Cost-utility analysis comparing hospital-based intravenous immunoglobulin with home-based subcutaneous immunoglobulin in patients with secondary immunodeficiency

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Short title: CUA comparing IVIg with SCIg in SID

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Abstract

Background and objective: Immunoglobulin replacement therapy (IRT) is often used to support patients with primary immunodeficiency disease (PID) and secondary immunodeficiency disease (SID). Home-based subcutaneous immunoglobulin (SCIg) is reported to be a cheaper and more efficient option compared to hospital-based intravenous immunoglobulin (IVIg) for PID . In contrast, there is little information on the cost-effectiveness of IRT in SID. However, patients who develop hypogammaglobulinaemia secondary to other conditions (SID) have different clinical aetiology compared to PID. This study assesses whether SCIg provides a good value-for-money treatment option in patients with secondary immunodeficiency disease (SID).

Methods: A Markov cohort simulation model with six health states was used to compare cost-effectiveness of IVIg with SCIg from a health care system perspective. The costs of treatment, infection, and quality-adjusted life-years (QALYs) for IVIg and SCIg treatment options were modelled with a time horizon of 10 years and weekly cycles. Deterministic and probabilistic sensitivity analyses were performed around key parameters.

Results: The cumulative cost for IVIg was A$151,511 and for SCIg A$144,296. The QALYs with IVIg were 3.07 and with SCIg 3.51. Based on the means, SCIg is the dominant strategy with better outcomes and at lower cost. The probabilistic sensitivity analysis shows that 88.3% of the 50,000 iterations fall below the nominated willingness to pay threshold of A$50,000 per QALY. Therefore, SCIg is a cost-effective treatment option.

Conclusion: For SID patients in Queensland (Australia) the home-based SCIg treatment option provides better health outcomes and is cost-saving.

Keywords: cost utility analysis; health economics; subcutaneous immunoglobulin; intravenous immunoglobulin; secondary immunodeficiency; malignancy

Abbreviations:

A$	Australian dollar
AoQL-6D	Assessment of Quality of Life - 6 Dimensions
CT	Computed Tomography
FICS	Finance Information and Cost Service (department at SCHHS)
GCUH	Gold Coast University Hospital
GP	General Practitioner
HRQoL	Health-related Quality of Life
ICER	Incremental cost-effectiveness ratio
IgG	Immunoglobulin G
IRT	Immunoglobulin Replacement Therapy
IVIg	Intravenous Immunoglobulin Replacement Therapy
MBS	Medical Benefits Scheme
NBA	National Blood Authority
PID	Primary Immunodeficiency Disease
QALYs	Quality-adjusted life years
QLD	Queensland
RN	Registered nurse
SCHHS	Sunshine Coast Hospital and Health Service

SCIg	Subcutaneous Immunoglobulin Replacement Therapy
SE	Side Effects
SID	Secondary Immunodeficiency Disease
WTP	Willingness to pay

Introduction

Hypogammaglobulinaemia in primary immunodeficiency disease (PID) is genetic in origin, whilst in secondary immunodeficiency disease (SID), it is due to other conditions and/or treatment regimes. Hypogammaglobulinaemia places patients at an increased risk of developing infection, which in turn affects their morbidity and mortality. These patients benefit from immunoglobulin replacement therapy (IRT) to manage infection risk and to prevent the development of associated complications, such as bronchiectasis**.** **Unlike PID, the incidence of hypogammaglobulinaemia in SID increases with severity or stage of underlying malignancy and treatment regimes {Svensson, 2013 #208;Crassini, 2018 #538}, and there is an increase in major infections with the progression of underlying disease {Visentin, 2015 #547}.**

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In Australia, the demand for immunoglobulin products has been increasing by 11% each year for the last decade {Authority, 2015-16 #518**}. Reasons given for this increase were population growth and introduction of documents outlining criteria of product use** {Authority, 2015-16 #518}. In 2015/16 supply of immunoglobulin products cost reached A$541.5 million, which made up almost half of Australia's total blood budget {Authority, 2015-16 #518}. This treated less than 17,000 people, with SID patients being the highest immunoglobulin user group (22.2%), followed by patients with chronic inflammatory demyelinating polyneuropathy (21.5%) and PID (13.3%) {Authority, 2015-16 #518}.

