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Quality of life, treatment beliefs and treatment satisfaction in children treated for Primary Immunodeficiency with SCIg

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Abstract

Despite the development of subcutaneous treatment, children and adolescents with Primary Immunodeficiency (PID) are vulnerable to a lower quality of life (QoL) than non-clinical participants. Comparisons have been offered in rare reports with limited sample sizes. No description is available of treatment beliefs and treatment satisfaction with standard tools. The objective of this study was to describe a large sample of patients with pediatric PID on QoL, treatment beliefs and satisfaction, and identify perceived benefits and issues of treatment both in children and parents. A mail-back survey was conducted in 60 patients with PID treated with subcutaneous Ig and their parents from a clinic in Montreal (Qc, Canada). We used the standardized tools to assess for QoL levels, beliefs of necessity and concerns with treatment and dimensions of satisfaction. We collected and coded perceived benefits and issues through open-ended questions. We found lower QoL in children with PID than in healthy non-clinical participants (median d=.40) and similar QoL levels to children with cancer (median d=.12). Participants considered their treatment as less necessary and able to control the illness and less convenient than patients with other conditions. Children were more prone to consider the treatment as convenient (69% vs. 47% p=.028) but reported more discomfort (24% vs. 10% p=.043) than parents. Results suggest a lower-than-expected QoL in pediatric PID. Aspects of the illness and treatment are probably unclear to patients and their families, as necessity beliefs were lower than expected. Educational strategies should be developed and assessed to address this issue.

Key words

Primary immunodeficiency; Quality of Life; SCIg; Treatment beliefs; Satisfaction.

Introduction

Primary Immunodeficiency (PID) is a heterogeneous group of rare diseases characterized by increased susceptibility to infections often accompanied by various immunopathological manifestations (autoimmune diseases, chronic inflammations, malignant or benign lymphoproliferative disorders) (1-3). This vulnerability to infection is due to a deficiency of one or more components of the immune system (4). The prevalence of PID has been estimated 2.27% in recent epidemiological studies with an incidence of 10.3/100 000 persons/year worldwide (5). Given the risk of infections and other complications, children with PID frequently require lifelong immunoglobulin replacement therapy (6-9). Recent treatment protocols have increasingly used subcutaneous administration of immunoglobulin doses (SCIg) in replacement to the traditional intravenous treatment (IVIg), especially in Europe and North America. SCIg-based treatments have received strong support since they are associated with better treatment outcomes including higher quality of life (QoL) (3, 10-14). As recent reports have demonstrated that clinician-rated severity is poorly correlated with the ratings of patients and parents, it is all the more important to consider patient reported outcomes in this population (15). The present study addresses treatment beliefs and QoL assessment in a population of children with PID treated by SCIg, using a mixed quantitative and qualitative data collection method.

Studies in the last five years have investigated the levels of QoL ratings in patients with PID (15-25), with only a handful of studies in pediatric populations (15, 17, 20, 22, 25). The findings suggested that patients with PID have lower QoL scores compared to healthy controls (15-23, 25). Yet, the studies also reported conflicting results when comparing PID patients to other chronic diseases such as diabetes (15, 24) and juvenile inflammatory arthritis (20, 25). Additional comparisons should thus be provided to evaluate the size of the difference with healthy controls as well as other illnesses, especially in larger pediatric samples.

Since patients with PID generally require a lifelong therapy, the characteristics of the treatment are an essential aspect of QoL. To date, what patients think of their treatment (i.e., their treatment beliefs) has only been studied when comparing IVIg and SCIg, with SCIg being associated with higher satisfaction and higher preference, (3, 26-30) the treatment being perceived as allowing greater independence and being more convenient (18, 26, 27, 29, 31-34). Although we know that treatment beliefs may strongly influence adherence and behaviors (35), there has not been any systematic inquiry on perceived benefits and issues of the treatment and on factors which may explain these beliefs. We may expect emotional well-being and treatment beliefs to be related, and more specifically negative beliefs to be associated with lower emotional well-being (or higher emotional distress) as it is the case with beliefs about the illness (36).

