

# **SKIN FIRST: COUNTING THE COST OF PERISTOMAL SKIN COMPLICATIONS**

Report for Hollister Incorporated

**2 OCTOBER 2024**

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## 1 Executive summary

It is estimated that 148,886 people are living with a stoma in England, and around 21,000 people have stoma surgery each year. A common, usually preventable complication associated with having a stoma is poor skin health, called a Peristomal Skin Complication (PSC). Hollister Incorporated, a developer and manufacturer of ostomy products, commissioned Frontier Economics to explore the impact of PSCs in England.

### PSC treatment in England

PSCs have several causes and are classified by severity (mild, moderate and severe). People living with a PSC should see a stoma care nurse (SCN) as soon as possible to provide a suitable diagnosis and treatment course.

Access to an SCN may differ by person and across regions in England, meaning some people can experience delays in receiving treatment. These delays are worse in areas with more limited awareness and availability of SCN services, where people with a PSC first visit non-specialised healthcare services or self-care. This delay may increase the duration of the PSC and the usage of other health and care services.

### Approach

We carried out a Cost-of-Illness (CoI) analysis to estimate the cost of PSCs in England each year. We included healthcare costs to the NHS and non-financial costs due to individuals' reduced quality of life, which have been valued in monetary terms for comparison. Costs are reported in 2021/22 prices.

### Results

We estimate that the cost of a PSC is at least £316, of which £131 is due to individual quality of life losses and £185 is due to additional healthcare costs to the NHS.

This cost varies depending on the severity of the PSC. We estimate that the cost of mild PSCs is £204 on average, increasing to £347 for moderate PSCs and more than doubling to £751 for severe PSCs.

Additionally, some costs are incurred while people wait for access to PSC treatment. We estimate that each week of delay leads to a cost to individual health of £18 for mild, £36 for moderate and £48 for severe PSCs and an additional healthcare cost of up to £43 per week.

We estimate that the total cost of PSCs in England each year is £28.1m, of which £16.4m are healthcare costs to the NHS and £11.7m are non-financial quality of life losses to individuals with PSCs. This is based on an average cost per PSC of £396 and 71,009 PSCs per year.

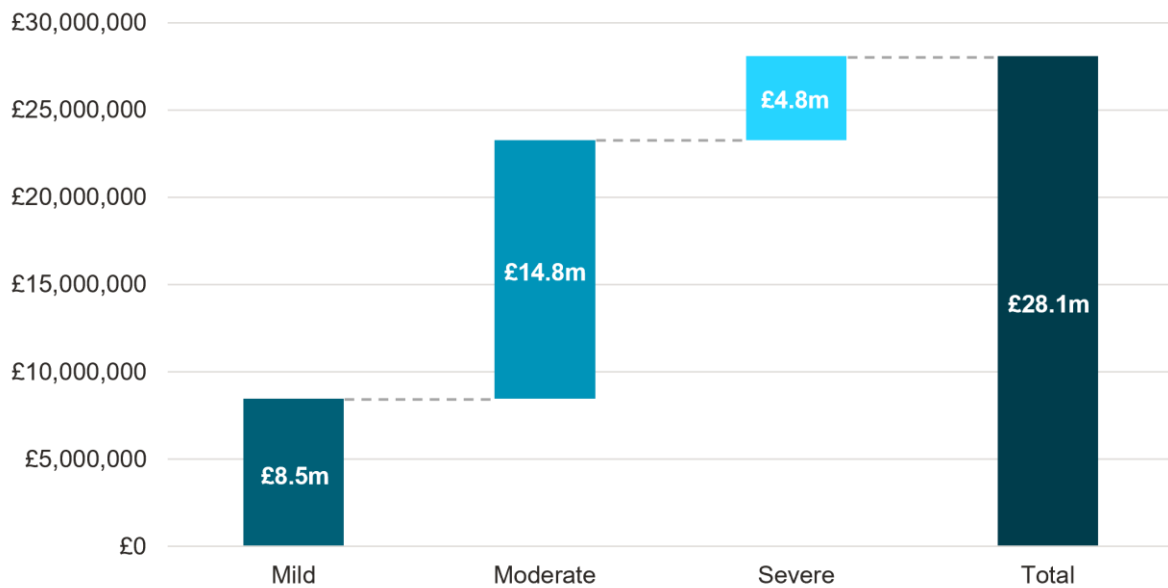
# £28.1 million

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Healthcare and individual costs of PSCs in England each year

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**Figure 1** Total cost of PSCs in England each year, by severity



Source: Frontier Economics

### Limitations

This analysis is limited by a lack of real-world data on PSCs. Further research would be valuable to explore the number of PSCs which could be avoided, and for those PSCs which cannot be avoided, how treatment can be optimised to minimise delays and resulting costs to individuals and the NHS.

Additional potential impacts of PSCs were not considered within this analysis. PSCs may affect individuals' contribution to the wider economy, for example, due to sickness absences and time off work for medical visits. Stakeholders also suggested to us that PSCs can lead to product waste, such as due to the disposal of stockpiled products that are no longer in use. Further research would be valuable to explore these potential impacts.

### Conclusions

The costs of PSCs across England are significant. However, these costs could be reduced by:

- **Avoiding PSCs:** Our analysis suggests that each PSC avoided could avoid an average of £396 in costs to individuals and the NHS. Additionally, earlier identification and treatment of PSCs might reduce the average severity of PSCs. This could reduce the overall and average cost in England per year.
- **Enhancing SCN access:** Our analysis suggests that any delay in receiving treatment leads to additional costs. Ensuring people with PSCs have access to the information, products and NHS services they need will reduce the costs to individuals and the NHS.

## 2 Introduction

A stoma is an opening in the abdomen that allows bodily waste (faeces and urine) to be diverted from the body directly into a stoma bag without going through the full digestive system. It is estimated that 148,886 people are living with a stoma in England, and around 21,000 people have stoma surgery each year.<sup>1,2</sup>

A common, usually preventable complication associated with having a stoma is poor skin health, called a Peristomal Skin Complication (PSC). PSCs have several causes and are classified by severity. The most common of which are irritant contact dermatitis, often a result of effluent leakage onto the peristomal skin, and mechanical trauma, from the frequent removal and re-application of adhesive products. The severity of a PSC can range from very mild symptoms, such as light itchiness, to severe ones, such as bleeding.<sup>3</sup>

PSCs have been shown to be associated with impacts on individuals' health outcomes and social care systems. For individuals, PSCs often lead to poorer health outcomes by causing discomfort and reducing their quality of life.<sup>4</sup>

***“The impact of PSCs on quality of life, such as isolation and intimacy can be huge.”***  
***(Senior Executive, stoma charity)***

As PSCs usually require medical attention, this impacts social care systems through increases in healthcare costs.<sup>5</sup>

Although evidence about some of the PSC impacts exists, there is currently no estimation of the overall cost that it creates for England. Hollister Incorporated, a developer and manufacturer of ostomy products, would like to assist in closing this gap. Hollister commissioned Frontier Economics to undertake an analysis to explore the impact of PSCs in England. This type of analysis will help shed light on the burden that PSCs create for people living with a stoma and the economy as a whole.

This report summarises the findings of our analysis:

- Section 3 presents our approach to the study.
- Section 4 discusses PSC access, treatment and impacts.
- Section 5 provides an outline of our economic modelling.

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<sup>1</sup> Kettle, J (2019), <https://www.eoecph.nhs.uk/Files/Integrated%20Care/StoMap%20Baseline%20Report%20FINAL.pdf>

<sup>2</sup> Aibibula et al (2022), <https://doi.org/10.12968/bjon.2022.31.6.S30>

<sup>3</sup> Hollister (Accessed 29/08/2023), <https://www.hollister.co.uk/en-gb/ostomycare/ostomylearningcenter/maintaininghealthyskin/top8signsyourperistomalskinisirritatedordamaged>

<sup>4</sup> Nichols et al (2019), <https://journals.lww.com/10.1097/WON.0000000000000666>

<sup>5</sup> Taneja et al. (2017 & 2019) <https://journals.lww.com/00152192-201707000-00008> & <https://journals.lww.com/00152192-201903000-00010>

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- Section 6 discusses the results and limitations.
- Section 7 concludes.
- Annexes provide further technical information.

### 3 Approach

Our approach is summarised in Figure 2 below.

**Figure 2 Approach**



Source: Frontier Economics

In Stage 1 we carried out a targeted **evidence review**. This first stage helped us identify the treatment pathway taken by people with a PSC and the expected impacts of PSCs. We examined academic, clinical and grey literature, with a particular focus on recent articles based on UK or EU data. From these sources, we were able to extract information on the incidence, risks and associated impacts of PSCs. We also gathered data to support the analysis, including the common forms of treatment, use and cost of healthcare interventions and quality of life estimates.

In Stage 2 we **identified impacts** of PSCs. This stage is built upon the information gathered in Stage 1. We identified impacts on individuals, the health care system, and wider society. We captured these impacts in a clear framework.

In Stage 3 we carried out **economic modelling**. We used a cost-of-illness (CoI) approach, which is a well-established approach for measuring "medical and other costs resulting from a specific disease or condition" occurring in a specific population.<sup>6</sup>

In Stage 4 – which was partly carried out simultaneously with Stages 1-3 – we sought **external validation**. To ensure the soundness of this analysis, we conducted two workshops with stoma professionals and stoma charities. These workshops tested that our understanding of PSC treatments and impacts reflects the reality in England. We also tested our key modelling assumptions and final results.

<sup>6</sup> Centers for Disease Control and Prevention (Accessed 16/10/2023), <https://www.cdc.gov/policy/polaris/economics/cost-illness/index.html>



## 4 PSCs in England: Access, treatment and impacts

In this section, we present the findings of our evidence review, which includes an explanation of PSCs, their causes and severities. We also discuss the ways that PSCs are being treated in England. We then also list and discuss the impacts of PSCs that were identified in the literature.

### 4.1 PSC causes and severity

PSCs are defined as skin damage, inflammation or injuries under the stoma adhesive portion of the stoma pouch or near it (3/4 inches) in or around the area of the stoma.<sup>7</sup> It is a very common complication among people living with a stoma, with incidence reported to be as high as 75% in some studies.<sup>8,9</sup> PSCs can occur for any person living with a stoma, regardless of the length of time with a stoma.

There are five most likely causes of PSCs. The most common cause is irritant contact dermatitis as a result of leakage of effluent onto the peristomal skin. The second most common cause is mechanical trauma caused by the application and removal of appliances. Others include allergic reactions, and disease-related and infection-related causes, although these are less common. PSCs will often present slightly differently depending on the cause and will require different treatments. For example, for irritant contact dermatitis, the individual is likely to present with sore, inflamed and discoloured peristomal skin, whereas PSCs caused by mechanical trauma are likely to present with blisters or broken skin.<sup>10</sup> See Annex C for more examples of standard treatments.

PSCs are usually classified by severity: mild, moderate and severe. The categorisation of a PSC's severity is complex and depends on physical symptoms (e.g., presence of an ulcer, presence of bleeding from the stoma) and sensory symptoms (e.g., pain, itching). An Ostomy Skin Tool was developed in 2010 to help clinical professionals with the severity categorisation of PSCs.<sup>11</sup> Whilst the original tool focused on visual symptoms (across three domains: discolouration, erosion and tissue overgrowth), an updated version was published in 2022 to include sensory symptoms measured using the pain, itching and burning (PIB) score.<sup>12</sup> The

<sup>7</sup> Salvadalena, et al. (2020), <https://doi.org/10.1097/WON.0000000000000666>

<sup>8</sup> Ostomy Life Study 2018/19. <https://www.coloplastprofessional.co.uk/stoma/clinical-evidence/ostomy-life-study-18-19/>

<sup>9</sup> Salvadalena, et al. (2020), <https://doi.org/10.1097/WON.0000000000000666>

<sup>10</sup> Burch, et al. (2021), <https://doi.org/10.12968/bjon.2021.30.Sup6.1>

<sup>11</sup> Martins, et al. (2010), <https://doi.org/10.12968/bjon.2010.19.15.77691>

<sup>12</sup> Martins, et al. (2022), <http://www.magonlinelibrary.com/doi/10.12968/bjon.2022.31.8.442>

vast majority of PSCs (80-95%) are categorised as either mild or moderate with roughly equal proportions of each. The remaining 5-20% of cases are classified as severe.<sup>13,14</sup>

### 4.2 PSC treatment pathway in England

Given the variety of causes and severity of PSCs, it is important that a person with a PSC see an SCN as soon as possible. An SCN is a qualified and experienced senior nurse whose role is to provide long-term support to ostomates who have all types of stomas.<sup>15</sup> In addition, they are involved in the coordination of ostomate treatment, including liaising with the surgical team and other members of the multidisciplinary team that may be involved in an individual's care.<sup>16</sup> Given the SCN's experience and relevant knowledge, they are best suited to understand the underlying cause of the PSC, categorise the severity level using the Ostomy Skin Tool (or something similar) and provide a suitable diagnosis. The SCN will then also be able to prescribe and coordinate the most suitable treatment. In this study, we refer to the pathway from the moment that an ostomate presents with PSC symptoms to the SCN until the episode is fully treated as the standard PSC treatment stage.