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For decades the immunoglobulin product has been administered intravenously (IVIg) at a health service centre by a registered nurse once every 4 weeks. Subcutaneous immunoglobulin (SCIg), which can be self-administered by the patient on a weekly basis at a place convenient to them, became available in Australia in 2013 {Authority, 2015 #386}. ~~Unlike PID, the incidence of hypogammaglobulinaemia in SID increases with severity or stage of underlying malignancy and treatment regimes {Svensson, 2013 #208;Crassini, 2018 #538}, and there is an increase in major infections with the progression of underlying disease {Visentin, 2015 #547}.~~

Currently less than 4% of SID patients in Australia are using SCIg {Authority, 2016-17 #516}, which is comparable to the reported 4.6% use in Europe {Reiser, 2017 #417}. In contrast, approximately 50% of PID patients use SCIg {Huang, 2013 #382}. SCIg has been shown to be a cost-effective treatment option in various PID cohorts {Beaute, 2009 #118;Ducruet, 2013 #246;Högy, 2005 #249} and a combined cohort of PID and SID patients {Gerth, 2014 #4}. The disparity in SCIg uptake combined with the differences in aetiology between PID and SID, led us to question whether SCIg is a cost-effective treatment option in SID patients. To answer that question we undertook a cost-utility analysis, and focused on IRT use in SID patients, specifically on patients with acquired hypogammaglobulinaemia secondary to malignancy or its treatment regimes.

Methods

A Markov cohort simulation model was constructed to compare the hospital-based IVIg and the newer home-based SCIg treatment mode. ~~The IVIg mode is administered by a registered nurse at a hospital outpatient ward once every four weeks. The SCIg mode is administered by the patient independently on a weekly basis at a place convenient to the patient.~~

The difference in clinical pathways, disease progression, costs and health outcomes of the two treatment options were modelled using TreeAge Pro 2017, R2.1 (TreeAge Software, Williamstown, MA). Probabilistic sensitivity analysis was used to quantify the level of confidence in the output of the analysis in relation to uncertainty in the model inputs (e.g. cost and outcomes). The primary outcomes were **cost to the health care system and health outcomes, as per quantitated in QALYs**~~costs from the health care system perspective, and quality adjusted life years~~ (QALYs). The clinical outcomes modelled were the incidence of infection at home or hospital, development of bronchiectasis (with and without infection), bronchiectasis with chronic *Pseudomonas aeruginosa* infection, and mortality.

The target population was adult patients with SID specifically acquired hypogammaglobulinaemia secondary to malignancy or associated treatment. **The cohort included eight females and 5 males, with a mean age of 62.5 years (39-76). No patient developed bronchiectasis or died within the 24 months period. Four patients had bronchiectasis at beginning of observation period. Two patient deceased three years post commencement of data collection. Seven patients were retired, four employed and two patients reported to be unemployed at time of data collection.**

All 13 patients of whom clinical and cost data was collected, were treated at the tertiary Sunshine Coast Hospital and Health Services (SCHHS), which serves a population of approximately 300,000 people. We had ethics approval to administer the AQoL-6D survey to patients at the tertiary Gold Coast University Hospital to increase number of survey responses. Both hospitals are in Queensland Australia.

~~All patients received treatment at either the Sunshine Coast Hospital and Health Service (SCHHS) or Gold Coast University Hospital (GCUH) in Queensland, Australia.~~

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Model structure

The six health states used were: SID no infection, SID with infection, SID with bronchiectasis no infection, SID with bronchiectasis with infection, SID with bronchiectasis and chronic *Pseudomonas aeruginosa* infection, and death (Fig 1 and Appendix A). The different costs for healthcare associated with each health state, the quality of life estimate using the Assessment of Quality of Life - 6 Dimensions (AoQL-6D) instrument (www.aqol.com.au) and the probability of remaining or transitioning into another health state were taken into account. The transition probabilities were estimated from our cohort data or from the literature {Finch, 2015 #446}{Royle, 2011 #543}{Quint, 2016 #458}, and from the life table on mortality from all causes by age (www.abs.gov.au/ausstats/abs@.nsf/mf/3302.0.55.001).