Our goal was to describe QoL levels and beliefs about treatment including perceived benefits and issues. We aimed to describe beliefs and compare them with those of patients with other conditions, as well as compare beliefs in respondents (i.e., children vs. parents). We also explored associations between treatment beliefs and emotional well-being.

Methods

Participants

Potential participants were identified from a list of patients diagnosed with PID at the Sainte-Justine UHC (Montreal, Canada) in the last 18 years. Only patients with SCIg therapies were included. Patients were eligible if they were treated with SCIg, were aged between 0 and 18 years and spoke French. Given the focus on treatment beliefs, we had no exclusion criteria except for the ability of the child or one parent to give valid responses to questionnaires.

Of the 90 eligible patients, 5 were unreachable (6%), 85 were contacted by the research team, and 3 declined to participate (4%). Of the 82 patients who agreed to participate, 63 completed and returned the questionnaires (77%). Of these, a subset of 60 responded to measures of QoL and treatment beliefs (mean age 11.7 ± 5.7 years, 36 boys 60%). The description of the patients' characteristics is provided in Table 1.

Procedure

The families were approached by telephone by a research coordinator (RD) and were invited to participate in the study. Families who agreed to participate were sent a cover letter with instructions, a set of questionnaires (child and parent versions), a consent form, and a pre-paid return envelope. Children and parents were asked to complete the questionnaires independently at home and mail them back to the research team. Child self-reports were used primarily for the analyses (N=45 for BMQ and PedsQL, N=26 for TSQM). When the child self-report was not available, we used the parent proxy-report (N=15 for BMQ and PedsQL, N=34 for TSQM). Medical data were collected from the medical charts. The study was approved by the Sainte-Justine UHC research ethics committee, and a written informed consent was obtained from all individual participants included in the study.

Measures

Pediatric Quality of Life Inventory 4.0 Generic Scale (PedsQL) (37). The PedsQL Generic Scale is a 23-item measure to assess health-related quality of life. It includes subscales measuring QoL in four domains: physical, emotional, social, and school (reliability coefficients α=.923-.897, .783-.831, .862-.876, .754-.834 for these domains and children and parents respectively). All parents completed the parent version of the questionnaire and children aged 8 and above completed the self-report version. The subscale scores ranged from 0 to 100, with higher scores representing better quality of life. As child and parent ratings have been consistently highly correlated in previous analyses (15), we report primarily on the child's rating and include the parents' ratings only when the child's is not available. This was adopted across all quantitative measures (PedsQL, BMQ, TSQM).

The Beliefs about Medicines Questionnaire-specific (BMQ) (35). The BMQ-Specific is a 10-item measure of patients' beliefs about their treatment. It includes two subscales: the necessity of the treatment and its efficacy to control the illness (sample item: "Without my treatment I would be very ill", α=.845-.885), and the concerns about the treatment (e.g., the beliefs about the side effects of the treatment such as long-term, toxicity, risk of dependence, disruption due to the treatment, sample item: "I sometimes worry about the long-term effects of my treatment", α=.629-.556). Following recommendations, parents completed the parent version of the questionnaire and children aged 8 and above completed the self-report version. The subscale scores ranged from 5 to 25, with higher scores representing stronger beliefs.

Treatment Satisfaction Questionnaire for Medication (TSQM) (38). The TSQM is a 14-item measure of patient satisfaction with treatment. It includes subscales measuring treatment satisfaction in four domains: side effects (α=.230-.775 unsatisfactory), effectiveness (α=.913-.902), convenience (α=.873-.687), and global satisfaction (α=.779-.830). Following authors' recommendations, parents of children aged 0 to 12 years completed the parent version of the questionnaire and children aged 13 and above completed the self-report version. The subscale scores ranged from 0 to 100, with higher scores representing higher satisfaction.

Perceived benefits and issues of SCIG treatment. We included two open-ended questions to investigate (a) perceived benefits or positive aspects and (b) issues or negative aspects of the treatment. The questions were answered by children and their parents (taking the perspective of their child): 1) What are the positive aspects of your current SCIg treatment (benefits and advantages)? 2) What are the negatives aspects of your current SCIg treatment (issues, drawbacks)?