Although the treatment of PSCs is standardised once an SCN is seen, access to an SCN may differ greatly between people and across regions in England. In this study, we refer to this stage as the access stage. During this access stage, some people will attempt to self-treat their PSC symptoms with over-the-counter medications and other treatments. They may also might seek advice from non-specialised healthcare professionals and people living with a stoma about self-care.

In very few cases, a person living with a stoma may experience very limited (or no) access to an SCN, for example if they live in a remote area. In such cases, the individual will spend their whole journey in the access period. However, experts suggested that this will apply to very few people living with a stoma. We have not included this scenario in our cost estimates.

Furthermore, anecdotal evidence provided by clinical experts suggests that some people with milder PSC symptoms may be unaware that they can seek treatment and consider this a 'normal' part of having a stoma. Due to data limitations, it was not possible to include this delay in our cost estimates.

Figure 3 below presents a simplified illustration of the journey of a person with a PSC.

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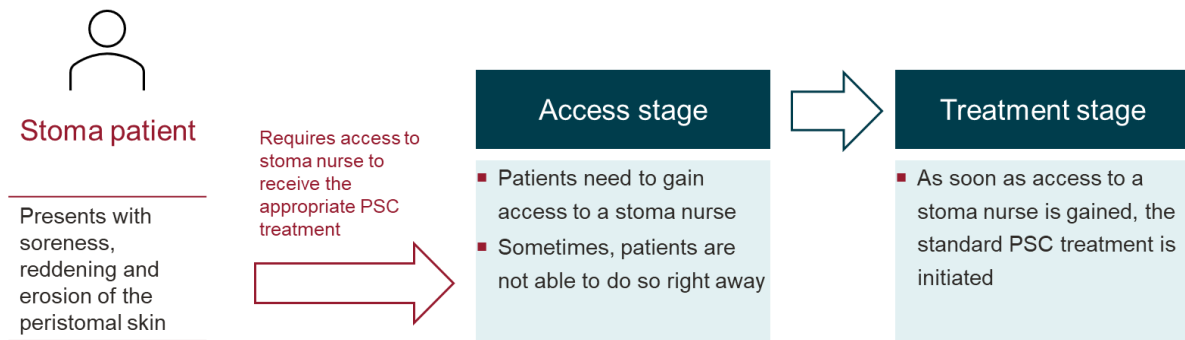
<sup>13</sup> Meisner, et al. (2012) <https://doi.org/10.1371/journal.pone.0037813>

<sup>14</sup> Salvadalena, et al. (2020), <https://doi.org/10.1097/WON.0000000000000666>

<sup>15</sup> Oakmed, (Accessed 16/10/2023), <https://www.oakmed.co.uk/help-advice/advice-articles/what-is-a-stoma-care-nurse/>

<sup>16</sup> Bladder & Bowel Community (Accessed 16/10/2023), <https://www.bladderandbowel.org/bowel/stoma/role-stoma-nurse/>

**Figure 3 PSC journey illustration**



Source: Frontier Economics  
 Note: Stylised illustration

We detail each of those stages in turn below.

**4.2.1 The standard treatment process**

Once a person has contact with an SCN, they should be recommended to follow the standard PSC treatment process, which is a function of the PSC cause and its severity. Figure 4, presents a stylised illustration of the standard PSC treatment by severity. Variations in cause would also impact the treatment prescribed in each stage. Annex C presents further details about how the treatment varies by cause.

**Figure 4 Standard PSC treatment**



Source: Frontier Economics  
 Note: Stylised illustration

On a high level, in the first stage, the individual presents to their SCN with PSC symptoms, e.g., soreness and reddening of the peristomal skin. The SCN assesses the peristomal skin and offers a diagnosis and treatment plan. Often, the first stage of treatment is to adjust/re-size or change the stoma products used. This will often be followed by at least one check-up. If it is clear that the PSC is due to an allergic reaction, disease or infection, then the person may be referred to a specialist (most commonly a dermatologist). The specialist would assess

the peristomal skin and recommend a course of treatment. For a minority of severe cases, (where there might be a poorly formed stoma) surgery may be needed to revise the stoma size or positioning with the potential need for additional hospital or at-home support.<sup>17</sup>

### 4.2.2 The access stage of treatment

Access to an SCN, and the standard treatment pathway described above, can vary between individuals. This depends on several factors, including how recently an individual had their stoma surgery and on the availability and awareness of SCN services in their local area.

People who have more recently undergone stoma surgery are likely to have better access to the correct stoma care. Recent ostomates - those who had their stoma surgery in the last 90 days - are monitored by an SCN after their surgery with regular check-ins. Whilst this level of monitoring might differ across regions, all recent ostomates should have some level of contact with an SCN for up to 3 months post-discharge.<sup>18</sup> This regular contact means the SCN might identify the PSC as part of a regular post-operation check-up. In addition, those with a recent stoma are more likely to have their SCN contact details, facilitating direct SCN access, and should be aware of their ability to contact the stoma care service if they notice any side effects, including PSCs, after the surgery. As such, recent ostomates who experience PSC symptoms should not experience delays in starting the appropriate standard PSC treatment.<sup>19</sup>

Non-recent ostomates experience more variable access to an SCN. Experts suggest that most non-recent ostomates face some delay in accessing the correct specialist stoma care. In areas where availability and awareness of stoma care services (among both people with a stoma and other healthcare professionals) is lower, delays in accessing these services will be longer. For example, the person may be unaware of how to contact the SCN services and might initially contact other local health providers, such as their GP or a district nurse. If their GP/district nurse is not aware of the available specialist care, they will attempt to assist the person by prescribing other medications and products that may not be best suited to treat the PSC. This can lead to seeing the GP/district nurse several times and trying various unsuitable treatments. In almost all cases, those individuals would eventually be referred to the SCN, but starting the standard PSC treatment would be delayed.<sup>20</sup>

This delayed access to the correct specialist care is likely to have three main implications:

1. Increase in the duration of individuals' poorer health outcomes: Non-stoma specialised healthcare professionals may have difficulty identifying the PSC and prescribing the

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<sup>17</sup> Examples of how this process would vary in practice by severity and cause of the PSC are available in Annex C.

<sup>18</sup> Davenport, (2014). <https://doi.org/10.12968/bjon.2014.23.22.1174>

<sup>19</sup> We note that in some very extreme cases, new ostomates with a PSC would experience delay in accessing an SCN, but from conversations with external professionals, we understand that this is an extremely rare occasion.

<sup>20</sup> We note that in some very extreme cases, non-recent ostomates will never be able to access an SCN, but from conversations with external professionals, we understand that this is an extremely rare occasion.

correct treatment, which means a delay in receiving effective treatment. This increases the time that a person suffers from the PSC.<sup>21</sup>

2. Ineffective use of NHS resources: Seeing a GP/district nurse instead of an SCN may lead to incorrect use of NHS resources and reduces the availability of those services for other, more suitable individuals.
3. Increase in NHS expenditure on treatment: Any GPs/district nurses prescribing ineffective treatment (e.g., medications) would increase the costs of treatment to the NHS.

The reasons for the diversity of access to an SCN are varied, however, experts suggest that in areas with better access to stoma care, there may also be additional SCN services that are supported by private companies (including sponsored SCNs and online and telephone support). Experts also indicated that these areas with private sponsorship increase the availability of specialist stoma care and help to raise awareness of the local stoma care service offering, reducing the delay of non-recent ostomates experience. It is estimated that about 70% of England has an SCN service supported by such a scheme.

Understanding the drivers of variation in access to SCNs was beyond the scope of this analysis, but its impact on the Col is important. The longer the delay in accessing an SCN and starting the standard PSC treatment, the greater the impact.

The patient journey outlined above is a simplified overview of the PSC treatment process and access to it. There are likely to be deviations from this, such as people with a stoma receiving suitable treatment from care home staff, recent ostomates that don't receive regular check-ups post surgery or individuals living in a remote area without access to stoma services. Exploring these potential scenarios was beyond the scope of this analysis.

### 4.3 Impacts of PSCs

The literature identifies several potential impacts of PSCs. Due to data limitations, not all identified impacts are quantifiable. These instances are noted below.

#### Individual health

A PSC can impact upon an individual's physical and mental health. Several studies have assessed the impact that PSCs have on an individual's health-related quality of life (HRQoL). In most cases, the change in HRQoL is measured in Quality-Adjusted Life Years (QALYs)<sup>22</sup> or Quality-Adjusted Life Days (QALDs), which are based on health outcomes surveys that assess the health levels of people with a stoma with and without PSCs.<sup>23</sup> Nichols et al. (2018) and Rolls et al. (2022) found that people with a PSC report a lower HRQoL than those without

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<sup>21</sup> Colman, (2020). <https://doi.org/10.12968/gasn.2020.18.7.18>

<sup>22</sup> Quality-Adjusted Life Year (QALY): A measure of the HRQoL of a person or group. One QALY equates to 1 year of life in perfect health. Source: National Institute for Health and Care Excellence (NICE). (n.d.). Glossary - Q. Retrieved from National Institute for Health and Care Excellence: <https://www.nice.org.uk/glossary?letter=q>.

<sup>23</sup> Quality-Adjusted Life Day (QALD): This is the same as a QALY but for 1 day instead of 1 year.

a PSC. Furthermore, this difference increases by PSC severity such that people with a severe PSC exhibit the lowest HRQoL, on average.<sup>24,25</sup> Nichols et al. (2019) used a large dataset of multinational data and found that, in the UK, ostomates with mild, moderate and severe PSCs decreased QALYs by 6.5%, 12.8% and 16.9%, respectively compared to ostomates with normal peristomal skin.<sup>26</sup>

Delayed access to the standard PSC treatment is expected to increase the duration of living with this poorer health. As we also understand that the delay might be accompanied by ineffective treatment until the SCN is seen, in theory, the HRQoL of those individuals might further decline, leading to an even greater impact.

***“With a urostomy, if the PSC is not treated then the urine, depending on the acidity, can cause major irritation to the surrounding skin.”***

***(Stoma patient)***

However, we did not find any research which explored the relationship between delays in accessing an SCN and the further deterioration of a person’s HRQoL levels, so have been unable to include it in our model.

### Healthcare costs

The treatment of PSCs requires consultations with various health professionals, the prescription of treatments and, in a few very severe cases, surgery and hospital stays. The NHS, private suppliers of healthcare devices and treatments (suppliers) and individuals bear these costs. A recent study by Rolls et al. (2023), using UK data, found the average total cost of a PSC was £381.<sup>27</sup> This estimate includes the costs associated with the standard PSC treatment process (nurse consultations and referrals, prescriptions and ostomy products used) but does not include healthcare costs incurred before receiving an SCN appointment.

Delayed access to the standard treatment incurs additional resources and healthcare costs for the NHS. The exact number of GP/District nurse visits that a person receives before seeing an SCN is unknown. We explored a range of costs to understand how this additional cost impacts our modelling.

