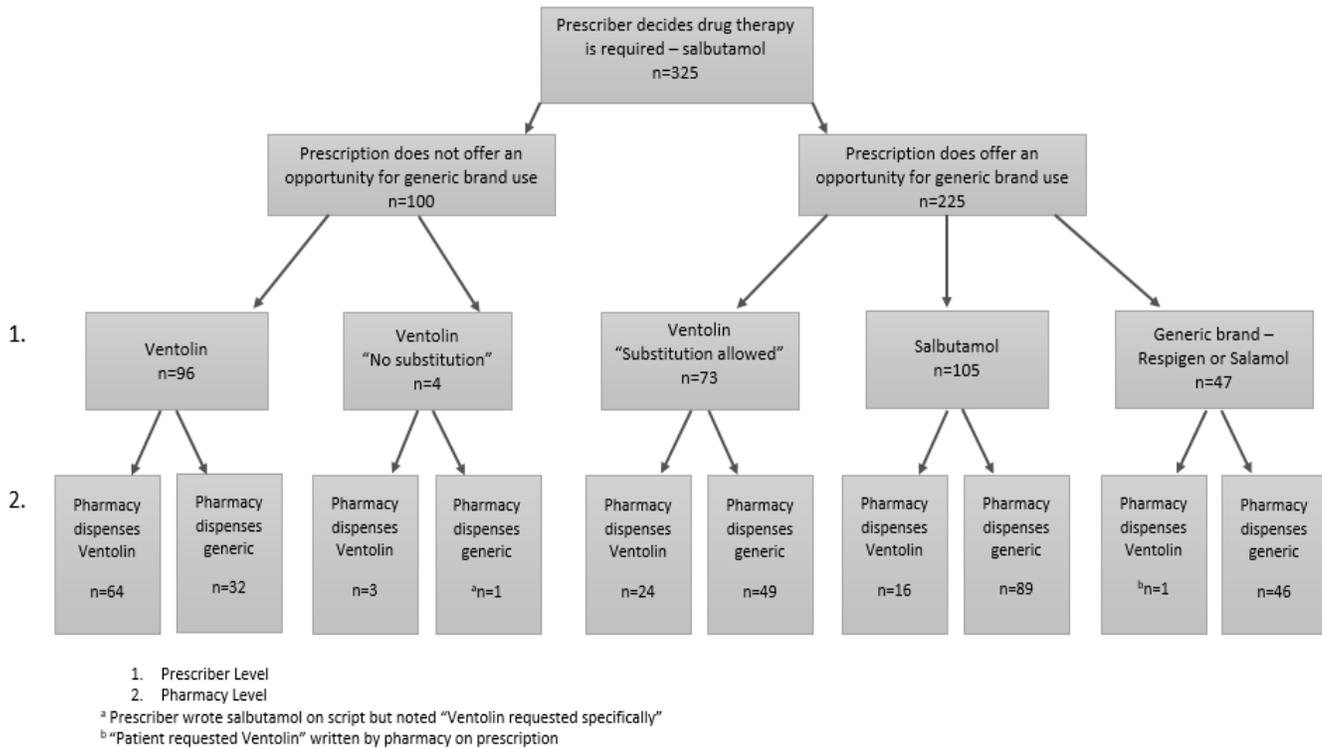
**Figure 6. Effect of prescribers on the Ventolin dispensed to their patients**

The average prescriber effect on Ventolin dispensing was  $0.3\% \pm 28.8\%$ .

Above 1 standard deviation ( $\geq 14.7\%$ ) of the mean, 262 prescriber/pharmacy pairings showed a possible prescriber effect encouraging the dispensing of Ventolin. At above 2 standard deviations ( $\geq 29.4\%$ ) of the mean, 48 prescriber/pharmacy pairings showed a stronger possible prescriber effect encouraging the dispensing of Ventolin.