Statistical analyses

For QoL, quantitative beliefs and satisfaction measures, we compared the present sample with published samples using Cohen's d. Cohen's d effect size is a measure of the differences between independent samples expressed in numbers of pooled standard deviation (39). We chose to focus on the size of differences instead of the standard statistical difference testing of the difference (e.g., t-test), as the latter may spuriously increase power when comparing the study sample with larger comparison samples, such as healthy norms or large clinical samples. To treat verbal responses to open-ended questions on benefits and issues, we categorized responses using a standard procedure of Thematic Content Analysis (40). This analysis is based on a set of defined procedures to inductively organize verbal material in consistent and distinct themes. Activities include combining codes into overarching themes that accurately depict the data (41). Finally, we regressed standardized measures of beliefs from the BMQ and TSQM on PedsQL-emotion to explore for associations of emotional well-being/distress with treatment beliefs. In this analysis, we adjusted the level of significance to .01 to account for multiple testing and controlled for age and sex. In other analyses the significance level was .05.

Results

When characterizing QoL levels in this population, as expected, the PID sample reported poorer QoL than the healthy sample (42) on all subscales with medium-size differences. Interestingly, children with PID reported similar QoL levels as children treated for cancer (42) either on- or off-treatment, and lower levels than children with diabetes (43) (Table 2). Differences were also smaller on the Emotion subscale than on School, Social, or Physical subscales. When the levels were compared with previous PID pediatric samples assessed with the same QoL instruments, we observed consistent levels across samples on all QoL domains (median across the QoL dimensions = 69.0-74.7) (15, 17, 20), with school functioning being consistently the lowest rated domain.

When exploring treatment beliefs and satisfaction, we found that perceived necessity in our PID group was markedly lower than in a comparison group of 105 patients with diabetes (44) (large difference of 14% with the diabetes group). Only negligibly small differences were observed with 40 patients who underwent renal transplant (45) (Table 3). We also observed that although global treatment satisfaction was not different than what was observed in a sample of 42 patients with cystic fibrosis (46), several subscores were lower. Indeed, PID patients and parents perceived lower convenience (medium difference), lower effectiveness (small difference) and more side effects (small difference) than patients with cystic fibrosis.

When analyzing responses to open-ended questions on perceived benefits of treatment, we found that responses could be categorized according to 7 themes: At home, Efficient, Convenient, Limited pain, Autonomy, Limited side effects, No need to miss school (see verbal examples for each theme on Table 4). The most common reported benefits were that the treatment was convenient, could be performed at home, and was perceived as efficient. When comparing frequencies of themes in children and their parents, children reported proportionately more frequently than parents about the treatment being Convenient (68.9% vs. 47.5%, p=.028) and yielding Limited Pain (22.2% vs. 8.2%, p=.041), although the latter was infrequent in both groups (Table 5). As for perceived issues, the same procedure identified 10 themes: Pain induced, Lengthy, Frequent, Discomfort, Makes bumps under skin, Needs planning in advance, Side effects, Stressful, Makes you feel different, Makes you feel constrained (Table 4). The most common reported issues were that the treatment induced pain, was long to administer, too frequent, and generated discomfort. When comparing frequencies in children and parents, children more frequently reported aspects related to Discomfort than parents did (24.4% vs. 9.8%, p=.043) (Table 5).

When exploring quantitative associations between treatment beliefs and emotional well-being, we found that Concerns about the treatment from the BMQ were negatively associated with emotional well-being from the PedsQL (β =-.363, p=.004, ΔR^2=.132) after adjusting for age and sex, suggesting that mood was associated with how participants perceive the side effects of SCIg treatment. We found no association involving Necessity beliefs from the BMQ. We also found that judgments on the treatment convenience were positively associated with higher emotional well-being (β=.368, p=.003, ΔR^2=.135), suggesting that mood was associated with personal judgments on convenience. We found no other significant associations with necessity judgments (BMQ) or judgments on effectiveness or side effects (TSQM). Full models are available in supplementary Table S1.