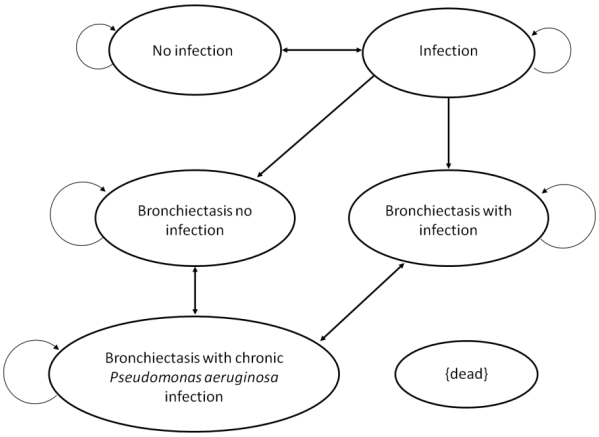

Fig 1 State transition diagram of a typical treatment pathway for patients with secondary immunodeficiency requiring immunoglobulin replacement therapy to manage infections. Each oval represents a chance node, arrows from all states to the absorption state (dead) were not included for ease of viewing.

As SCIg is administered weekly, a weekly cycle was chosen with a time horizon of 10 years. To assess the distribution of outcomes from the simulations based on ranges in treatment cost, transition probabilities and QALYs, a probabilistic sensitivity analysis with 50,000 iterations was performed. Triangular distributions with variations ranges from 50% to 150% of the mean value were selected to simulate changes in costs. The beta distribution was selected to assess variations in QALYs with observed means and standard deviations. The Dirichlet distribution was selected to account for multinomial probability distributions.

Data inputs and sources

Following ethics approval (HREC:15/QPCH/166) informed consent was obtained from 13 patients with SID treated at SCHHS. All patients received a minimum of 12 months IVIg before switching to SCIg between March 2013 and December 2016. Data from 12 months of IVIg and the subsequent 12 months of SCIg was collected.

Data on the number of infections (bacterial, viral and fungal), Emergency Department (ED) visits and hospitalisation due to infection were collected retrospectively from patient's medical charts and patient's General Practitioner (GP). Costs associated with this was provided by the Finance Information & Costing Services (FICS).

Probabilities

The mean annual number of infections in our cohort was 1.85 on IVIg and 2.31 on SCIg (n=13**), which was not statistically different (Table 1)**. We could not find any study that reported a significant difference in the number of infections between treatment options. The rate of hospitalisation due to infection in our cohort decreased from 0.13 on IVIg to 0.03 on SCIg (Table 1). Indicating that while the numbers of infections increased on SCIg, they may have been less severe in our cohort on SCIg.

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The infection data from our cohort was used in the model with the exception of transition probabilities for *Pseudomonas aeruginosa* infection and death. As neither were observed in our cohort over the 52 weeks period, data from the literature was used {Finch, 2015 #446;Quint, 2016 #458}. There appears to be no Australian data available on *Pseudomonas aeruginosa* infection and death. It has been reported that the risk of mortality in SID patients is 2.55 times higher compared to general population {Royle, 2011 #543}, which was included in the model (Appendix B).

Costs

The cost of Ig product per gram was obtained from the National Blood Authority (NBA) website in April 2018 (https://www.blood.gov.au/), this cost excludes plasma for fractionation {Authority, 2015 #386}. In Australia, 56% of Ig issued was the domestic product at $58.49/g for both IVIg and SCIg, and 44% was the imported product at $45/g for IVIg and $57.43/g for SCIg {Authority, 2016-17 #516}. The weighted mean cost was used in the model (Table 1). Our mean cohort product usage was 29.46g/month on IVIg and 31.15g/month on SCIg.

A mean of three training sessions was required for patients to reach competency at SCIg self-administration, which accrues a direct and indirect outpatient ward cost of $600. Each session lasted approximately 2.5 hours. The cost of consumables (syringes, needles, cannula, infusion lines, alcohol wipes) increased from $21.40/month on IVIg to $90.48/month on SCIg, due to the difference in frequency of administration (monthly versus weekly).

All patients used the Springfusor® pump (Go Medical Industries Pty Ltd)(A$100) to administer SCIg, which can be reused for approximately 100 infusions. In Australia, IRT is provided at no additional direct cost to patient {Authority, 2014 #145}. As these infusion pumps were provided by the health system, this cost was included in the model. The IVIg infusion equipment is used extensively for administration of other products for all patients treated at the outpatient ward, and this cost is included in ward cost for treatment (Table 1). **Therefore, the infusion equipment used for IVIg is a shared cost amongst all patients treated in that ward since the time the equipment was purchased (approx $2000). The life expectancy is estimated at 15 years and assuming it served three patients per day would equate $0.17 per patient.**

~~Patients were treated as either inpatients or outpatients.~~ The mean weekly direct and indirect ward cost for IVIg treatment was $53.54, and this included the use of a treatment chair for infusion and nursing supervision of 4-6 hours per infusion. SCIg treatment was $24.08 per week and included approximately 15 min of nursing staff time for review and the product pick up.