Since some people would attempt to self-treat their PSC, individuals would also bear the costs of over-the-counter medications and other treatments. We were not able to locate evidence that would indicate the level of self-treatment among people with a PSC.

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<sup>24</sup> Fellow, et al (2021). <https://doi.org/10.12968/bjon.2021.30.16.S22>

<sup>25</sup> Rolls, et al (2022). <https://doi.org/10.1080/13696998.2022.2101776>

<sup>26</sup> Nichols, et al (2019). <https://doi.org/10.12968/bjon.2019.28.5.S14>

<sup>27</sup> Rolls, et al (2023). <https://doi.org/10.1111/iwj.14118>, the cost has been adjusted to 2022 price levels.

### Productivity loss

PSCs may impact economic productivity levels if the condition causes people to miss days of work, leave the workforce altogether, or seek a lower-paying job that offers greater flexibility, such as working from home. We found no existing evidence which explores the extent to which these impacts occur as a result of PSCs.

### Additional waste

Whilst there is likely to be some waste generated in the treatment of PSCs, conversations with stoma nurses suggest that this is unlikely to account for a large concern as the first treatment for PSCs is usually to change the type of manufacturer of products used (e.g. if there is an allergic reaction). However, we understand that some individuals might be left with stockpiles of stoma management products they are no longer using as a result. In those cases, the stockpiled products may be thrown out, causing unnecessary environmental waste and NHS resource expenditures. We could not locate a paper that would indicate the level of wasted products due to required changes following a PSC.

## 5 Economic modelling outline

Based on our evidence review and discussions with experts, we modelled the impact of PSCs in two stages:

- the standard treatment process, in which the SCN supports the individual in resolving the PSC; and
- the additional cost incurred in accessing the standard treatment, in which people first experience a PSC and seek some form of healthcare support, and reach (sooner or later) an SCN.

We discuss our approach to modelling each of these stages below.

### Standard treatment process

The costs associated with the standard process were modelled in the same way for all PSCs:

- Calculated individual health cost (by severity): Using estimates of health-related quality of life (HRQoL) loss and PSC duration from the literature. Estimates of the lost HRQoL per PSC were valued in monetary terms using well-established NHS and UK Government approaches.<sup>28</sup>
- Calculated healthcare costs (by severity and cause): Monetary costs were assigned to each step of the updated treatment pathways.
- Scale up to annual cost: Using the estimated proportions by severity and PSC cause, the cost per episode was multiplied by the number of PSCs in England per year.

Further details about the sources, inputs and calculations can be found in Annex A1.

### The access stage of treatment

As the true cost and duration of delay are unknown, we modelled estimates for the cost of the delay under different parameters (length of delay, number of GP/district nurse visits and quantity of treatments prescribed) and reported the results for a range of delay durations: one, two, four and eight weeks.

In calculating the total cost, we identified two distinct groups of people living with a stoma in England:

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<sup>28</sup> The National Institute for Health and Care Excellence (NICE) uses a 'threshold value' of £20,000 per Quality-Adjusted Life Year (QALY) to assess the cost-effectiveness of healthcare interventions (see <https://www.nice.org.uk/media/default/guidance/lgb10-briefing-20150126.pdf>). UK Government's Green Book (2022) for policy appraisal and evaluation recommends that QALY gains or losses are valued at £70,000 per QALY in 2020-21 prices (see <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government/the-green-book-2020>, Annex A1). We have conservatively applied the NICE value of £20,000 per QALY in our analysis.



- **Recent ostomates:** Those that had their ostomy surgery within the last 90 days. Our modelling assumes they experience no delay in receiving the correct stoma care due to already being in regular contact with an SCN.
- **Non-recent ostomates:** Those with a stoma for more than 90 days. As data on the average length of delay for this group is limited, we model two scenarios: (i) a lower bound that assumes these people experience a minor delay when seeking clinical assistance with a PSC, and (ii) an upper bound that assumes these people experience a longer and more avoidable delay caused by the time spent seeking assistance for a PSC. This delay can include additional consultations with a GP/district nurse and a potential treatment programme.

To estimate the total cost of PSCs in England per year, we rely on expert estimates of the proportion of non-recent ostomates that are living in areas with lower or upper bound average delays.

### Overview of PSCs incidence and cause

In any one year, we expect there to be 71,009 new PSCs in England. Of these, 14% are among recent ostomates, who mostly have direct access to their SCN.<sup>29</sup> The remainder either first present to another healthcare professional or attempt to self-treat.

Of the total 71,009 PSCs, 85% are likely to be due to either irritant contact dermatitis or mechanical trauma which, in most cases, can be effectively treated from (at least one) visit to the SCN. The remaining 15% are likely to be due to allergic dermatitis, disease related or infection related and may result in visit(s) to the SCN and a specialist. Very few PSCs are likely to result in hospitalisation or surgery.<sup>30</sup>

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<sup>29</sup> Hospital admitted patient care activity 2020-21.

<sup>30</sup> Meisner, et al. (2012). <https://doi.org/10.1371/journal.pone.0037813>

## 6 Results

The following section outlines the results from our cost-of-illness analysis. This includes

- individual health impacts – these are non-financial costs, which have been valued in monetary terms for comparison; and
- healthcare costs – these are financial costs to the NHS.

To begin, we discuss the costs associated with the standard treatment pathway and present our estimates in Section 6.1. However, in most cases, there will be additional costs incurred before the individual visits their SCN that must be accounted for. We discuss our estimation of these and present our results in Section 6.2.

Next, in Section 6.3, we demonstrate how these costs are aggregated to give the average cost of treatment per PSC episode and discuss how changes in the delay to accessing an SCN could have an impact on these aggregated costs.

In Section 6.4 we present the total cost of PSCs in England per year and discuss the drivers of these results and the relative significance of the two stages of the person's PSC journey.

Finally, in Section 6.5, we discuss the limitations of the analysis and some recommendations for future research. Additional details on the inputs and calculations used in the model are presented in the Annexes.

### 6.1 Costs of the standard PSC treatment

#### 6.1.1 Average cost per PSC

From the moment the person with a PSC sees an SCN, we assume they will receive the standard PSC treatment. We break down the cost of the standard treatment into the cost incurred by the individual, through reduced quality of life, and the healthcare costs incurred during treatment.

The individual cost varies by PSC severity and duration such that people with a severe PSC for a long time experience a greater quality of life reduction than those with a mild PSC for a short time. We calculated the weighted average cost to the individual, per PSC episode, as £131.38. This is a monetary estimate of the (non-financial) health-related quality of life losses suffered by the individual. This estimate is based on the estimated average PSC duration of 21, 31 and 56 days for mild, moderate and severe cases, respectively.<sup>31</sup>

As mentioned in Section 4.2, healthcare costs will depend on the cause of the PSC and its severity. Using available information, we calculated the weighted average cost of the standard

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<sup>31</sup> Duration of PSCs based on the mid-point of ranges provided by clinical experts.

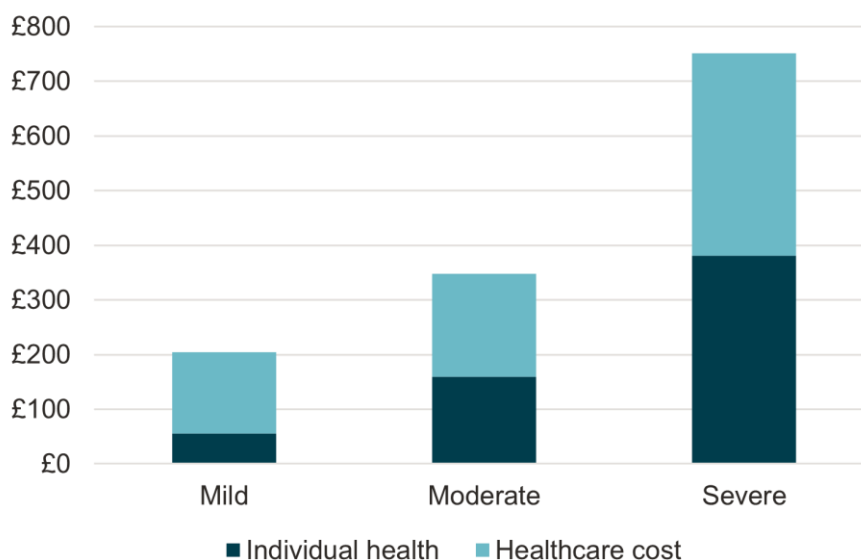
PSC treatment, which includes both SCN and specialists' time and healthcare costs to the NHS, which is £185.40. These healthcare costs are primarily (88%) made up of SCN visits.

Therefore, we find that the average cost of the standard PSC treatment equals £316.78 in total, including individual health-related quality of life losses and NHS treatment costs.

### Average cost by severity

Figure 5 shows how this average cost of the standard PSC treatment varies by PSC severity. The average cost for mild and moderate PSCs is £204.43 and £347.33, respectively. The average cost more than doubles, compared to the moderate case, to £751.35 for severe PSCs. This suggests a potential cost-saving advantage if treating PSCs earlier would reduce the number of severe and moderate PSCs.

**Figure 5** Average cost by severity



Source: Frontier Economics

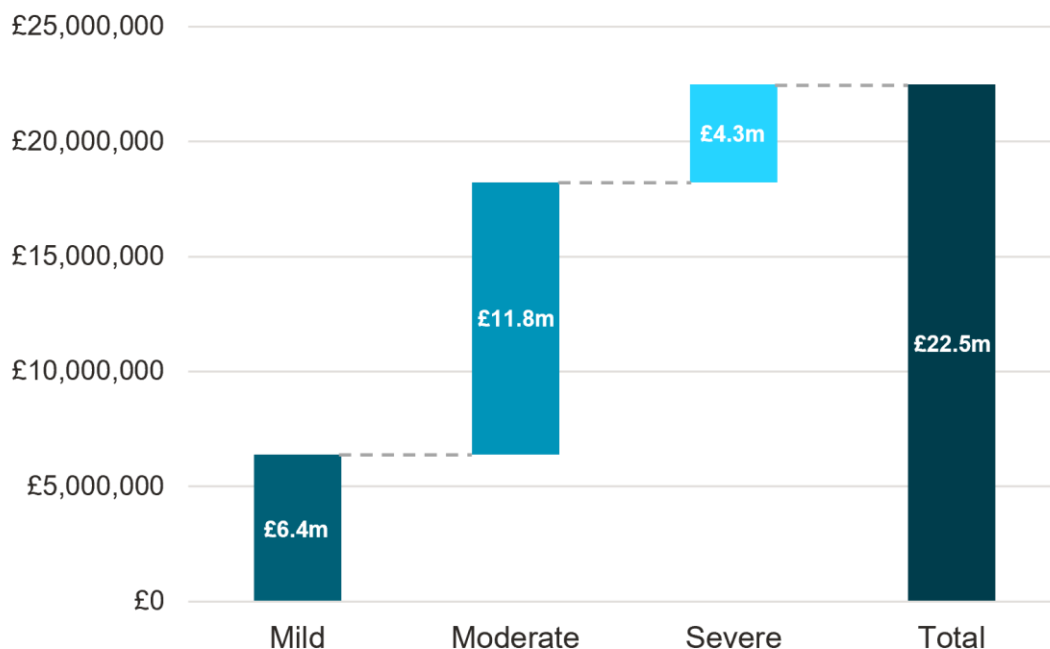
Note: Breakdown of costs by severity is provided in Annex A. Individual costs are non-financial health-related quality of life losses, estimated in monetary terms for comparison.

## 6.1.2 Total cost of the standard treatment process

We calculated the total cost associated with the standard treatment of PSCs in England per year by scaling the average cost per episode by the number of PSC episodes per year. This gives us an estimate of £22.5m. This total cost only takes into account the costs associated with the standard treatment process, excluding costs before the standard treatment is received. In the following section, we look into how delays in receiving the correct stoma care can increase the cost to the individual and healthcare systems.

Figure 6 below demonstrates how this total cost is broken down by severity, with mild, moderate and severe cases accounting for 28%, 53%, and 19% of the yearly cost respectively.