### 3) Prescribed-dispensed matching of a selected sample of prescriber/pharmacy combinations

The four pharmacies where the salbutamol prescriptions were obtained were all based in the Auckland region with an average socioeconomic deprivation score of 6.16. The pharmacy with the highest average patient deprivation score of 7.78 dispensed 90% Ventolin through one prescriber/pharmacy pairing. Figure 7 shows the way the 325 prescriptions were handled at both the prescriber and pharmacy level.



**Figure 7. Numbers of prescriptions (prescriber/pharmacy matched) dispensed as either Ventolin or generic salbutamol**

Of the selected prescriber/pharmacy pairing combinations:  
30.8% of the prescriptions did not offer the opportunity for generic brand use.  
However of these prescriptions, 33% were dispensed as a generic brand anyway.  
33.2% of all the prescriptions for salbutamol (where Ventolin, Respigen, Salamol or salbutamol was written on script) were dispensed as Ventolin.

11.2% of the prescriptions where “Ventolin” was not written on the script were dispensed as Ventolin.

225 of the prescriptions offered an opportunity for generic brand use. 18.2% of these prescriptions were dispensed as Ventolin.

A chi-squared test was done to compare the observed and expected dispensing outcomes if “salbutamol” or if the specific generic brand (Salamol or Respigen) was written on the prescription.

**Table 2. Chi-squared test – Comparing observed with expected dispensing numbers when different terminology is used on the prescription.**

Prescribed:	Dispensed:		
	Generic (Salamol or Respigen)	Ventolin	Total:
“Salbutamol”	89 [93.3]	16 [11.7]	105
“Salamol” or “Respigen”	46 [41.7]	1 [5.3]	47
	135	17	152

**Note:** values given as numbers in group, expected values in square brackets, chi-square p value = 0.0177, a p value of <0.05 was considered significant.

**4) *Online questionnaire to explore prescribers’ and pharmacists’ opinions regarding substitution of Ventolin with generic brands.***

54 pharmacists responded, with a response rate of 30%. 36 GPs responded with a response rate of 0.8%.

Table 3. Self-reported socioeconomic deprivation scores of the areas the pharmacies and general practices operate in. (1= least socioeconomically deprived, 10 = most deprived)		
Socioeconomic Deprivation Score (self-reported)	Frequency	
	Number	Percentage
1-3		
• GPs	14	38.9%
• Pharmacists	15	28.3%
4-6		
• GPs	9	25%
• Pharmacists	19	35.9%
7-10		
• GPs	9	25%
• Pharmacists	14	26.4%
Don't know		
• GPs	4	11.1%
• Pharmacists	5	9.4%

26 (48.2%) of the pharmacists and 29 (80.6%) of the GPs surveyed believed generic brands of salbutamol are an adequate substitution for Ventolin. There were many reasons that were given for this, including that the generic branded salbutamol has to be proven (e.g. though Medsafe evaluation and PHARMAC assessment) to be bioequivalent and be an adequate substitute before PHARMAC funds the medication.

“They are tested/approved by pharmac as an adequate substitution” – GP12

“Medsafe evaluates all medicines available on pharmaceutical schedule to be bio equivalent” – PH42

Some pharmacists and GPs mentioned their own clinical experience of talking to patients who are satisfied with the generic brands and have been receiving sufficient symptom relief from them.

“We have been using them for a number of years and we have a large proportion of patients using the successfully. 68%” – PH21

“Obvious. I never see anybody presenting w asthma attack whose respigen inhaler has not helped. I used respigen by spacer in clinic daily, w symptom resoltion. And i ask patients did respigen help as opposed to ventolin when i change their old script. Rarely told ventolin is superior (sic).” – GP5

“Same drug, same delivery. I've never heard any clinical concerns apart from one or two patients say they have a different taste.” – GP28

Reasons against generic salbutamol as adequate substitutions for Ventolin included issues with quality of the generic brands (e.g. increased mechanical blocking), the alcohol content and bad/different taste of the generic brands, and patients reporting better relief from Ventolin.