Analgesics to treat side-effects such as headaches were excluded, as these are over-the-counter medicines and not a cost to the health service. No serious adverse events requiring hospitalisation due to IRT where reported in our cohort.

Pathology tests to screen for infections (bacterial, viral, fungal) and to monitor serum IgG trough levels were included (Table 1). The mean cost of treatment for infection at ED is $401.81 for our cohort data, and $54.38 for treatment by GP. Whilst on IVIg, 38% of infectious episodes resulted in an ED instead of GP visit, and with SCIg 27% led to ED visits. The weighted mean cost was calculated for treatment of infection that did not require hospital admission (Table 1).

Data was collected over two consecutive years with the IVIg period being first. As the underlying disease may have progressed in this time, the mean length of hospital stay per infectious episode for

IVIg and SCIg period combined was used in the model. This was 3.29 days in patients without bronchiectasis and 5.50 days in patients with bronchiectasis per infectious episode. **Patients who started on home-based SCIg not willing to change to hospital-based IVIg after 12 months, Reasons given were difficulty with venous access, not having to drive to hospital, convenience of administrating at time and place of their choice.**

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Table 1 Mean cost per patient associated with IRT used to calculate the cost of each health state in the model

PROBABILITY	**IVIg**	**SCIg**	**Sources**
Infection requiring hospitalisation/total annual	3/24	1/30	SCHHS cohort data
Treatment sought for infection at ED/GP	9/15	8/22	SCHHS cohort data
MEAN LENGHT OF HOSPITAL STAY PER INFECTION (days)	**IVIg**	**SCIg**	**Sources**
Patients without bronchiectasis	3.75	2.67	SCHHS cohort data
Patients with bronchiectasis	5.44	5.67	SCHHS cohort data
MEAN WEEKLY COSTS (A$)	**IVIg**	**SCIg**	**Sources**
Ig product using mean SCHHS cohort data	357.29	417.10	NBA pricelist
Consumables (syringe, needles, lines...)	4.94	20.88	SCHHS cohort data
Springfusor® pumps for SCIg only	0	1.00	SCHHS cohort data
Direct and indirect ward cost for treatment	53.54	24.08	FICS data
Initial training cost of SCIg	0	600.00	FICS data
Haematologist Consult fee (two visits/year)	6.84	6.84	FICS data
Pathology test	6	4	Pathology QLD pricelist
MEAN WEEKLY COSTS - Patients with Bronchiectasis only	**IVIg**	**SCIg**	**Sources**
Respiratory Consult fee	8.95	8.95	FICS data
Respiratory function test (including ward direct and indirect cost)	18.07	18.07	FICS data
CT scan and X-ray	5.63	5.63	MBS data
MEAN COSTS per infection (A$)	**IVIg**	**SCIg**	**Sources**
Infection no hospitalisation	160.05	123.38	FICS data
Infection with hospitalisation	6,927	5,884	FICS data
Bronchiectasis with hospitalisation	9,580	12,855	FICS data

IRT = Immunoglobulin Replacement Therapy; IVIg = Intravenous Immunoglobulin; SCIg = Subcutaneous Immunoglobulin; SCHHS = Sunshine Coast Hospital & Health Service; ED = Emergency Department; GP = General Practitioner; FICS = Finance Information & Costing Services; A$ = Australian dollars; Ig = immunoglobulin; NBA = National Blood Authority, Australia; QLD = Queensland; MBS = Medical Benefits Scheme; CT = Computed Tomography;

Utility values

The AQoL-6D survey was handed out to each SID patient when they visited the SCHHS or GCUH for IVIg or SCIg treatment or pickup of SCIg product. **This survey was also handed out to patients who have only been on one treatment mode or where switched prior 12 months period was completed, hence were unsuitable to calculate annual infection rate and cost per treatment mode.** A total of 84 patients completed the survey, with some patients having completed the survey multiple times over the study period. A total of 192 responses was used to calculate the weighted utility values (Table 2).