Discussion

In a single center cohort of 60 children with primary immunodeficiency treated with subcutaneous administration of immunoglobulin doses from Québec (Canada), we analyzed quality of life, beliefs about treatment, and satisfaction with treatment using validated standardized measures. To make interpretation possible, as no norms were available for these measures, we compared our results to data in the literature obtained from cohorts assessed in a similar way. The present study is particularly original since it includes a fairly large sample of 60 (as compared to Ns=19-43 from the previous reports (15, 17, 20)) and includes for the first time a systematic investigation of treatment beliefs and satisfaction, completed by a qualitative survey of benefits and issues related to treatment.

The levels observed on QoL dimensions are very consistent with previous observations made by Cole (17) in 23 children with chronic granulomatous disease under conventional treatment, Kuburovic (20) in 25 children with PID, and Titman (15) in 43 children with Primary Antibody Deficiency disorders. Importantly, all of these reports have used the same tool as we did and are therefore comparable. Our results confirm the differences observed by these authors, showing that QoL levels in PID patients appeared strikingly lower than in healthy children and than in children with diabetes (medium-large differences >.56 of pooled SDs). This is surprising, since diabetes shares common features with PID, including the fact that it is a lifelong disorder, requires regular infusions, and carries significant risks of complications. Notably, medium-large sized differences were noted on all dimensions of QoL except for emotional well-being, showing that practical and physical aspects of QoL are particularly lower in PID. Predominantly, functioning at school as well as social functioning with peers were low. More surprising was that QoL observed in our PID cohort was similar to QoL observed in children with cancer. Keeping in mind the important effect of cancer, the difficult trajectory of children, and the intense nature of treatment, the results set an important comparison point to describe QoL in PID children and their social environment (47). Similar levels on all domains were observed in our PID sample as in a previous cancer sample, including school, physical, social, and emotional functioning. To our knowledge, it is the first time that QoL in children with PID has been compared with that of children with cancer. These results suggest that improvements in the treatment modalities are still necessary to improve the quality of life of children with PID, even in patients treated with SCIg. Beyond the treatment itself, the results also underline that supportive resources, both from the clinics and the community should be secured to address the issue of QoL.

The results from the exploration of treatment beliefs showed that the belief of necessity, i.e., the belief that the treatment is necessary to treat the illness, that it is efficient to control symptoms or prevent complications, was much less adopted than could be expected, especially when one compares levels with ratings by patients with diabetes. It is possible that the illness and its treatment remain poorly understood by children despite a growing interest in this field of treatment perception (18). Diabetic patients have indeed benefited from elaborated and strong education strategies which have promoted adherence and self-care (48). It is also possible that PID being a complex set of rare heterogeneous illnesses, patients and parents have a hard time understanding these immune deficiencies and have a lack of informational resources. Of course, one cannot rule out the possibility that the disease was not well explained in our center and it will be therefore important to confirm these data in other centers. We also found unexpected differences with lower perceived convenience and effectiveness of treatment than in patients with cystic fibrosis. This is unexpected since cystic fibrosis is a chronic disease with frequent deteriorations that are taxing to QoL. Its treatment is mainly palliative involving a complex array of chest physical therapy, pulmonary rehabilitation, medicines, physical exercise, etc. which seems more complex than standard SCIg. Future research should investigate treatment perceptions in matched samples to ascertain and explain this difference. Together, the results on beliefs and satisfaction underline the necessity to improve how we explain the illness and its treatment to children and parents. Parents can act as major allies to promote desirable treatment beliefs and behaviors in children provided that they are given the appropriate tools (49). This is all the more important since a strong body of research supports the predictive link between illness and treatment perception on various outcomes in other chronic illnesses (50, 51).