“respigen appears suitable but salamol had a lot of patients complaining so we have stopped stocking this “– PH38

“Ventolin tastes different, is alcohol free and doesn't clog as much” – PH3

“I use Ventolin and it is far superior to any generic” – PH5

“The generics generally aren't so good where inhalers are used intermittently as they tend to clog up easier. may be due to particle size” – GP4

“Taste is offensive and I get feedback from a small number of people that they actually increase cough and discomfort temporarily or don't work as well.” – GP31

## DISCUSSION

This study aimed to investigate the driving influences for the high rates of Ventolin dispensing in New Zealand. By undertaking this research in four components, we were able to build a composite picture of what might be causing these high rates and the possible reasons behind them.

Maximal use of generic medication is important as this ensures the best cost savings for patients, as well as best health outcomes by freeing funds for other medicines that would otherwise be unaffordable under PHARMAC's fixed budget. However, this does not yet appear to be the case for New Zealanders, as Ventolin remains the preferred salbutamol inhaler. Such issues of extra costs to patients with branded medicines are particularly important for patients less able to afford \$4/inhaler pharmacy part charges or who otherwise experience financial difficulties. Cost can affect access to effective treatments. For dispensings overall (all medicines), 11.7% of parents of children living in the most socioeconomically deprived areas report having not collected a prescription for their child in the past 12 months due to cost, compared with 2.0% living in the least deprived areas – this being 5.2 times higher for those living in the most deprived areas, after adjusting for age, sex and ethnic differences. (1) Although the proportion of salbutamol dispensings for

Ventolin were lowest in the most deprived patients, at 40% this is still too high considering the corresponding loss of cost savings to patients who may be affected the most.

An important question to ask is: what are the barriers to maximising use of generic medications in New Zealand?

Both pharmacists and prescribers play an important role in informing patients about the medication they use and are ultimately the gate-keepers to the use of generic medications by patients in New Zealand. Al-Gedadi et al (2008) conducted a study looking into the perceptions and knowledge of patients towards generic medications. Only 112 (28.3%) of the respondents they surveyed were familiar with the term, "generic medicines". Of these respondents, 33.9% learned the term "generic medication" from their pharmacists, 25.9% of the respondents learnt it from their physicians and 23.2% from reading materials like newspapers. (6) The study by Babar et al (2010), found that patients who had better knowledge of generic medications were more prepared to change to generic medication when recommended by their pharmacist. (3)

Prescribers are encouraged to prescribe generically where possible. (7) Pharmacists in New Zealand hold the authority to generically substitute provided the prescriber has not requested "no brand substitution permitted" and that they have informed the patient of the brand substitution. (8) In many ways, the choice of what is dispensed at the pharmacy lies, not only in the hands of the patient, but with both the pharmacist and prescriber who hold the responsibility of informing patients about generic medications and offering these more affordable alternatives.

The third component of this study looks at how salbutamol prescriptions are handled by the prescriber and the pharmacy, identifying the consequences of decisions made at these different levels (figure 7). This component involved manually comparing what is written on the prescription to what is dispensed. The majority (69.2%) of the prescriptions at the prescriber level allowed the opportunity for generic substitution. However, 18.2% of these prescriptions were dispensed as Ventolin by the pharmacy minimising the possible cost savings to the patient.

It appears that although many prescribers may have the best intentions in supporting generic brand use, the terminology used on the prescription could yield different responses at the pharmacy level. When "salbutamol" was written on the prescription instead of the specific generic brand name (Salamol or Respigen), less generic salbutamol was dispensed than would be expected (see table 2).

These findings reflect the freedom that pharmacists have to make a choice of what to dispense when a non-specific term is written on the prescription. This choice may be swayed by many factors. Patient preference is a key component, influencing Ventolin dispensing at both the prescriber and pharmacy levels. However many studies show positive patient attitudes towards generic medications. A study by El-Dahiyat et al (2013) surveyed Jordanian patients' perceptions toward generic medicines. Out of 400 respondents, 92% preferred to be prescribed the cheapest medicine. (9) In another study by Shrank et al (2009), more than 70% of the respondents surveyed agreed that "generic drugs are better value than branded drugs". (10) Kobayashi et al (2011), reported that the respondents they surveyed that had experience using generic medications were 2.9 times more likely to have willingness for generic drug substitutions than those who did not have this experience. (11)

Therefore, it is possible that the pharmacist's own perceptions of generic medication has a role to play when choosing the salbutamol brand for the patient.