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Table 2 Utility weights (n=84)

Health states	Utility score [95% CI]
No infection	0.71 [0.67;0.75]
With infection	0.70 [0.63;0.76]
With bronchiectasis no infection	0.64 [0.55;0.72]
With bronchiectasis with infection	0.63 [0.56;0.70]

Analysis

An annual discount rate of 5% was applied to all costs and health outcomes (QALYs), as this is standard practice in Australia {Committee, 2016`, September #534}. The incremental cost-effectiveness ratio (ICER) was calculated as the additional cost of SCIg compared to IVIg divided by the additional QALYs of SCIg compared to IVIg. The acceptable range of willingness-to-pay (WTP) used, was a cost-effectiveness ratio less than A$50,000 {Nimdet, 2015 #515}. (NB: A$1 ≈ US$0.73)

Results

The results show SCIg is the dominant strategy compared to IVIg, with greater QALYs at lower cost (Table 3).

Table 3 Results of cost utility analysis

	IVIg	SCIg	Difference	ICER
Cumulative cost	A$151,511	A$144,296	-A$7,214	
Cumulative QALYs	3.07	3.51	0.45	SCIg is dominant

QALYs = quality-adjusted life years; IVIg = Intravenous Immunoglobulin; SCIg = Subcutaneous Immunoglobulin: ICER = Incremental cost-effectiveness ratio

Deterministic sensitivity analysis

A deterministic analysis was conducted by allowing costs, utilities and discount rates to vary arbitrarily from their reported mean. Figure 2 shows that the model is most sensitive to costs without infection, i.e. product and IRT treatment costs, followed by costs of bronchiectasis. The product cost itself makes up the largest proportion of overall treatment cost. **Our sensitivity analysis showed that numbers of infections had no impact on outcome of model. The increase in infections of 83.4% from base case was defined as the threshold where SCIg is less effective than IVIg, but remained cheaper.**

Compagno's study {Compagno, 2014 #1} appears to be the only one comparing infection rate between IVIg and SCIg in SID patients and they reported no significant difference. This indicates similar probabilities of infection between treatment modes, while the cost associated for treatment of infection may vary between states and countries. However, variation in probability of infection had no effect on the model, and even increasing the probability of developing an infection by 300% produced no effect.

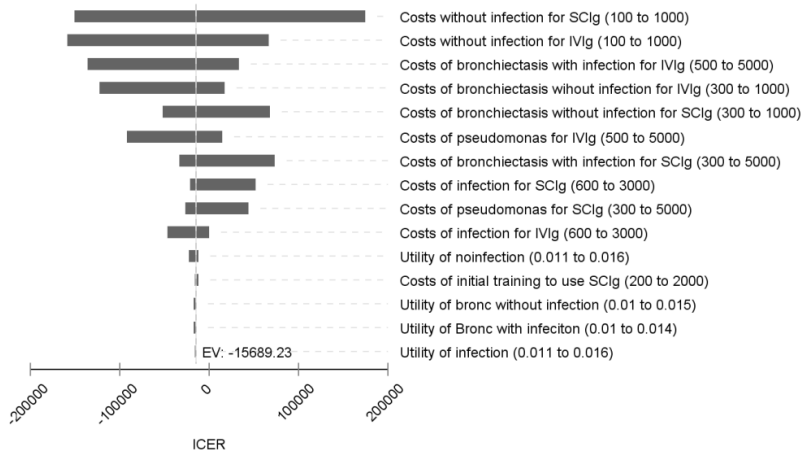

Fig 2 Deterministic sensitivity analysis: (The transition probabilities for developing infection had minimal effect, over the plausible range of probabilities, hence were not included in the diagram). The triangular distribution was used for all cost variables and a beta distribution for utility variables. Cost and utility values were derived from our cohort data.

IVIg = Intravenous Immunoglobulin; SCIg = Subcutaneous Immunoglobulin: ICER = Incremental cost-effectiveness ratio

Probabilistic sensitivity analysis

The SCIg treatment mode incurs a mean lower cost and overall higher QALYs compared to IVIg, including at the lower and upper bound 95% confidence interval.

The Monte Carlo simulation indicates that 88.4% of simulations lie below the WTP line (Fig 3). While 61.8% of those simulations had lower cost and higher QALYs, 26.6% had higher cost and higher QALYs but with an ICER <A$50,000. The SCIg mode was not cost effective in 11.7% of iterations (higher cost and lower QALYs), with an ICER greater than A$50,000 per QALY.