We also qualitatively collected perceived benefits and perceived issues of treatment, calculated frequencies of benefits and issues, and further compared the perceptions of children and parents. This inquiry indicated that convenience was a definite characteristic of the SCIg treatment, with children reporting more often than their parents on this convenience. When looking into issues related to the treatment, we found that pain and discomfort were important aspects for our participants. Notably, children raised discomfort as an issue more often than their parents. This illustrates an interesting aspect of treatment beliefs, i.e., that these require a fine-tuned approach to be investigated: although the treatment was recognized as practical (convenient), it was identified as a source of discomfort or pain, and as generating bumps under the skin, for instance. Future studies should refine and develop such systematic perception collection to guide future improvements in treatment, especially in vulnerable population such as children. Moreover, as treatment administration is often performed by a parent, discomfort and pain often becomes a major issue in parent-child relations, and treatment time frequently becomes a challenge for parenting (52, 53). As there are differences on important perceptions between children and parents, our results suggest that perceived issues should primarily be reported by patients, as these will soon be fully in charge of their treatment behaviours and self-care activities.

Finally, the results suggest that some treatment beliefs may be associated with mood and distress. Here, distress was evaluated through the emotional QoL subscale (lower emotional QoL is indicative of distress as is evidenced from the PedsQL items, e.g., “I feel sad or depressed”). As could be expected, concerns about the treatment or expected side effects were related with reported distress. Distress was also associated with a lower perception of convenience. It is possible that mood may modify perception of treatment, or alternatively, that treatment modalities may impact mood and distress. However, the fact that concerns about side effects and perceptions of convenience go along with emotional experience speaks in favour of taking affectivity into account if one wishes to modify these treatment beliefs (54).

We should recognize the limitations of this research. First, we did not include a matched control sample. The comparisons made with external samples, which may vary in age, sex or other factors, should thus be interpreted with caution. Moreover, all patients were treated in one site. This is important, as treatment often bears site-specificities in this field, including treatment education. Yet, the final N=60 sample actually represented 66% of the total eligible cohort and outnumbers most published samples on QoL in pediatric PID. The participation rate of 91% (82/90) was also high. Although no information was available from non-participants, it is likely that results of this report reflect the entire cohort of our site. Second, due to developmental age constraints, it was not possible to obtain self-report from all children. Although it is an asset to include both respondents (child and parent), the issue of the validity of self vs. proxy ratings is still debated in pediatric behavioural or emotional assessment (55). Finally, our study is cross-sectional, which prevents us to make causal inferences when interpreting associations. Despite these limitations, the present study is the first to systematically compare QoL levels on a fairly large pediatric PID sample with external samples with a non-biased metric (effect size d) and to include a quantitative validated approach of treatment beliefs. It also used an original method to classify perceptions of treatment benefits and issues to comprehend the actual experience of young people treated for PID. Future research should explore the specificities of PID patients, including a lower-than-expected QoL as well as lower-than-expected beliefs on necessity and ability of the treatment to control for symptoms and complications. Consortia such as the Primary Immune Deficiency Treatment Consortium (PIDTC) (56) or the United States Immunodeficiency Network (USIDNET) (57) could be a great help to explore these issues in multi-centered surveys.

Conclusions

In a sample of 60 PID pediatric patients we found lower QoL in children with PID than in healthy non-clinical participants and similar QoL levels to children with cancer. Participants considered their treatment as less necessary and able to control the illness and less convenient than patients with other conditions. Children were more prone to consider the treatment as convenient but reported more discomfort than parents. The results suggest a lower-than-expected QoL in pediatric PID, which future research should investigate. Aspects of the illness and treatment are probably unclear to patients and their families, as necessity beliefs were lower than expected. Educational strategies should be developed and assessed to address this issue.

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Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Conflict of Interest

EH has received investigator-initiated grant from CSL Behring.
All other authors have no conflict of interest.