The final component of this study involved surveying pharmacists and prescribers for their opinions on generic salbutamol. While the sample size was small and unlikely to represent the population of pharmacists and GPs in New Zealand, but it did allow us gain a better understanding of their personal thoughts on generic salbutamol. There was a wide variety of attitudes regarding generic substitution amongst GPs and pharmacists, reflecting the findings found through the pharmacy claim data, that there is large variance in Ventolin dispensing rates between different prescribers and between different pharmacists.

### ***Limitations to study***

In the study component involving matching prescriptions to what had been dispensed, 1062 prescriptions were requested but only 325 were received. In addition, it was found that Sector Services were unable to select prescriptions specific to the prescriber/pharmacy pairing, only those prescriptions dispensed at selected pharmacies, independent of the prescriber. This greatly limited the data further because of the 325 prescriptions received, only 76 prescriptions were sent from the two selected prescribers. So instead of an investigation into select prescriber/pharmacy pairings showing unusual Ventolin dispensing characteristics, an analysis was done on the 325 prescriptions to identify whether there are any differences between what is written on the prescription (from a non-specified selection of prescribers) and what is dispensed (through four high rate Ventolin-dispensing pharmacies).

# CONCLUSION

The study findings from this research indicated rates of Ventolin dispensing at both the prescriber and pharmacy levels vary greatly. There are high rates of Ventolin dispensing in New Zealand, at all levels of socioeconomic deprivation and although it is possible that these high rates are patient driven, measures are not always taken by pharmacists and prescribers to minimise them. Pharmacists' and prescribers' opinions on generic medication are important. Their influence on Ventolin dispensing rates and on patient perceptions of generic medication should not be underestimated. In New Zealand, the use of generic salbutamol brands needs to increase to ensure the best cost savings to patients.

Further study could be done to directly link salbutamol prescribing and dispensing from a larger sample of prescribers and pharmacies. The New Zealand Electronic Prescription Service (NZePS) is a potentially useful tool able to connect prescribers and pharmacists directly. This service has the potential of producing quality data that will pave the way for further research on generic medication use in New Zealand.

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### **Conflicts of Interest.**

Author personally uses the Ventolin brand of salbutamol inhaler

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# APPENDICES

## Questionnaire for General Practitioners:

### **Variation in Salbutamol Prescribing - University of Otago Summer Studentship Project**

*Thank you for taking the time to do this survey. I am wanting to survey a random selection of prescribers, to gauge possible reasons for prescribing branded Ventolin<sup>®</sup> instead of generic salbutamol inhalers (Respigen<sup>®</sup> and Salamol<sup>®</sup>), or generic salbutamol instead of Ventolin<sup>®</sup> inhalers.*

*This will be an important component of my University of Otago Summer Studentship research project, for PHARMAC.*

*There are 12 questions and it shouldn't take longer than 5 minutes to complete. All responses will be anonymised.*

*Your feedback is much appreciated.*

*Olivia Badcock*

*Medical Student, working with PHARMAC's Medical Directors*

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1. Do you believe that generic brands of salbutamol (Respigen<sup>®</sup> and Salamol<sup>®</sup>) are an adequate substitution for Ventolin<sup>®</sup>?
  - Yes
  - No
2. If yes, why?
3. If no, why not?
4. Why do you think patients may prefer Ventolin<sup>®</sup> over generic salbutamol brands (Respigen<sup>®</sup> and Salamol<sup>®</sup>)?
5. Why do you think patients may prefer generic salbutamol brands (Respigen<sup>®</sup> and Salamol<sup>®</sup>) over Ventolin<sup>®</sup>?
6. Do you always feel comfortable talking through with patients the substitution of their Ventolin<sup>®</sup> with generic brands of salbutamol (Respigen<sup>®</sup> and Salamol<sup>®</sup>)?
  - Yes
  - No
7. In your experience, what factors can make this conversation difficult?