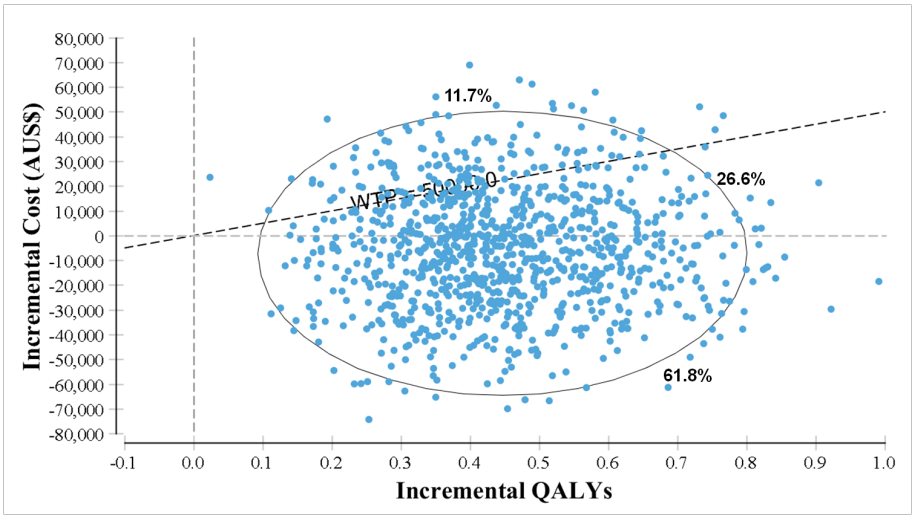

Fig 3 Probabilistic sensitivity analysis

WTP=willingness to pay; QALYs= quality-adjusted life years

Discussion

This is the first cost-utility analysis conducted to examine the cost-effectiveness of the home-based SCIg treatment option compared to the hospital-based IVIg in SID patients in Australia. The results of this analysis show that SCIg is a cost-effective treatment option for SID patients in Queensland (Australia), with mean cost savings over a 10 year period of A$8,082 with SCIg. **Based on the data from this small clinical study, SCIg appears to be the preferred administration mode.**

The mean age of our cohort was 63 years, similar to the 56 to 64 years reported in the literature {Rassenti, 2008 #542;Payandeh, 2015 #540;Payandeh, 2015 #540;group, 2016 #545}. It has been estimated that 52 - 62% of chronic lymphocytic leukaemia (CLL) patients have hypogammaglobulinemia at diagnosis {Svensson, 2013 #208;Andersen, 2016 #535}, with 17 - 27.3% having IgG deficiency {Andersen, 2016 #535;Freeman, 2013 #185}. Interestingly, hypogammaglobulinaemia at diagnosis has been reported with an increased all-cause mortality risk {Andersen, 2016 #535}, which suggest that it may be a marker of aggressiveness of cancer and progression of disease {Svensson, 2013 #208;Andersen, 2016 #535;Crassini, 2018 #538}. This distinguishes SID patients from PID patients. However, current SCIg guidelines for SID patients heavily rely on PID experience, including health economic analysis. Only a combined PID and SID model was found, which estimated SCIg being cost-effective for the health care sector {Gerth, 2014 #4}. Interestingly, the cost savings in our SID cohort are smaller compared to patients with PID using SCIg at the same hospital (data not shown).

In our cohort, SCIg was cost-effective despite the higher cost per gram with the SCIg product and the slightly higher mean SCIg dosage (31.15g/month) compared to IVIg (29.46g/month). It also resulted in an increase of serum IgG levels from 7.1g/L on IVIg to 8.4g/L on SCIg. However, despite this increase in IgG levels, the mean infection rate increased from 1.85 on IVIg to 2.31 on SCIg. In

contrast, one study reported an annual infection rate per patient as 2.29 on IVIg (n=33) and 1.76 on SCIg (n=61) {Compagno, 2014 #1}. A recent study of 231 SID patients reported an annual infection rate of 2.23, but did not distinguish between treatment mode {Benbrahim, 2018 #520}. Reports on IgG deficiency and the risk of developing infection in SID patients are contradictory. Some studies report no association with infection {Svensson, 2013 #208;Andersen, 2016 #535}. Another study reported low serum IgG levels as a risk factor for developing infections in SID patients (p=0.011), with an increase in number of infections with the progression of disease {Freeman, 2013 #185}.