**Figure 6 Total cost by severity – standard treatment stage only**



Source: Frontier Economics

Note: Proportions by severity and cost breakdowns are provided in Annex A. Individual costs are non-financial health-related quality of life losses, estimated in monetary terms for comparison.

## 6.2 Costs associated with the access stage

### 6.2.1 Access impacts on individuals' health outcomes

Delays in accessing an SCN mean that the individual is living with poorer health outcomes due to the PSC for a longer period of time. In theory, the delay in accessing treatment might also further reduce the level of the person's health. However, as we were unable to identify data on how a delay in receiving appropriate treatment worsens a PSC, we are only able to identify the additional cost associated with spending more time at a lower quality of life.

We estimate that each extra week of living with a PSC leads to a cost of £18.41 for mild, £36.05 for moderate and £47.56 for severe PSCs.<sup>32</sup> These are non-financial health-related quality of life losses, estimated in monetary terms for comparison.

<sup>32</sup> See Annex A1 for further explanation of the methodology and calculations of health outcomes into monetary values.

## 6.2.2 Access impacts on healthcare costs

An ostomate experiencing PSC symptoms may first present to their GP or district nurse. In areas where there is good access to stoma care, the person with a PSC is likely to then be referred to an SCN. In areas with more limited access, the person may receive treatment from the GP/district nurse and return for follow-ups. This would result in additional healthcare costs from the use of additional resources and treatments.

Data on the number of GP/district nurse visits and the treatment plans they recommend is limited.<sup>33</sup> The estimates used in our model are based on information gathered from clinical specialists. New data in this area would be welcome, particularly for areas with limited access to stoma care.

Our estimates suggest a one, four or eight-week delay leads to an additional £41.00, £85.41 or £129.82 in additional healthcare costs, respectively.

## 6.2.3 Overall costs associated with access to an SCN

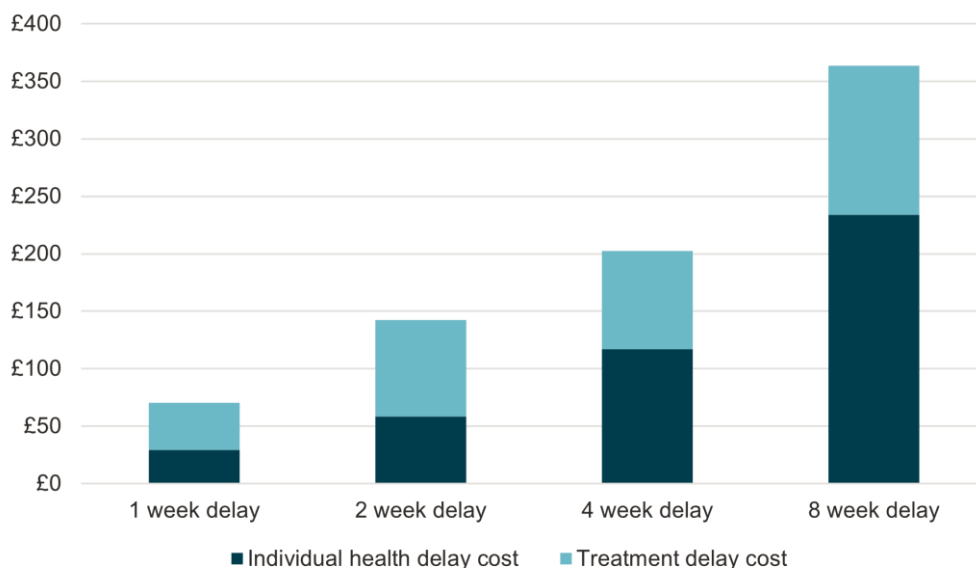
Summing the healthcare and individual impacts, we find that the costs associated with a delay of a week are substantial, estimated at £70.21.<sup>34</sup> Figure 7 demonstrates how the cost of delay increases until an SCN is seen and the standard PSC treatment is initiated. The additional individual health cost is increasing linearly over time (the cost of a two-week delay is equal to twice that of a one-week delay) whereas, in reality, it is likely that this cost would grow over time as a delay to visiting an SCN could worsen the PSC. By contrast, additional healthcare costs vary week-by-week depending on the number of GP visits.

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<sup>33</sup> Colman (2020) discusses that it is common for GPs to misdiagnose irritant contact dermatitis as an infection, resulting in the overprescription of antibiotics for people with a stoma.

<sup>34</sup> Based on keeping the reduced individual health outcomes due to PSC constant over the delay period (conservative assumption) and assuming 1 visit to a GP/district nurse and no prescribed treatment..

**Figure 7** Average cost per PSC episode



Source: Frontier Economics.

Note: Details of the full list of inputs assumed for each level of delay are provided in Annex A1. Individual costs are non-financial health-related quality of life losses, estimated in monetary terms for comparison.

### 6.3 Average costs per PSC

As explored in Section 4, there is evidence to suggest that recent ostomates experience minimal delays in accessing an SCN, regardless of their location. In our model, we assume recent ostomates do not experience any delay in starting the standard PSC treatment.<sup>35</sup>

The evidence for non-recent ostomates is less robust. Conversations with clinical experts suggest that in areas considered to have good access to specialised stoma care, individuals often experience minor delays of between 7-28 days. Delays in areas with more limited access to stoma care could be substantially more.

In order to adequately account for this delay in our estimates, we consider a lower bound average delay for non-recent ostomates of 1 week and an upper bound average delay for non-recent ostomates of two weeks. The average weighted cost per recent ostomate is estimated at £316.78, 59% of which (£185) is due to NHS healthcare costs<sup>36</sup>, and 41% (£131) is due to the reduced quality of life of people with a PSC, valued in monetary terms.<sup>37</sup>

<sup>35</sup> We note that this is a simplifying assumption and that, in reality, some recent ostomates would experience some delay in seeing an SCN, but these delays will be much lower compared to the delay experienced by non-recent ostomates.

<sup>36</sup> We acknowledge that those costs are distributed between the NHS, the medical treatments and device suppliers when the SCN is funded by those companies and patients (when paying for prescriptions).

<sup>37</sup> The reduced health compared to people with a stoma but without a PSC. Please see Annex A1 for further details about the methodology, assumptions inputs and calculations of the individual health impacts.

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The lower bound estimated average weighted cost for non-recent ostomates is about 22% higher at £386.99. Some of the additional costs caused by the delayed access may be expected as it captures time waiting for an SCN appointment.

Finally, we estimate that the upper bound cost of non-recent ostomates with limited access would be £459 – an increase of 19% in average cost compared to the lower bound case. This is 45% higher than the average cost without delay. This 14-day upper bound delay assumption was validated by stoma experts to be reasonable and likely conservative.

Based on the above analysis, areas where access to stoma nursing is good and delays to accessing it are minimal (i.e. one week) avoid at least £71.92 of cost per PSC episode, compared to areas where the average delay is equal to two weeks.

Evidence on the reasons for these delays is limited. However, these statements suggest a general lack of awareness among patients and other healthcare professionals.

***"There is a knowledge gap where many ostomates don't know how to access an SCN or know the service exists."***

***(Stoma patient)***

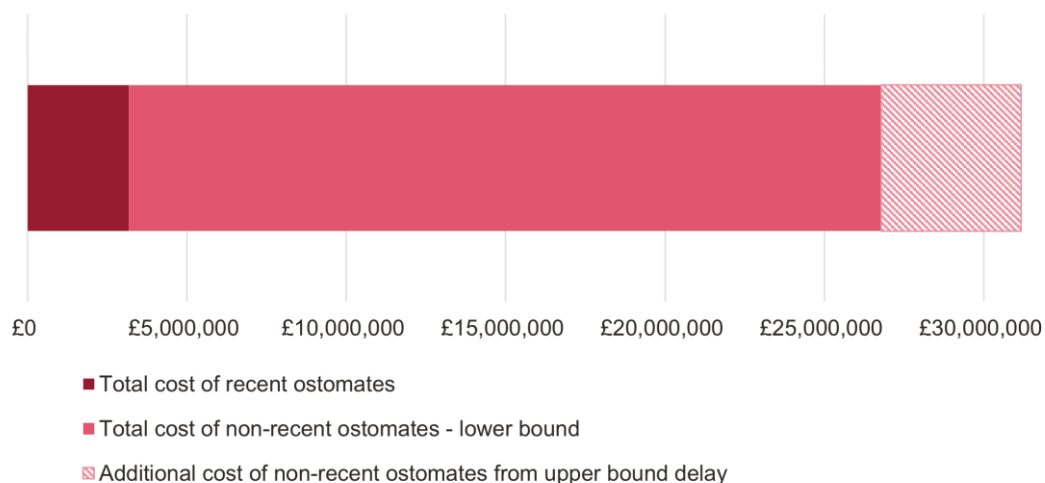
***"There can be a lack of effective communication or a relationship between GPs and stoma care nurses, this is at times due to a lack of understanding of what stoma care nursing services are available locally."***

***(Stoma Services Clinical Lead)***

### 6.4 Total cost of PSCs in England

We estimated a range for the cost of PSCs in England each year, allowing for the uncertainty over the true average delay in SCN access of non-recent ostomates. Figure 8 presents those costs.

**Figure 8 Total cost of PSCs in England per year**



Source: Frontier Economics

Note: Breakdown of the total cost is provided in Annex A. Individual costs are non-financial health-related quality of life losses, estimated in monetary terms for comparison.

The dark red bar shows the total cost as a result of PSCs in recent ostomates, which amounts to £3.2m annually. It accounts for a small proportion of the total minimal cost because recent ostomates face lower average costs (due to no cost of delay) and because there are fewer stoma surgeries per year than people living with a stoma in England.

The light pink bar presents the lower bound of the costs associated with non-recent ostomates, which are about £23.6m. This is generated by assuming the average delay to accessing specialised stoma care for all non-recent ostomates is one week. Both solid pink parts of the chart represent the minimum estimated total cost for England if all ostomates have good access, which sums up to £26.8m.

The shaded portion of the chart shows the range of additional costs that might be incurred in England should the average delay in SCN access increase. The upper bound of the shaded part of the bar shows the total costs if the average delay for all non-recent ostomates was two weeks. Using this conservative assumption shows that up to £4.4m might be added to the cost of PSC in England due to increased limitations in accessing an SCN – those costs are avoidable if access to SCNs is improved across England's regions.

The reality is likely to be somewhere between these two points – i.e. the total costs are somewhere between £26.8m and £31.2m. Discussions with experts suggested that about 70% of people living with a stoma may have good access to an SCN.<sup>38</sup> Assuming these 70% of areas experience a one-week delay, on average, and the remainder of areas have an average delay of accessing an SCN of two weeks, we estimate the total cost of £28.1m. Some

<sup>38</sup> We understand that about 70% of the areas in England would have SCN services that are sponsored by suppliers, increasing the accessibility of SCN in those areas.



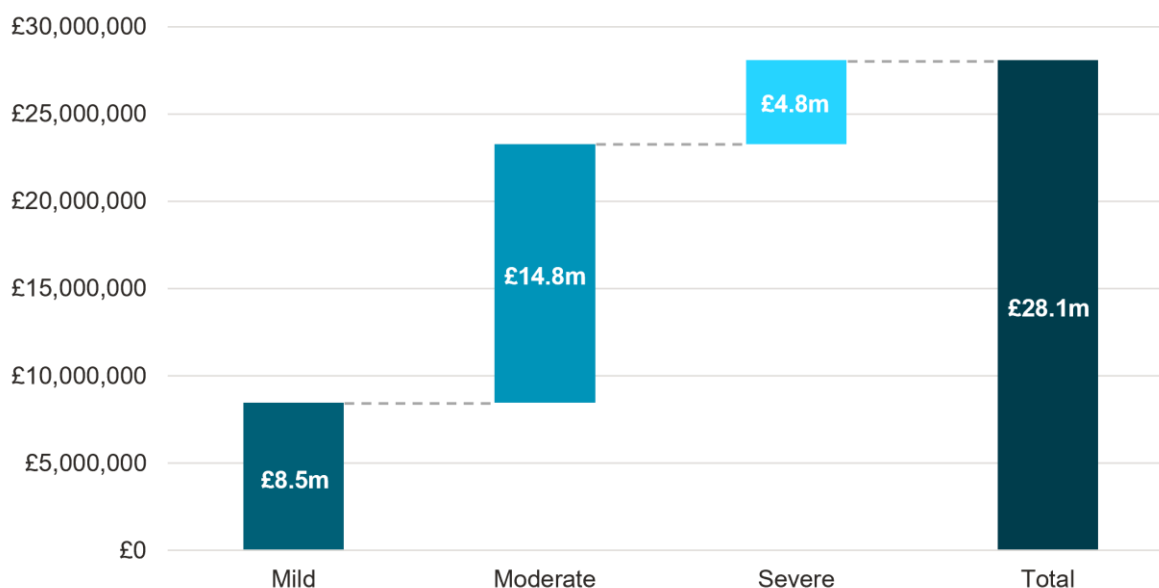
£1.3m of this cost (about 5%) is due to avoidable delays of living in an area with longer delays in accessing an SCN and starting the standard PSC treatment course.