8. What kind of feedback have you received from patients when substituting their Ventolin® with generic brands of salbutamol (Respigen® and Salamol®)?
- Always positive
  - Mostly positive
  - Neutral
  - Mostly negative
  - Always negative
  - No feedback
  - No substituting done
9. What kind of feedback have you received from patients when substituting their generic brands of salbutamol (Respigen® and Salamol®) with Ventolin®?
- Always positive
  - Mostly positive
  - Neutral
  - Mostly negative
  - Always negative
  - No feedback
  - No substituting done
10. If applicable, please list what patients say:
11. If applicable, what additional issues have you encountered when substituting between Ventolin® and generic brands of salbutamol (Respigen® and Salamol®)?
12. Finally, what is the socioeconomic deprivation score of the area your general practice operates in?  
(1 being least deprived and 10 being most deprived)
- 1-3
  - 4-6
  - 7-10
  - Don't know
  - No Comment

Questionnaire for Pharmacists:

**Variation in Salbutamol Dispensing - University of Otago Summer Studentship Project**

*Thank you for taking the time to do this survey. I am wanting to survey a random selection of pharmacists, to gauge possible reasons for dispensing branded Ventolin<sup>®</sup> instead of prescribed generic salbutamol inhalers (Respigen<sup>®</sup> and Salamol<sup>®</sup>), or generic salbutamol when prescribed Ventolin<sup>®</sup> inhalers.*

*This will be an important component of my University of Otago Summer Studentship research project, for PHARMAC.*

*There are 12 questions and it shouldn't take longer than 5 minutes to complete. All responses will be anonymised.*

*Your feedback is much appreciated.*

*Olivia Badcock*

*University of Otago Wellington School of Medicine and Health Sciences / PHARMAC*

13. Do you believe that generic brands of salbutamol (Respigen<sup>®</sup> and Salamol<sup>®</sup>) are an adequate substitution for Ventolin<sup>®</sup>?

- Yes
- No

14. If yes, why?

15. If no, why not?

16. Why do you think patients may prefer Ventolin<sup>®</sup> over generic salbutamol brands (Respigen<sup>®</sup> and Salamol<sup>®</sup>)?

17. Why do you think patients may prefer generic salbutamol brands (Respigen<sup>®</sup> and Salamol<sup>®</sup>) over Ventolin<sup>®</sup>?

18. Do you always feel comfortable talking through with patients the substitution of their Ventolin<sup>®</sup> with generic brands of salbutamol (Respigen<sup>®</sup> and Salamol<sup>®</sup>)?

- Yes
- No

19. In your experience, what factors can make this conversation difficult?

20. What kind of feedback have you received from patients when substituting their Ventolin® with generic brands of salbutamol (Respigen® and Salamol®)?

- Always positive
- Mostly positive
- Neutral
- Mostly negative
- Always negative
- No feedback
- No substituting done

21. What kind of feedback have you received from patients when substituting their generic brands of salbutamol (Respigen® and Salamol®) with Ventolin®?

- Always positive
- Mostly positive
- Neutral
- Mostly negative
- Always negative
- No feedback
- No substituting done

22. If applicable, please list what patients say:

23. If applicable, what additional issues have you encountered when substituting between Ventolin® and generic brands of salbutamol (Respigen® and Salamol®)?

24. Finally, what is the socioeconomic deprivation score of the area your pharmacy operates in? (1 being least deprived and 10 being most deprived)