SID patients are heterogeneous because of their different comorbidities, such as diabetes mellitus (12%), thyroid disease (12%) and chronic obstructive pulmonary disease (7%){Reiser, 2017 #417}. In addition, SID patients are often concurrently treated for their underlying condition, relapsing, refractory or have received a haematopoietic stem-cell transplant {Benbrahim, 2018 #520}. The heterogeneity of this cohort may explain why our infection rate is different to Compagno's study {Compagno, 2014 #1}. Although the infection cost is high, its contribution to the overall cost is insubstantial as the chance of developing an infection that requires hospitalisation is relatively small, even though it varies depending on the stage of underlying disease {Freeman, 2013 #185;Crassini, 2018 #538}. Our results show that even with an increase in cost due to infection by 300%, SCIg is still cost-effective.

Studies reported that while IRT resulted in a decrease in number of infections, this did not change overall survival {Benbrahim, 2018 #520;Raanani, 2008 #155}. Death due to cancer has been reported at 64.8% and is estimated to be 2.5 higher compared to general population {Royle, 2011 #543}. Risk of mortality in patients with bronchiectasis was reported as 2.2 times higher compared to general population {Quint, 2016 #458}. However, despite unchanged mortality risk with IRT, patients reported via our project specific questionnaire that they experienced an improved quality of life and less side effects with IRT (data not shown).

~~**Limitations**~~

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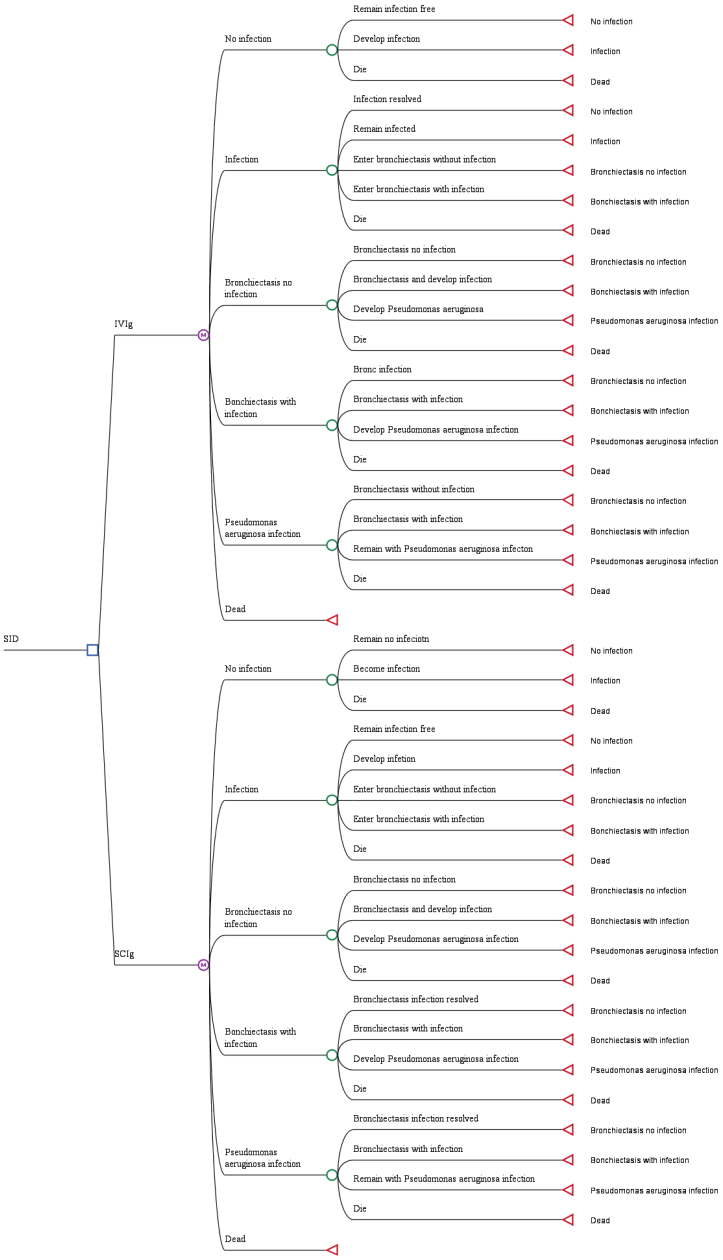
~~Data on infection was collected over two consecutive years with the IVIg period being the first 12 months, followed by SCIg. The increase in the number of infections may be due to the progression of underlying disease rather than treatment mode. However, the number of hospitalisations decreased in the SCIg period suggesting that the infections may have been less severe.~~

Conclusion

From a health care system perspective, SCIg is a cost-effective treatment option compared to IVIg for SID patients in Queensland, Australia. Switching SID patients from IVIg to SCIg would result in cost-savings to the health care sector, as well as improve the quality of life for the patient. Thus, based on this study, the development of an implementation strategy to shift SID patients from IVIg to SCIg is recommended.