### Total cost of PSCs by severity

Figure 9 shows how the total cost of PSC is split across the three severity categories. Although severe PSCs have the highest average cost, they account for the smallest proportion of total yearly costs (£4.8m). Mild PSCs account for nearly double this, totalling £8.5m, whereas the largest contributor comes from moderate PSC cases, accounting for more than half the overall total cost at £14.8m.

The expenses related to moderate PSCs are notably high. Studies reveal that there are almost the same number of mild and moderate cases. However, the expenses linked to treating moderate cases are considerably more. This emphasises the significance of early PSC treatment to prevent the worsening of cases.

**Figure 9 Total cost of PSCs in England each year, by severity**



Source: Frontier Economics

Note: Severity proportions and costs are provided in Annex A. Individual costs are non-financial health-related quality of life losses, estimated in monetary terms for comparison.

## 6.5 Discussion

We have estimated that the average combined cost to individual health and healthcare services ranges between £387 and £459 per PSC episode. This can be broken down into the average cost to individual health through reduced quality of life, costing between £161 and £190 per episode, and the average cost to healthcare services, between £226 and £269 per episode.

Although data are limited on the average cost of stoma care in England, a 2020 review in Scotland found that the average cost of stoma care per year per person living with a stoma should be between £783 and £2,574.<sup>39</sup> Comparing this with our average cost to healthcare services per PSC of £226-269 suggests that the cost of treating PSCs is a significant additional burden.

Comparing our results with another dermatological condition, a UK study on the cost of atopic eczema found the combined cost to the patient and health services over a 2 month period averaged £74, but can be as high as £1,308 for some severe cases. This suggests that the cost of PSCs is broadly comparable, but on average significantly higher for a PSC than for atopic eczema.

### 6.6 Limitations and further research

There are several limitations to our analysis.

#### Reliance on publicly-available evidence and expert input

This analysis was based on publicly-available literature and data sources, supplemented with input from stoma professionals and stoma charities. The model combines evidence from multiple sources, which would have included different patient populations which may not be identical. Consequently, the modelled patient population may not necessarily reflect patients who are managed in clinical practice.

We also note that some sources of evidence relied upon are a little out-of-date. For example, the incidence of different types of stoma is drawn from UK data from Martins et al. 2012.<sup>40</sup>

Due to limitations in the publicly-available evidence, the analysis was also not able to explore potential variation in costs by age, gender, comorbidities, stoma type or other potential risk factors.

#### Limited information about the access to an SCN

Several data points were not available, most notably:

1. Data about the length of delay experienced by people with a PSC. We know that some people would experience delays accessing an SCN, but we do not know the exact delay duration. We have characterised this uncertainty in Figure 8 which shows our estimates of the lower and upper bound average delays. Further work could explore this delay.

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<sup>39</sup> Inflation adjusted to 2022 values. <https://www.nursingtimes.net/news/policies-and-guidance/nurse-backed-stoma-plan-seeks-to-cut-costs-and-improve-care-12-08-2020/#:~:text=Prescribing%20variations%2C%20lack%20of%20clarity,%C2%A3700%20and%20%C2%A32%2C300.>

<sup>40</sup> Martins, L., Tavernelli, K., Sansom, W., Dahl, K., Claessens, I., Porrett, T., & Andersen, B. D. (2012). Strategies to reduce treatment costs of peristomal skin complications. *British Journal of Nursing*, 21(22), 1312–1315. <https://doi.org/10.12968/bjon.2012.21.22.1312>

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2. Data about the number of GP/district nurse visits and treatments during the delay period. We understand that during the delay stage, people would seek medical care through their GP/district nurse (in addition to self-care and other means - see Limitation 3 below) and might be prescribed some treatment to help with their symptoms. However, we found no data on the actual number of visits and treatments that people received during this time, and we used information from experts to estimate the costs of this stage.
3. The share of people living in areas with more limited access. Through discussions with experts, we used the estimated proportion of regions that have sponsored SCN services as an approximation to the proportion of people that would have the lower bound delay to accessing their SCN. In reality, even sponsored areas might have more limited access and vice versa. To address this limitation, we calculated the possible range of the costs and assumed that all or none of the PSCs fall under each category.
4. Information about the management of PSCs outside of SCN services. Although expert input suggested the vast majority of stoma cases would reach SCN services, there may be some individuals with PSCs who receive successful treatment from non-specialist nurses. This may be more likely for individuals in care homes, for example. This analysis was not able to consider these potential cases.

The above limitations might be overcome in the future with further research. For example, a wide survey of people living with a stoma can reveal how long they have waited to see an SCN and, whether they had to see a GP/District nurse (how many times and what type of treatment were they prescribed). This research could also help address the gap in our data about the share of people that would fall under each category.

### Omission of the further reduction in individual health outcomes over the delay period

Due to data limitations, we were not able to model the health reduction that might occur in people with a PSC over the delay period. We assume conservatively a constant level of reduced health outcomes over the delay period. A clinical study could establish the relationship between the delay in access to an SCN and a person's health outcomes.

### Omission of self-treatment options before seeking formal medical care

In discussions with health professionals and stoma charities, we understand that people might not seek medical help as soon as PSC symptoms appear. People might be unaware of the ability to seek treatment, resulting in self-treatment (through purchasing over-the-counter medications etc.), seeking advice on self-care from other ostomates, or simply accepting the symptoms as a normal side-effect of having a stoma. Self-care can exacerbate a PSC:

***“When patients experience soreness of the peristomal skin they may cut the hole of the stoma plate bigger, not wanting to stick it onto their damaged skin. This practice causes more damage than it helps as then the effluent can leak onto the damaged skin”.***

***(Stoma Nurse Specialist)***

## SKIN FIRST: COUNTING THE COST OF PERISTOMAL SKIN COMPLICATIONS

There is currently no available evidence about this part of the PSC pathway, although the impact on treatment costs might be incurred during this period. In addition, the omission of this part of the pathway also suggested that our estimations of the PSC impact on individual health might be low, and the length of living with lower health outcomes due to PSC in our calculation does not include this additional time of self-care.

This limitation might be filled in the future with further research. For example, a wide survey of people living with a stoma can reveal to what extent they engage in self-care activities before seeking formal medical care and what type of self-care is most common over this period of the pathway.

### Other impacts (e.g., productivity) which are not included in the calculations

Due to data limitations, our calculations do not include some potential costs of PSC.

We were not able to explore the costs that might be incurred within social care services, either to individuals or to local authorities.

We were also not able to explore wider impacts such as productivity losses or increases in waste. Productivity impacts, in particular, might create substantial costs to the economy due to sick days and time off work for medical appointments. This exclusion means that our estimates are conservative and might underrepresent the true cost of PSCs on the economy.

This limitation might be filled in the future with further research. For example, a wide survey of people living with a stoma can reveal how many sick days and time off work they require.

## 7 Conclusions

Our analysis of the economic impact of PSCs in England reveals significant costs associated with this common and often preventable complication for individuals and healthcare providers. We estimate that the total cost of PSCs in England each year is £28.1m, based on an average cost per PSC of £396 and an annual incidence of 70,009 cases.

We calculate the average cost per PSC in England as the sum of the cost associated with the standard PSC treatment process, which begins with a visit to an SCN, and any additional cost incurred in accessing an SCN. The cost of the standard treatment process is equal to £316 per episode, comprising £131 attributed to individual quality of life losses and £185 in additional healthcare expenses. Each week of delay in accessing PSC treatment incurs up to an additional cost of £72 per episode.

We know that the ease of accessing the necessary stoma care services can vary substantially across England. Based on conversations with sector experts, we assumed that areas with relatively good access to stoma care experience an average delay of one week and areas with more limited access experience an average delay of two weeks. These assumptions suggest that improving local access to stoma care could reduce the average cost of a PSC episode by £72. Discussions with experts suggest that areas with good access to stoma care may have additional SCN services that are supported by private companies.

The results presented in this analysis are based on England, in the context of universal free healthcare and relatively high standards of stoma care, compared to other countries.<sup>41,42</sup> The costs of PSCs may fall more on individuals in other countries. Furthermore, in countries with low population density, or low rates of stoma care service coverage, it is likely that the cost of access may be substantially higher.<sup>43</sup>

Reducing the healthcare and individual costs of PSCs in England might be achieved by:

- **Avoiding PSCs:** Our analysis suggests that each PSC avoided could avoid an average of £396 in costs to individuals and the NHS. Additionally, earlier identification and treatment of PSCs might reduce the average severity of PSCs. This could reduce the overall and average cost in England per year.<sup>44</sup>

<sup>41</sup> [https://www.coloplast.co.uk/Global/3\\_Bladder%20and%20Bowel/SCFlex%20Set%20-%20product%20range/Consensus%20Statement%20two-pager-18%20\(1\).pdf](https://www.coloplast.co.uk/Global/3_Bladder%20and%20Bowel/SCFlex%20Set%20-%20product%20range/Consensus%20Statement%20two-pager-18%20(1).pdf)

<sup>42</sup> Aibibula, et al. (2022), <https://doi.org/10.12968/bjon.2022.31.6.S30>

<sup>43</sup> In the UK, the ratio of stoma care nurses to the population is roughly 3:50,000. [https://ascnuk.com/userfiles/pages/files/resources/ascn\\_uk\\_standards\\_2021.pdf](https://ascnuk.com/userfiles/pages/files/resources/ascn_uk_standards_2021.pdf)

<sup>44</sup> We note that interventions to reduce the number of PSCs would also incur costs, which would need to be compared with these potential avoided costs.

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- Enhancing SCN access: Our analysis suggests that any delay in receiving treatment leads to additional costs. Ensuring people with PSCs have access to the information, products and NHS services they need will reduce the costs to individuals and the NHS.

Further research should also explore the main drivers that lead to better access to SCN services (and to people seeking medical help with the presentation of PSC symptoms), as that would shed light on the most effective policies that can help reduce those avoidable costs associated with access issues.

## Annex A Technical annexes

### A.1 Economic modelling

The following section outlines the process, inputs and outputs of the economic modelling. The section provides information about:

- access to an SCN;
- the standard PSC treatment;
- the average cost of a PSC; and
- the total cost of PSCs

Inputs for each stage were based on findings from the literature or estimated based on discussions with stoma professionals and stoma charities.

#### The standard PSC treatment

The requirements for estimating the cost associated with the standard PSC treatment process are explained in Figure 10. We calculated the costs for each impact (individual health costs and healthcare costs) separately. Inputs for these costs are provided in Table 1.