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Tables

Table 1. Patients' characteristics (n=60)

	n	%	Mean	SD
Age (years)			11.7	5.7
0-13	39	65.0		
14+	21	35.0		
Sex				
Boys	36	60.0		
Girls	24	40.0		
Time since diagnosis (years)			5.4	3.8
Diagnosis				
DiGeorge Syndrome	1	1.7		
Common Variable Immunodeficiency	53	88.3		
X-Linked Agammaglobulinemia	1	1.7		
IgG Subclass Deficiency	1	1.7		
Ataxia-Telangiectasia	1	1.7		
Hyper IgM Immunodeficiency	1	1.7		
SAD (Specific Antibody Deficiency)	2	3.3		
Severity*				
Standard	31	52.0		
Complex	29	48.0		
Treatment				
SCIg	60	100.0		
Treatment performed by				
Mother	23	38.3		
Father	3	5.0		
Both parents	18	30.0		
Child involved	13	21.7		
Other	3	5.0		
IgG levels (g/L)			10.2	2.9
Frequency of treatments				
Four times a month	56	93.3		
Other	4	6.7		
Missed treatments in the last three months				
No	43	71.7		
Yes, once or more	17	28.3		
School/Work status				
Preschool	10	16.7		
Elementary school	22	36.7		
High school	13	21.7		
College	5	8.3		
University	1	1.7		
Special class	1	1.7		
Part-time job	1	1.7		
Unemployed	7	11.7		

Note. * Severity levels refer to centrality of the immunoglobulin treatment and the absence vs. presence of other comorbidities or illness complication. 'Standard' is an isolated well-defined and simple deficit mainly treated with immunoglobulin. 'Complex' is associated with other conditions, complications or comorbidities with immunoglobulin being only one aspect of the treatment.

Table 2. Comparison of Quality of Life scores in pediatric patients with PID, Cancer, Diabetes, and Healthy non-clinical participants

	PID[a] (n=60)		**Cancer (n=219)**		**Diabetes (n=124)**		**Healthy (n=401)**		**PID vs. Cancer**	**PID vs. Diabetes**
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**d[b]**	**d**
Total	74.0	17.3	72.2	16.4	82.5	12.8	83.0	14.8	0.11	0.56***
Psychosocial[c]	73.6	16.8	72.6	16.4	81.2	13.8	82.4	15.5	0.06	0.49**
Physical	75.6	25.6	71.8	21.8	84.8	13.7	84.4	17.3	0.16	0.45**
Emotion	74.2	19.4	71.8	21.4	78.9	18.3	80.9	19.6	0.12	0.25
Social	79.9	20.5	76.8	20.3	89.2	13.9	87.4	17.2	0.15	0.53***
School	65.9	19.8	68.5	19.7	77.7	17.4	78.6	20.5	0.13	0.63***

[a] 15 (25%) of responses were provided by parents on behalf of their child. [b] Small effect: d=0.2; medium effect: d=0.5; large effect: d=0.8. [c] The psychosocial dimension summarizes all scores except the Physical scores. * p<.05 ** p<.01 *** p<.001. Comparison samples are from the following reports: Healthy and Cancer [42]: Varni et al. (2002). The PedsQL™ in pediatric cancer. *Cancer, 94(7)*, 2090-2106. Diabetes [43]: Upton et al. (2005). Measurement properties of the UK-English version of the Pediatric Quality of Life Inventory™ 4.0 (PedsQL™) generic core scales. *Health and quality of life outcomes, 3(1)*, 22.

Table 3. Descriptive statistics for treatment beliefs (BMQ) and treatment satisfaction (TSQM) in a sample of children with PID and comparison with previous samples with other conditions

	PID (n=60)		**Renal transplant (n=40)**		**Diabetes (n=105)**		**Cystic fibrosis (n=42)**		**PID vs. Renal transplant**	**PID vs. Diabete**
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Cohen's d[c]**	**Cohen's**
Beliefs of treatment[a]										
Necessity beliefs	19.0	4.3	20.7	3.7	21.7	3.4			0.42*	0.70***
Concern beliefs	11.2	3.9	12.1	3.8	12.0	4.3			0.23	0.19
Treatment satisfaction[b]										
Effectiveness	70.7	21.6					79.7	16.9		
Side effects	89.0	16.0					96.1	10.0		
Convenience	67.4	21.1					79.6	18.9		
Global satisfaction	80.6	17.4					78.8	16.1		