Appendices

Appendix A: Markov model structure



Appendix B Transition matrices

Health states:	1	2	3	4	5	6 (Dead)
a) IVIg						
1) No infection	0.947	0.053				0.00034
2) Infection	0.592	0.313	0.063	0.031		0.00142
3) Bronchiectasis with no infection			0.917	0.050	0.030	0.00311
4) Bronchiectasis with infection			0.300	0.664	0.033	0.00311
5) *Pseudomonas aeruginosa* infection			0.182	0.091	0.718	0.00916
b) SCIg						
1) No infection	0.956	0.044				0.00034
2) Infection	0.463	0.486	0.024	0.024		0.00142
3) Bronchiectasis with no infection			0.924	0.054	0.019	0.00311
4) Bronchiectasis with infection			0.433	0.500	0.064	0.00311
5) *Pseudomonas aeruginosa* infection			0.182	0.091	0.718	0.00916

(1=SID no infection; 2=SID with infection; 3=SID with bronchiectasis no infection; 4=SID with bronchiectasis with infection; 5=Bronchiectasis with chronic *Pseudomonas aeruginosa* infection; 6=death)

Appendix C Summary of variables used in model

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Variable	Base case	Distribution	Low	High	Source
Costs without infection for SCIg	472.89	Triangular	100	1000	SCHHS cohort data
Costs without infection for IVIg	428.60	Triangular	100	1000	SCHHS cohort data
Costs of infection for IVIg	1434.58	Triangular	600	3000	SCHHS cohort data
Costs of infection for SCIg	788.19	Triangular	600	3000	SCHHS cohort data
Costs of bronchiectasis without infection for IVIg	466.09	Triangular	300	1000	SCHHS cohort data
Costs of bronchiectasis without infection for SCIg	510.38	Triangular	300	1000	SCHHS cohort data
Costs of bronchiectasis with infection for IVIg	1803.68	Triangular	500	5000	SCHHS cohort data
Costs of bronchiectasis with infection for SCIg	1058.08	Triangular	500	5000	SCHHS cohort data
Costs of pseudomonas for IVIg	1058.08	Triangular	500	5000	SCHHS cohort data
Costs of pseudomonas for SCIg	1058.08	Triangular	500	5000	SCHHS cohort data
Costs of initial training to use SCIg	600	Triangular	200	2000	SCHHS cohort data

Probability bronchiectasis no infection IVIg	0.262	Dirichlet	0.2096	0.3144	SCHHS cohort data
Probability bronchiectasis no infection SCIg	0.262	Dirichlet	0.2096	0.3144	SCHHS cohort data
Probability of bronchiectasis and developing infection IVIg	0.037	Dirichlet	0.0296	0.0444	SCHHS cohort data
Probability of bronchiectasis and developing infection SCIg	0.037	Dirichlet	0.0296	0.0444	SCHHS cohort data
Probability of no infection for IVIg	0.652	Dirichlet	0.5216	0.7824	SCHHS cohort data
Probability of no infection for SCIg	0.638	Dirichlet	0.5104	0.7656	SCHHS cohort data
Probability of infection for IVIg	0.040	Dirichlet	0.032	0.16	SCHHS cohort data
Probability of infection for SCIg	0.055	Dirichlet	0.044	0.22	SCHHS cohort data
Probability of death from bronchiectasis	0.0031	Dirichlet	0.0016	0.0046	Quint, 2016
Probability of death from pseudomonas infection	0.0092	Dirichlet	0.0046	0.0138	Finch, 2015
Utility of no infection	0.7073/52	Beta	0.011	0.016	SCHHS cohort data
Utility of infection	0.6956/52	Beta	0.011	0.016	SCHHS cohort data
Utility of bronchiectasis without infection	0.6392/52	Beta	0.010	0.015	SCHHS cohort data
Utility of bronchiectasis with infection	0.6278/52	Beta	0.010	0.014	SCHHS cohort data
Utility of pseudomonas	0.6278/52	Beta	0.010	0.014	SCHHS cohort data

References