**Figure 10 Steps in calculating the cost of the standard PSC treatment**

Inputs	Intermediate outputs	Outputs
<p><u>Standard parameters:</u></p> <ul style="list-style-type: none"> <li>■ PSC duration by severity</li> <li>■ Proportion of PSCs by severity and type</li> </ul>	<p><u>Individual health costs</u></p> <ul style="list-style-type: none"> <li>■ Measure of QALY loss by PSC severity</li> <li>■ Monetary conversion</li> </ul>	<p>By severity:</p> <p>Av. QALY loss per episode = QALY loss * duration/365</p> <p>Av. monetary QALY loss per episode = Av. QALY loss per ep. * conversion</p>
	<p><u>Healthcare costs</u></p> <ul style="list-style-type: none"> <li>■ Treatment plan by PSC type and severity</li> <li>■ NHS reference costs</li> <li>■ Medicine costs</li> </ul>	<p>By PSC type and severity:</p> <p>Av. Healthcare cost = <math>\sum</math> input * proportion that receive</p>
		<p>Av. Healthcare cost per episode = weighted av. Healthcare cost</p>
		<p>=====</p> <p>Average cost per episode</p>

Source: Frontier Economics

- **Individual health costs.** We began by calculating the difference in QALY measures for each level of PSC severity compared to a person with a stoma without a PSC. These differences were then scaled by the duration (taken as the midpoint of a range provided by an SCN) of the PSC (by severity) and multiplied by the conversion rate to express the rate in pounds. Finally, these were multiplied by their severity weights to give the average individual health cost from the standard PSC treatment.
- **Healthcare costs.** Based on the treatment plans and their likelihoods listed in Table 2, we calculated the average cost of treating a PSC by type and severity, using the unit costs

listed in Table 3. These average costs were then multiplied by the PSC type and severity weights and summed to calculate the average healthcare cost from the standard PSC treatment.<sup>45</sup>

**Table 1 Inputs in calculating the cost of the standard PSC treatment**

Input	Breakdown	Value	Source/comments
PSC duration	Mild	14-28 days	Ranges provided by SCN <sup>46</sup>
	Moderate	21-42 days	Ranges provided by SCN
	Severe	28-84 days	Ranges provided by SCN
PSC proportion by type	Irritant contact dermatitis	60.0%	Meisner et al 2012 <sup>47,48</sup>
	Allergic dermatitis	9.4%	Meisner et al 2012
	Mechanical trauma	25.3%	Meisner et al 2012
	Disease-related	4.0%	Meisner et al 2012
Proportion of PSCs by severity	Infection-related	1.3%	Meisner et al 2012
	Mild	44%	Salvadalena et al 2020 <sup>49</sup>
	Moderate	48%	Salvadalena et al 2020
	Severe	8%	Salvadalena et al 2020
QALY by PSC severity	No PSC	0.73	Nichols et al. 2019 <sup>50</sup>
	Mild	0.69	Nichols et al. 2019
	Moderate	0.64	Nichols et al. 2019
	Severe	0.61	Nichols et al. 2019
Monetary conversion	-	1 QALY = £20,000	<a href="https://www.nice.org.uk/media/default/guidance/lgb10-briefing-20150126.pdf">https://www.nice.org.uk/media/default/guidance/lgb10-briefing-20150126.pdf</a>

<sup>45</sup> As proportions by PSC type and severity are only provided separately, we assume the proportion of PSC severity is constant within PSC type categories, and vice versa.

<sup>46</sup> Ranges provided by one NHS SCN and verified with two further SCNs.

<sup>47</sup> The “Other” category has been divided (weighted) across the other categories.

<sup>48</sup> Meisner, et al. (2012). <https://doi.org/10.1371/journal.pone.0037813>

<sup>49</sup> Salvadalena, et al. (2020). <https://doi.org/10.1097/WON.0000000000000666>

<sup>50</sup> Nichols, et al. (2019). <https://doi.org/10.12968/bjon.2019.28.5.S14>



## SKIN FIRST: COUNTING THE COST OF PERISTOMAL SKIN COMPLICATIONS

Input	Breakdown	Value	Source/comments
Treatment plan & resource unit costs	Type & severity	See Tables 2 & 3	See Tables 2 & 3

Source: Various – see table.

Note: Specific healthcare inputs and their use are listed below, in Tables 2 and 3.

**Table 2 Treatment plan by type and severity**

PSC Type	Process	Mild	Moderate	Severe
Irritant contact dermatitis	<ul style="list-style-type: none"> <li>•F2F consultation</li> <li>•Check and change products and accessories</li> <li>•Followed by check-up (F2F)</li> <li>•Change of product/manufacture (common)</li> <li>•Revision/re-do surgery (very severe cases only)</li> </ul>	<ul style="list-style-type: none"> <li>•SCN consultation 1 (100%)</li> <li>•SCN consultation 2 (40%)</li> </ul>	<ul style="list-style-type: none"> <li>•SCN consultation 1 (100%)</li> <li>•SCN consultation 2 (50%)</li> <li>•SCN consultation 3 (15%)</li> </ul>	<ul style="list-style-type: none"> <li>•SCN consultation 1 (100%)</li> <li>•SCN consultation 2 (100%)</li> <li>•SCN consultation 3 (60%)</li> <li>•SCN consultation 4 (60%)</li> <li>•Local surgical revision (3%)</li> <li>•Redo-surgery (2%)</li> <li>•Additional home care (10%)</li> </ul>
Allergic dermatitis	<ul style="list-style-type: none"> <li>•Check and change products and accessories</li> <li>•Simple patch test</li> <li>•Skin swab</li> <li>•F2F check-up</li> <li>•Treat if no improvement from change of product</li> <li>•Derm referral (severe)</li> <li>•Revision/re-do surgery (very severe cases only)</li> </ul>	<ul style="list-style-type: none"> <li>•SCN consultation 1 (100%)</li> <li>•SCN consultation 2 (100%)</li> <li>•Topical corticosteroid (50%)</li> </ul>	<ul style="list-style-type: none"> <li>•SCN consultation 1 (100%)</li> <li>•SCN consultation 2 (100%)</li> <li>•SCN consultation 3 (15%)</li> <li>•Topical corticosteroid (60%)</li> <li>•Derm consultation 1 (40%)</li> <li>•Derm consultation 2 (25%)</li> <li>•Derm consultation 3 (15%)</li> <li>•Prednisolone (10%)</li> </ul>	<ul style="list-style-type: none"> <li>•SCN consultation 1 (100%)</li> <li>•SCN consultation 2 (100%)</li> <li>•SCN consultation 3 (15%)</li> <li>•SCN consultation 4 (5%)</li> <li>•Topical corticosteroid (40%)</li> <li>•Derm consultation 1 (70%)</li> <li>•Derm consultation 2 (50%)</li> <li>•Derm consultation 3 (30%)</li> <li>•Derm consultation 4 (25%)</li> <li>•Prednisolone (20%)</li> <li>•Additional home care (5%)</li> </ul>
Mechanical trauma	<ul style="list-style-type: none"> <li>•F2F consultation</li> <li>•Re-educate the patient on how to remove appliances</li> <li>•Check and change products and accessories if necessary</li> </ul>	<ul style="list-style-type: none"> <li>•SCN consultation 1 (100%)</li> <li>•SCN consultation 2 (25%)</li> </ul>	<ul style="list-style-type: none"> <li>•SCN consultation 1 (100%)</li> <li>•SCN consultation 2 (30%)</li> <li>•SCN consultation 3 (20%)</li> <li>•Wound dressing (10%)</li> </ul>	<ul style="list-style-type: none"> <li>•SCN consultation 1 (100%)</li> <li>•SCN consultation 2 (90%)</li> <li>•SCN consultation 3 (30%)</li> <li>•Wound dressing (25%)</li> <li>•Additional home care (10%)</li> </ul>
Disease-related	<ul style="list-style-type: none"> <li>•F2F consultation</li> <li>•Check and change products and accessories (mild to moderate)</li> <li>•Derm referral (moderate to severe)</li> </ul>	<ul style="list-style-type: none"> <li>•SCN consultation 1 (100%)</li> <li>•SCN consultation 2 (70%)</li> </ul>	<ul style="list-style-type: none"> <li>•SCN consultation 1 (100%)</li> <li>•SCN conference with specialist (100%)</li> <li>•SCN consultation 2 (70%)</li> <li>•Derm consultation 1 (60%)</li> <li>•Derm consultation 2 (25%)</li> <li>•Topical corticosteroids (60%)</li> <li>•Tacrolimus (5%)</li> <li>•Cyclophosphamide (5%)</li> <li>•Prednisolone (10%)</li> </ul>	<ul style="list-style-type: none"> <li>•SCN consultation 1 (100%)</li> <li>•SCN conference with specialist (100%)</li> <li>•SCN consultation 2 (100%)</li> <li>•Derm consultation 1 (100%)</li> <li>•Derm consultation 2 (65%)</li> <li>•Derm consultation 3 (45%)</li> <li>•Topical corticosteroids (85%)</li> <li>•Tacrolimus (10%)</li> <li>•Cyclophosphamide (10%)</li> <li>•Prednisolone (20%)</li> <li>•Additional home care (10%)</li> <li>•Hospitalisation (5%)</li> </ul>
Infection-related	<ul style="list-style-type: none"> <li>•F2F consultation</li> <li>•Swab to identify infection and treat appropriately</li> </ul>	<ul style="list-style-type: none"> <li>•SCN consultation 1 (100%)</li> <li>•SCN consultation 2 (25%)</li> <li>•SCN conference with specialist (25%)</li> <li>•Derm consultation 1 (15%)</li> <li>•Derm consultation 2 (15%)</li> </ul>	<ul style="list-style-type: none"> <li>•SCN consultation 1 (100%)</li> <li>•SCN consultation 2 (65%)</li> <li>•SCN conference with specialist (60%)</li> <li>•Derm consultation 1 (25%)</li> <li>•Derm consultation 2 (15%)</li> </ul>	<ul style="list-style-type: none"> <li>•SCN consultation 1 (100%)</li> <li>•SCN consultation 2 (100%)</li> <li>•SCN conference with specialist (100%)</li> <li>•Derm consultation 1 (100%)</li> <li>•Derm consultation 2 (100%)</li> <li>•Systemic anti-fungal treatment (80%)</li> </ul>

## SKIN FIRST: COUNTING THE COST OF PERISTOMAL SKIN COMPLICATIONS

PSC Type	Process	Mild	Moderate	Severe
				<ul style="list-style-type: none"> <li>•Systemic antibiotics (20%)</li> <li>•Hospitalisation (5%)</li> <li>•Redo surgery (10%)</li> </ul>

Source: Meisner et al. 2012 (updated with SCN)

Note: Percentage in parentheses demonstrates the weighting applied to each resource by type-severity grouping.

**Table 3 Healthcare resource unit costs**

Resources	Unit	Cost (£, 2022)	Reference	Source
SCN consultation 1 (first consulaton)	Visit	122	60 mins. Stoma care F2F	NHS National Cost Collection (2021/22)
SCN consultation 2+ (follow-ups)	Visit	61	20-30 mins. Stoma care F2F	NHS National Cost Collection (2021/22)
SCN conference with a specialist	Session	42	10–15 mins. Stoma care. Non-F2F	NHS National Cost Collection (2021/22)
Additional home care	Visit	33	Community nurse home visit (£66/hr)	Unit costs of health and social care (2022)
Dermatologist consultation 1 (first consultation)	Visit	191	30 mins. Dermatology (First attendance, consultant-led, multi-professional F2F)	NHS National Cost Collection (2021/22)
Dermatologist consultation 2+ (follow-ups)	Visit	179	10–15 mins. Dermatology (Follow-up, consultant-led, multi-professional F2F)	NHS National Cost Collection (2021/22)
District nurse visit	Visit	54	District nurse, adult, F2F	NHS National Cost Collection (2021/22)
GP visit	Visit	41	9.22 min consultation, F2F	Unit costs of health and social care (2022)
Local surgical revision	Case	1,497	Day case. Intermediate skin procedures. Category 1. Without CC	NHS National Cost Collection (2021/22)
Re-surgery (re-siting of stoma)	Case	4,572	FZ10B^{3} Non-elective, short stay. Distal colon procedures. Without major CC	NHS National Cost Collection (2021/22)
Hospital stay	Day	388	Non-elective inpatient stays (short stay)	NHS National Cost Collection (2021/22)
Wound dressing	Once	2.30	Allevyn Gentle Border 10x10cm	British National Formulary (Sept 21)
Topical corticosteroids	Course	1.37	Betamethasone 30g 0.1% cream	British National Formulary (Sept 21)
Prednisolone	Course	1.23	Prednisolone 5mg tablets, 28 pcs	British National Formulary (Sept 21).