- 1-3
- 4-6
- 7-10
- Don't know
- No Comment

Reasons why pharmacists believe that generic brands of salbutamol (Respigen® and Salamol®) are an adequate substitution for Ventolin®?		
Theme	Subtheme	Frequency (n=27)
They are similar to Ventolin	• They provide the same dose	3
	• They have the same active ingredient	4
	• They work the same way/ have the same effect if administered correctly	2
	• Drug delivery is the same	1
	• They are as effective as Ventolin	1
The generic brands of salbutamol are effective		2
They have been researched and tested	• They have been proven to be effective (e.g. by Medsafe)	1
	• They have been proven (e.g. by Medsafe, clinical research) to be bioequivalent to Ventolin	4
	• They would have to be an adequate substitution to gain funding and registration in NZ	1
Cheap	• They are an affordable alternative	4
Patients tolerate them well	• Most patients don't complain about them	1
	• Most patients are satisfied with them	1
	- Respigen is well received	1
	• No problems with side effects	1
	• Pharmacy has been dispensing them for a number of years – history of patients using them successfully	1
Personal experience using them has shown they work well		1
They are an adequate substitution but do not seem as good as Ventolin		1
They are an adequate substitution if the different taste of the generic brands can be tolerated by patients		2
Respigen is an adequate substitute but Salamol is inferior in quality	• More problems with mechanical blocking of the Salamol inhaler – making it difficult for patients to rely on	1
	• Salamol is widely disliked due to taste	1

Reasons why GPs believe that generic brands of salbutamol (Respigen® and Salamol®) are an adequate substitution for Ventolin®?		
Theme	Subtheme	Frequency (n=27)
They are similar to Ventolin	• They have the same active ingredient	11
	• They have the same mechanism of action/ have the same effect	2
	• Drug delivery is the same	2
	• They are as effective as Ventolin	4
	• They are equivalent to Ventolin	2
They are clinically effective		1
They have been proven to be an adequate substitute before funding(e.g. by PHARMAC assessment)		4
Cheap	• They are an affordable alternative	1
Clinical experience supports the use of the generic brands	• Have given patients in the practice generic salbutamol and have observed asthma symptom resolution	2
	• Has not seen any significant differences between the brands	1
The packaging of the generic salbutamol is suitable		1
Have asked patients their opinion on using the generic brands	• Have expressed few concerns about the use of the generic brands	2
	• Has been rarely told by patients that Ventolin is superior as a reliever	1
They have the same active ingredient but have different propellants		2
Have not had any reasons to suspect otherwise		1

Reasons why pharmacists believe that generic brands of salbutamol (Respigen® and Salamol®) are NOT an adequate substitution for Ventolin®?		
Theme	Subtheme	Frequency (n=27)
Issues with quality of the generic brands	• Problems with mechanical blocking of the generic inhalers	5
	- Specifically Salamol®	2
	• Sub-therapeutic doses	1
	- Specifically Salamol®	2
They are different to Ventolin	• They do not have reliable effectiveness	2
	- Specifically Salamol®	2
	• They are not as effective	3
They may contain alcohol which can be a concern for patients (e.g. children)	- Specifically Salamol®	1
	• They have a different formulation	1
They can have a bad taste which can be a concern for patients	• They taste different	3
	- Specifically Respigen®	7
Patient's perceptions of the generic brands	- Specifically Respigen®	4
	- Specifically Salamol®	1
Patient's perceptions of Ventolin	• Have received patient complaints	1
	- Specifically Salamol®	1
	• Patients are not convinced that the generic brands and Ventolin are the same	1
Preference towards Ventolin due to personal use.	• Patients have less confidence in the generic brands	1
	• Patients report better relief from Ventolin	2
Patients have returned the generic medication to the pharmacy	• More patients request Ventolin over other brands	1
		1

**Reasons why GPs believe that generic brands of salbutamol (Respigen® and Salamol®) are NOT an adequate substitution for Ventolin®?**

Theme	Subtheme	Frequency (n=7)
Issues with quality of the generic brands	• Problems with mechanical blocking of the generic inhalers	1
	• They have poor performance	1
They can have a strange taste which can be a concern for patients		4
Anecdotal evidence from patients	• Patients experiencing reduced relief from the generic brands/they don't work as well	2
	• Patients experiencing increased cough and discomfort from the generic brands	1
Ventolin is more acceptable to patients	• Alcohol free	1
	• Better taste	1
	• Patients prefer the way Ventolin feels – “puff rather than a spray”	1