[a] 15 (25%) of responses were given by parents on behalf of their child (proxy ratings). [b] 34 (57%) of responses were given by parents on behalf of their child (proxy ratings). [c] Small effect: d=0.2; medium effect: d=0.5; large effect: d=0.8. * p<.05 ** p<.01 *** p<.001. Comparison samples are from the following reports: Renal transplant [45]: Zelikovsky et al. (2011). Medication beliefs and perceived barriers in adolescent renal transplant patients and their parents. *Pediatric Nephrology, 26(6)*, 953-959. Cystic Fibrosis [46]: Regnault et al. (2012). Validation of the Treatment Satisfaction Questionnaire for Medication in patients with cystic fibrosis. *Journal of Cystic Fibrosis, 11(6)*, 494-501. Diabetes [44]: Wisting et al. (2016). Psychological barriers to optimal insulin therapy: more concerns in adolescent females than males. *BMJ Open Diabetes Research and Car*e.

Table 4. Verbal examples of self-reported benefits and issues related to SCIg treatment in a sample of 60 children with PID

Themes	Verbal examples
Perceived benefits	
At home	"It's easier to do the treatment at home and I don't have to go to the hospital every mo
Efficient	"I have more energy and fewer infections"
Convenient	"SCIg takes less time. IVIg took one day"
Limited pain	"SCIg needles are less painful"
More autonomy	"I can choose when I want to do the treatment"
Limited side effects	"I have fewer side effects"
No need to miss school	"I don't have to miss school because I do the treatment at home"
Perceived issues	
Pain	"Infusion sites can be painful for 24 hours"
Lengthy	"It takes time to prepare and to administer the treatment"
Frequent	"I have to do it every week"
Discomfort	"Having two needles in your stomach is not comfortable"
Bumps under skin	"There are bumps under my skin"
Needs planning	"It can be difficult to fit the treatment into my schedule (school, holidays) "
Side effects	"Sometimes, there is itching and swelling at the infusion sites"
Stressful (incl. fear, stress, anger)	"I'm always anxious because of the needle"
Makes you feel different	"I can't do the same things as my friends"
Makes you feel constrained	"I don't like having to do the treatment"

Table 5. Frequencies of self-reported benefits and issues related to SCIg treatment in a sample of children with PID and their parents

	Children-report (n=45)		Parent-report (n=60)		
	N	**%**	**N**	**%**	**P**
Perceived benefits					
At home	27	60.0	28	45.9	.151
Efficient	25	55.6	29	47.5	.410
Convenient	31	68.9	29	47.5	.028*
Limited pain	10	22.2	5	8.2	.041*
More autonomy	8	17.8	14	23.0	.514
Limited side effects	6	13.3	7	11.5	.780
No need to miss school	6	13.3	4	6.6	.244
Perceived issues					
Pain	28	62.2	29	47.5	.134
Lengthy	14	31.1	10	16.4	.074
Frequent	12	26.7	13	21.3	.518
Discomfort	11	24.4	6	9.8	.043*
Bumps under skin	8	17.8	4	6.6	.072
Needs planning	7	15.6	3	4.9	.063
Side effects	5	11.1	4	6.6	.412
Stressful (incl. fear, stress, anger)	5	11.1	3	4,9	.232
Makes you feel different	2	4.4	3	4.9	.904
Makes you feel constrained	2	4.4	2	3.3	.769

Table S1a. Summary of hierarchical regression analyses for emotional well-being predicting concerns about treatment from the BMQ (n=60)

	Model 1			Model 2		
	B	SE	β	B	SE	β
Age	-.003	.087	-.004	.004	.082	.006
Sex	.397	.979	.052	.305	.920	.040
Emotional well-being (PedsQL-E)				-.071	.024	-.363*
ΔR^2		.003			.132*	

*p=.004

Table S1b. Summary of hierarchical regression analyses for emotional distress predicting convenience of treatment from the TSQM (n=60)

	Model 1			Model 2		
	B	SE	β	B	SE	β
Age	-.602	.489	-.155	-.682	.458	-.175
Sex	-2.376	5.570	-.054	-1.574	5.217	-.035
Emotional distress (PedsQL-E)				.417	.133	.368*
ΔR^2		.028			.135*	

*p=.003