## SKIN FIRST: COUNTING THE COST OF PERISTOMAL SKIN COMPLICATIONS

Resources	Unit	Cost (£, 2022)	Reference	Source
Topical anti-fungal drug	Course	1.84	Terbinafine 1% spray, 15ml	British National Formulary (Sept 21)
Systemic anti-fungal drug	Course	6.01	Fluconazole 200mg capsules 7 pcs	British National Formulary (Sept 21)
Systemic antibiotics	Course	1.69	Amoxicillin 500mg capsules, 21 pcs	British National Formulary (Sept 21)
Tacrolimus	Course	62	Tacrolimus 500 microgram capsules 50 pcs	British National Formulary (Sept 21)
Cyclophosphamide	Course	139	Cyclophosphamide 50mg tablets, 100 pcs	British National Formulary (Sept 21)
Infliximab	Course	3,399	Weeks 0, 2 and 6. 80kg	British National Formulary (Sept 21)
Weak opioids, systemic	Week	1.10	Tramadol 50mg capsules, 30 pcs	British National Formulary (Sept 21)
Hydrocortisone cream	Course	1.72	1%, 15g	British National Formulary (Sept 21)

Source: Various – see table for details

Note: F2F – face-to-face; CC – complications and comorbidities; pcs – pieces

Finally, the average individual health and healthcare costs were summed to give the average cost of the standard PSC treatment. These outputs are provided in Table 4.

**Table 4**      **Outputs from calculating the cost of the standard PSC treatment**

Output	Value (£)	Source
Average individual health cost	£131.38	Calculated.
Average healthcare cost	£185.40	Calculated.
Average combined cost	£316.78	Calculated.
<i>Breakdown of average healthcare cost:</i>		
Average healthcare cost (SCN visits)	£162.90	Calculated.
Average healthcare cost (Referrals)	£14.75	Calculated.
Average healthcare cost (Surgery and hospital stays)	£7.02	Calculated.
Average healthcare cost (Medication)	£0.39	Calculated.
Average healthcare cost (Additional home care)	£0.30	Calculated.

Output	Value (£)	Source
Average healthcare cost (Supporting products)	£0.05	Calculated.

Source: Frontier Economics

Note: All values in 2021/22 prices.

## Access to an SCN

The requirements for estimating the cost associated with accessing an SCN are explained in Figure 11.

**Figure 11 Steps in calculating the cost of delayed SCN access**

Inputs		Intermediate outputs	Outputs
<u>Standard parameters:</u> <ul style="list-style-type: none"> <li>Delay boundaries</li> <li>Proportion of PSCs by severity</li> </ul>	<b>Individual health costs</b> <ul style="list-style-type: none"> <li>QALY by PSC severity</li> <li>Monetary conversion</li> </ul>	By severity: Av. QALY loss of X week delay = QALY loss * delay/365 Av. Monetary QALY loss, X week delay = QALY loss with delay * conversion	Av. Individual cost of X week delay = weighted monetary QALY loss
	<b>Healthcare costs</b> <ul style="list-style-type: none"> <li>Resource use by delay</li> <li>Treatment use by delay</li> <li>GP costs</li> <li>Medicine costs</li> </ul>	None	Av. Healthcare cost of X week delay = $\sum$ inputs
			Average cost of X week delay

Source: Frontier Economics

- Individual health costs.** We began by calculating the difference in QALY measures for each level of PSC severity compared to a person with a stoma but without a PSC. These differences were then scaled by the number of days it takes to access the SCN and multiplied by the conversion rate to express the rate in pounds. Finally, these were multiplied by their severity weights to give the average individual health cost of an X-week delay.
- Healthcare costs.** As data on healthcare usage during a delay in accessing an SCN is limited, this usage has been estimated (see Table 5 for the estimated usage by delay). The first step then assigned costs to each resource used. This usage was assumed to be constant across each level of severity. These inputs were then summed to give the average healthcare cost of an X-week delay.

We calculated the costs for each impact (individual health costs and healthcare costs) separately. Inputs for these costs are provided in Table 5.

**Table 5** Inputs for calculating the cost of delayed SCN access

Input	Breakdown	Value	Source/comments
Delay characteristics	1 week	1 GP visit	Estimated based on SCN discussion. GP visit cost used as it provides the most reliable cost & duration.
	2 weeks	2 GP visits + 1 week treatment	Estimated based on SCN discussion. One week of treatment = 0.5*antibiotics +0.5*hydrocortisone.
	4 weeks	2 GP visits + 2 week treatment	Estimated based on SCN discussion.
	8 weeks	3 GP visits + 4 week treatment	Estimated based on SCN discussion.
Proportion of PSCs by severity	Mild	44%	Salvadalea et al 2020 <sup>51</sup>
	Moderate	48%	Salvadalea et al 2020
	Severe	8%	Salvadalea et al 2020
QALY by PSC severity	No PSC	0.73	Nichols et al. 2019 <sup>52</sup>
	Mild	0.69	Nichols et al. 2019
	Moderate	0.64	Nichols et al. 2019
	Severe	0.61	Nichols et al. 2019
Monetary conversion	-	1 QALY = £20,000	<a href="https://www.nice.org.uk/meda/default/guidance/lgb10-briefing-20150126.pdf">https://www.nice.org.uk/meda/default/guidance/lgb10-briefing-20150126.pdf</a>
Resource costs	GP visit	£41	Based on a 9.22 min consultation. Unit costs of health and social care (2022). <sup>53</sup>
	District nurse visit	£53.74	National Cost Collection (2021/22) <sup>54</sup>
Healthcare costs (1 week regime)	Systematic antibiotics	£1.69	British National Formulary (Sept 2021) <sup>55</sup>

<sup>51</sup> Salvadalea, et al. (2020). <https://doi.org/10.1097/WON.0000000000000666>

<sup>52</sup> Nichols, et al. (2019). <https://doi.org/10.12968/bjon.2019.28.5.S14>

<sup>53</sup> <https://www.pssru.ac.uk/unitcostsreport/>

<sup>54</sup> <https://www.england.nhs.uk/publication/2021-22-national-cost-collection-data-publication/>

<sup>55</sup> <https://bnf.nice.org.uk/>

Input	Breakdown	Value	Source/comments
	Hydrocortisone cream	£1.72	British National Formulary (Sept 2021)

Source: Various

Finally, the average individual health cost and average healthcare cost were summed to give the average cost of an X-week delay. These outputs are provided in Table 6.

**Table 6** Outputs from calculating the cost of delayed SCN access

Output	Value (£)	Source
<i>Panel A: 1-week delay</i>		
Average individual cost of delay	29.21	Calculated.
Average healthcare cost of delay	41.00	Calculated.
Average total cost of delay	70.21	Calculated.
<i>Panel B: 2-week delay</i>		
Average individual cost of delay	58.42	Calculated.
Average healthcare cost of delay	83.71	Calculated.
Average total cost of delay	142.13	Calculated.
<i>Panel C: 4-week delay</i>		
Average individual cost of delay	116.85	Calculated.
Average healthcare cost of delay	85.41	Calculated.
Average total cost of delay	202.26	Calculated.
<i>Panel D: 8-week delay</i>		
Average individual cost of delay	233.70	Calculated.
Average healthcare cost of delay	129.82	Calculated.
Average total cost of delay	363.52	Calculated.

Source: Frontier Economics

## The average cost of PSC

To better characterise the different types of SCN access, we present the results for the two defined groups: recent ostomates and non-recent ostomates.

**Average cost from standard PSC treatment.** We assumed the standard healthcare cost is constant across all accessibility states. This is a result borne from the assumption that proportions of PSC severity and PSC type are constant across the three states.

**Average cost from delayed access.** We account for the uncertainty over the length of the delay to accessing an SCN by providing a lower and upper bound. Further details of why these distinctions were made are provided in Section 4.

These two averages were summed to give the total average cost of PSC – by accessibility state.

**Table 7 Average cost of PSC**

Accessibility group	Delay	Average cost from delayed access to SCN	Average cost from standard PSC treatment	Total average cost
Recent ostomates	None	£0	£316.78	£316.78
Non-recent ostomates, lower bound	1 week	£70.21	£316.78	£386.99
Non-recent ostomates, upper bound	2 weeks	£142.13	£316.78	£458.91

Source: Frontier Economics

### Total cost of PSC

The final step in the model used the average costs, weighted by the number of PSCs per year in each accessibility state, to calculate the total cost of PSCs in England per year.

**Table 8 Number of PSCs per year**

Time with stoma	Population (England)	Proportion with PSC per year <sup>56</sup>	Number of PSCs per year
Recent	21,000 <sup>57</sup>	0.477	10,017
Non-recent, total	148,866 <sup>58</sup> -21,000 = <b>127,866</b>	0.477	60,992

Source: Frontier Economics

Note: Various – see footnotes.

<sup>56</sup> Salvadarena et al (2020). <https://doi.org/10.1097/WON.0000000000000666>

<sup>57</sup> Hospital admitted patient care activity 2020-21.

<sup>58</sup> Total estimate for the number of ostomates in England. Kettle, J (2019), <https://www.eoecph.nhs.uk/Files/Integrated%20Care/StoMap%20Baseline%20Report%20FINAL.pdf>

Table 9 below assumes 70% of non-recent ostomates live in areas where the average delay is 1 week (lower bound) and the remaining 30% live in areas where the average delay is 2 weeks (upper bound).

**Table 9 Total cost of PSC**

Accessibility group	Delay	Average cost	Number of PSCs per year	Total cost
Recent	None	£316.78	10,017	£3,173,185.26
Non-recent, lower bound	1 week	£386.99	42,694	£16,522,151.06
Non-recent, upper bound	2 weeks	£458.91	18,298	£8,397,135.18
Total	-	£395.18	71,009	£28,092,471.50

Source: Frontier Economics

### Data sources for model

In modelling, we selected the most recent, relevant sources of data. This mainly resulted in the use of a single data source. Where data sources were especially out of date, e.g. Meisner et al (2012) and Martins et al (2012), data were validated with comparisons in other countries and from discussions with stoma professionals and stoma charities.

### Resource use

**Table 10 Resource use – standard PSC treatment process**

Breakdown	SCN visits	Specialist visits	Hospital visits
<i>Per episode</i>			
Mild	1.43	0.004	0.00
Moderate	1.71	0.13	0.00
Severe	2.81	0.27	0.03
Average	1.67	0.1	0.002
<i>Per year</i>			
Mild (n=31,244)	44,662	125	0



Breakdown	SCN visits	Specialist visits	Hospital visits
Moderate (n=34,084)	58,266	4,349	0
Severe (n= 5,681)	15,981	1,526	192
Total (n=70,009)	118,909	6,000	192

Source: Frontier Economics

## A.2 Evidence review

We ran a focused review of the literature based on the five steps outlined in Khan et al. (2003).<sup>59</sup> This review was used to identify inputs for our model. Therefore, we focused on papers that related to the evaluation of the individual health impacts or the healthcare impacts of PSCs. The five steps involve:

1. Framing the question
2. Identifying relevant work
3. Assessing the quality of the studies
4. Summarising the evidence
5. Interpreting the findings

**Framing the question.** We identified the following criteria for our review:

- Population sample: UK/England ostomates, expanded to include EU and US where data on the UK were unavailable.
- Interventions or exposures: PSC sufferers vs. no PSC. This is important to find the marginal impact of PSCs. Articles that didn't focus on this marginal impact were collected to deepen our wider knowledge of PSCs, but their data were not included in the model.
- Outcomes: Changes in HRQoL and healthcare costs as a result of PSCs.
- Study designs: Comparative studies - outcomes of PSC patients vs. stoma patients without a PSC. Observational studies were also considered.

**Identifying the relevant work.** Work was identified by searching using Google Scholar and web searches. Searches were run in two batches for the two main outcomes:

- Changes in HRQoL
  - Keywords: Peristomal skin complications, PSC, HRQoL, health utility
  - Timeframe: 2010-2023

<sup>59</sup> Khan, et al. (2003). <https://doi.org/10.1177/014107680309600304>

- Healthcare costs
  - Keywords: Peristomal skin complications, PSC, economic burden, treatment costs, resource use
  - Timeframe: 2010-2023

**Assessing the quality of studies.** Studies were assessed based on their ability to answer the framed questions. For example, papers were dropped if they did not relate to PSCs, if it was the wrong type of evaluation (e.g. not a marginal impact), used the wrong population or considered the wrong outcome.

**Summarising the evidence & interpreting.** The shortlisted papers were summarised and interpreted for use in the model. The use of each was validated by our advisory group.

### A.3 External input and validation

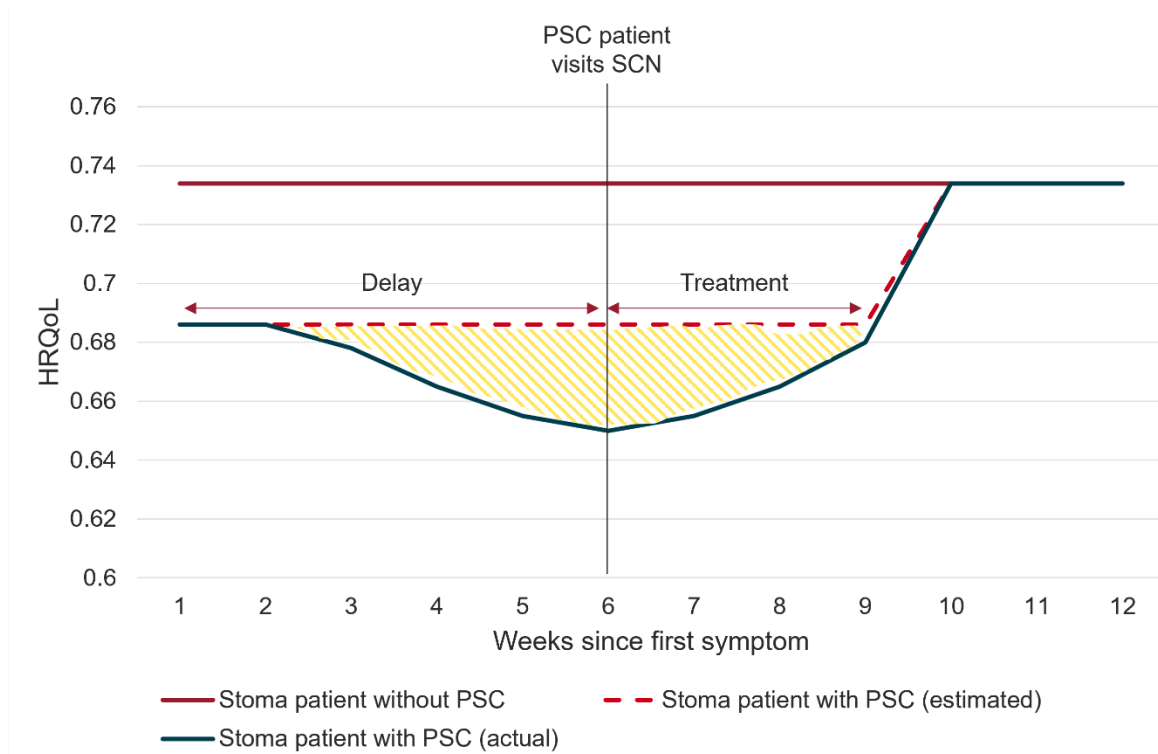
Throughout the project, we sought two main sources of external input:

1. Advisory board meetings, held once after the PSC treatment process and impacts had been identified and a second time to discuss the initial results. These meetings were used to validate our thinking and findings. The Advisory Board comprised of three Stoma Care Nurses, a stoma patient, two representatives from patient charities and a Health Economist.
2. Ad hoc input sought from stoma care nurses to provide input where alternative data sources were unavailable, such as the expected delay to receiving stoma care services.

### A.4 Impact of delay in accessing an SCN on individual health outcomes

To calculate the impact of delayed access to an SCN on individual health outcomes, we would want to calculate the difference in QALD between the dark red line (individual with a stoma but without PSC) and the blue line (individual with PSC) in Figure 12. However, due to data limitations, we are only able to calculate the additional decrease in the individual health outcomes (and the associated costs) due to delay (the difference between the dark red line and the dashed red line). As a result, we are unable to estimate the cost associated with the yellow shaded area in Figure 12, leading to an underestimation of the true cost of the delay on an individual's health outcomes.

**Figure 12** Impact of delay in accessing an SCN on individual health outcomes – illustration



Source: Frontier Economics  
 Note: Stylised illustration

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## Annex C Examples of standard PSC treatments

### Example 1: Mild case of irritant contact dermatitis<sup>60</sup>

Individual A presents to their SCN with soreness and reddening of the peristomal skin. The SCN determines the PSC as irritant contact dermatitis caused by an ill-fitting appliance and treats it by changing the appliance. The SCN arranges to see the individual for a follow-up (either in person or by telephone). After the follow-up, no further treatment is needed.

### Example 2: Moderate case of allergic dermatitis

Individual B presents to their SCN with reddened, sore and itchy peristomal skin. The SCN determines the PSC as allergic dermatitis caused by an allergy to the adhesive. They swab the individual's skin and run a simple patch test. They check and change the products and accessories and arrange a follow-up with the individual. At the follow-up, the peristomal skin is still red and itchy so the SCN refers the individual to a dermatologist. The dermatologist assesses the peristomal skin and prescribes a topical corticosteroid. After the treatment plan, the PSC has improved and no further treatment is needed.

### Example 3: Severe case of mechanical trauma

Individual C presents to their SCN with broken and bleeding peristomal skin. The SCN determines the PSC as severe mechanical trauma, checks and changes the appliance, re-educates the individual on how to correctly remove the appliance and prescribes a skin barrier to use until the skin heals. Individual C returns for a follow-up with their SCN at least once. After the follow-up, no further treatment is needed.

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<sup>60</sup> Examples created from clinical consultation and reference to Stoma Care National Clinical Guidelines (Osborne et al., 2019)

## Annex D Sensitivity analysis

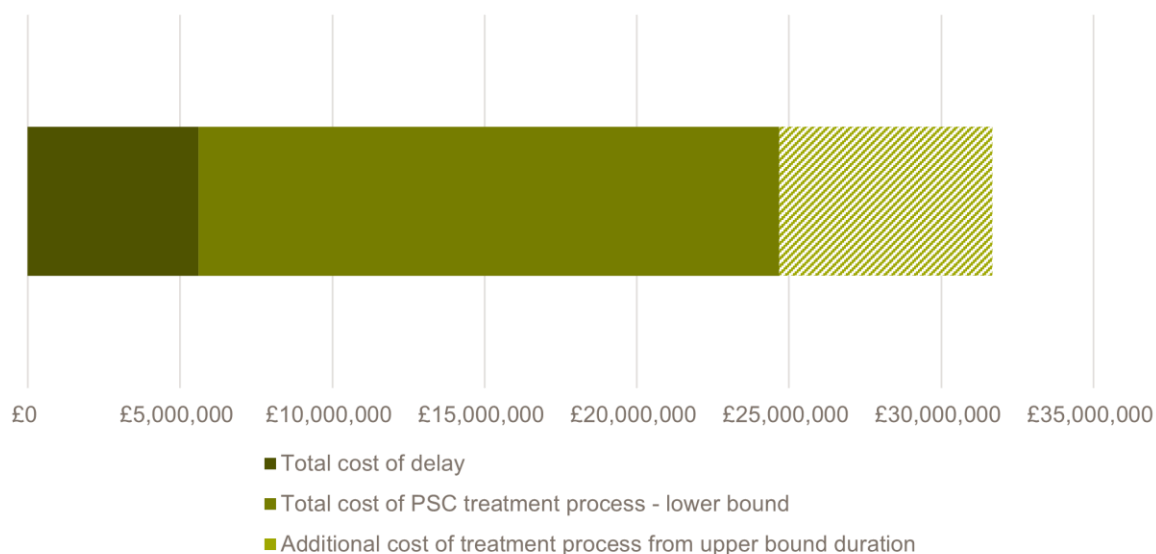
For this model, we've relied on several assumptions to characterise the impacts of PSCs on individual and healthcare. In this section, we demonstrate how relaxing some of the key assumptions impacts the total cost of PSCs in England per year.

### Duration of a PSC

In our model, we take the mid-point of PSC duration range estimates provided by stoma care nurses. The graph below shows how the total cost of PSCs in England could vary with changes in this average duration.

Using our estimate for the average duration of delay and taking the minimum duration for PSCs, the total cost in England per year is £24.7m. If the average duration was closer to the maximum range, this could add £7m to give a total cost of £31.7m.

**Figure 13 Total cost of PSCs in England per year (PSC duration variation)**



Source: Frontier Economics

### Incidence of PSCs

In the literature, the incidence of PSCs varies significantly.<sup>61</sup> In our model, we have used the incidence rate of 47.7% provided in Salvadalena et al (2020). In Figure 14 below, we demonstrate how varying this rate from 37.7% to 57.7% impacts the cost of PSCs in England per year.

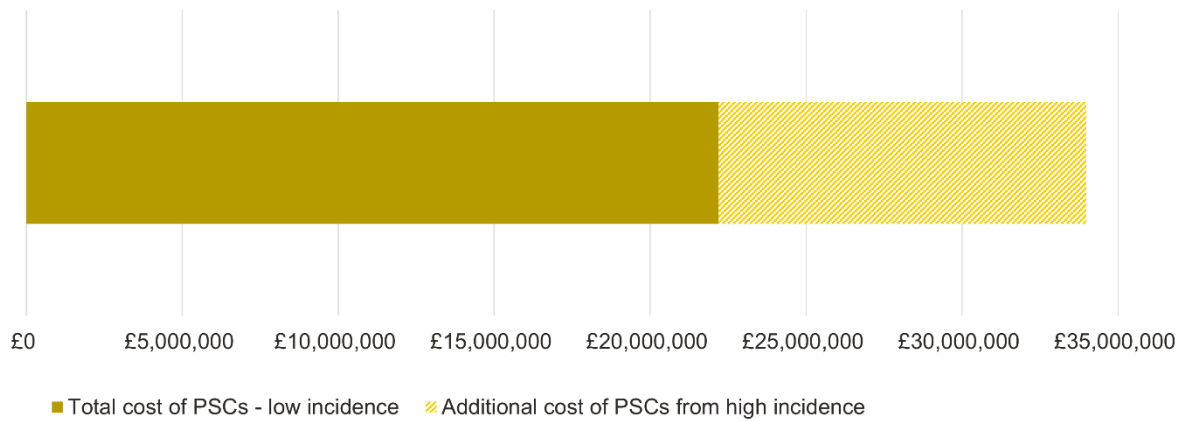
<sup>61</sup> Studies report incidence rates in the range of 30-60%, and even up to 75% for some groups (Almutairi, et al. 2018).



## SKIN FIRST: COUNTING THE COST OF PERISTOMAL SKIN COMPLICATIONS

A 10 percentage points reduction in the incidence of PSCs reduces the number of episodes per year to 56,122. At an average cost of £396 per episode, this amounts to a total cost of £22.2m. Increasing the incidence of PSCs by 10 percentage points, to 57.7% increases the number of episodes per year to 85,896, resulting in an upper bound total cost of £34.0m.

**Figure 14** Total cost of PSCs in England per year (PSC incidence variation)



Source: Frontier Economics

## Annex E List of acronyms

**Table 11** List of acronyms

CoI	Cost of Illness
GP	General Practitioner
HRQoL	Health-Related Quality of Life
NHS	National Health Service
PSC	Peristomal Skin Complication
QALD	Quality-Adjusted Life Day
QALY	Quality-Adjusted Life Year
HRQoL	Health-Related Quality of Life
SCN	Stoma Care Nurse

Source: Frontier Economics

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