

## **Ethics for Life Sciences Engineers 2025**

### **Gender and international differences in asthma experiences**

Liv is 18 years of age and lives in western Europe. As a child she suffered frequently from laryngitis and from breathing problems. She also suffered with eczema. Her breathing problems were treated with soluble prednisone (a glucocorticoid) and, when they were severe, with a nebuliser (inhaled corticosteroid [ICS]) treatment as a hospital outpatient. As a child she was not diagnosed with asthma, despite regularly identifying the respiratory problems on doctor visits. Not having any clear indication as to the cause of her respiratory problem was a significant cause of stress for her family. About the age of 12, following a respiratory tract infection, she developed a persistent cough. At this point she was diagnosed with asthma. She was prescribed a salbutamol inhaler (a short-acting  $\beta_2$  adrenergic receptor agonist [SABA]) which she took according to need. This gave some relief, but was of limited benefit.

At the age of 16, her breathing problems became again more pronounced. She found that her breathing problems reduced her ability to engage in sport; running became more difficult and often led to pronounced wheezing which could last for days. Swimming also became difficult as she found she could not inhale sufficiently when in the crawl position and so she was only able to swim backstroke (i.e., with her face out of the water). At this time she had wheezing over periods of days and the salbutamol inhaler did not give her as much relief as before, despite using it frequently. This caused significant anxiety, and frustration. She found that the inhaler was lasting for weeks instead of months. She ran out of her inhaler while on a foreign vacation and had to be given an emergency supply without prescription by a pharmacist due to a severe wheezing attack (this also led to an outpatient hospital visit and treatment). Her treatment was subsequently changed by her doctor to a medicine called Symbicort (budesonide, an inhaled corticosteroid [ICS]). This gave her increased relief,

although the delay in finding an effective treatment caused anxiety and anger in her family. She found that she was able to recommence running, and to swim in a crawl position once more.

Asthma is a chronic disease that causes tightness in the chest, airway obstruction and wheezing. In Europe, almost 10 million people under 45 years old have asthma (Selroos et al. 2015). The Global Burden of Disease Study estimated that asthma caused the loss of 21.6 million healthy years of life (disability-adjusted life years [DALY]) and 461,069 deaths in 2019. Approximately 90% of the asthma burden of disease is borne by people living low and middle income countries (LMICs). Some countries report very high (up to 90%) rates of uncontrolled asthma. Differences in disease burden across countries may result from cultural or environmental factors (air pollution, smoking rates etc.) but may also be linked to differences in treatment linked to underdeveloped health care systems which are designed to address the needs of a comparatively affluent minority, cultural differences in how treatments are understood and adopted, and a lack of research on the effectiveness and implementation feasibility of treatments in these populations (see Mortimer et al., 2022).

As children, boys are reported to have a higher prevalence of asthma than girls and are twice as likely as girls to be hospitalised for asthma treatment. Fuseuni and Newcomb (2017) report that this pattern reverses during adolescence, and, by adulthood, women have a higher prevalence of asthma than men, and are three times more likely than men to be hospitalized for asthma related events. Asthma symptoms are frequently linked to menstrual cycle, with 30-40% of women with asthma reporting pre or peri-menstrual worsening of symptoms. This increased prevalence in women is maintained until menopause, when a decrease in asthma prevalence in women is noted. Fuseni and Newcomb report that “While pre-menstrual

asthma impacts many women with asthma, the molecular mechanisms driving the cyclic increase in symptoms are poorly understood" (2017: 19). Similarly, the relationship between asthma symptoms and contraceptive use is poorly understood. While there are a number of studies on this topic, they give rise to discordant findings (some finding increased asthma symptoms with contraceptive use, others reduced and some no change). These discordant findings may be related to small sample size, short study duration and to many different forms of contraceptives in use in those involved in these studies. Fuseni and Newcomb suggests a need for longer, more controlled, and larger studies.

Despite the increased prevalence of asthma in women which suggests that factors associated with biological sex may play a role in the disease, existing international recommendations for the management of asthma do not provide any sex-related indications for treatment. This would be justified if there were in fact no relevant differences between people of different biological sex. This hypothesis of no difference has not, however, been adequately tested. But, there are some initial indications from research about sex-related differences which suggests that common treatments like inhaled corticoid steroids have less positive effects on asthma symptoms in women than in men (Rogliani et al., 2022). In addition to biological sex differences, contextual and environmental factors may also play a role in asthma. We might therefore expect that gender differences (defined as socially constructed roles, behaviours and expressions of identity in girls, women, boys, men and gender-diverse people) may also be relevant. However there is even less data on the experiences of gender diverse people than there is on sex differences (Jenkins et al., 2022).

### Case study analysis questions

1. The care concept of ‘caring for’ (responsibility) suggests we need to locate our actions in a social network with empathy for others. Who are the people that are involved in this network?
2. The care concept of ‘caring with’ identifies the need to act in solidarity with those who are comparatively powerless in society. Who has power in this situation and who has less power? (Another way of framing the same question is to ask whose voice/perspective is typically heard in such situations, and whose voice/perspective is typically silenced?)
3. The World Economic Forum (2024) says that the root causes of gender health gap include (i) scientific research which treats male body as the ‘default’, (ii) datasets that either don’t include sufficient women or which are not gender differentiated, (iii) barriers to healthcare for women resulting in diagnostic delays and difficulties in accessing treatment, and (iv) under investment in developing treatments for conditions that disproportionately impact on women. The same four factors (lack of scientific research, lack of data, barriers to healthcare and underinvestment in research specific to these contexts) may also be assumed to impact on differences in health outcomes across wealthier and lower income countries. Identify which one of these four aspects of the situation you would like to focus on in your analysis, and whether you would like to focus on questions of gender, international differences or on both (you have  $4*3=12$  different scenarios you could focus on).
4. In relation to the issue you have decided to focus on, identify who are the actors that most need care or give care in this situation (pick 3 or 4). For each, identify how this situation would be seen from their perspective.
5. For each of these, identify what emotions they would probably feel about this situation. What are the thought action tendencies associated with each of these emotions (refer back to chapter 3 if needed)?
6. What competences do you expect biophysical scientists bring to this situation (think about technical competences such as specific biological knowledge, knowledge of research techniques etc., as well as organisational competences, ethical competences and public advocacy roles)?
7. Who should be involved in arriving at a solution that supports those who give and need care? What might such a solution be? What roles could biophysical scientists and engineers play in such a solution?
8. The care concept of ‘receiving care’ identifies the need to monitor how the care that is given is received. What monitoring would be put in place in the context of your proposed solution?

The sources I used in preparing this case are:

Fuseini, H., & Newcomb, D. C. (2017). Mechanisms driving gender differences in asthma. *Current allergy and asthma reports*, 17, 1-9.

Jenkins, C. R., Boulet, L. P., Lavoie, K. L., Raherison-Semjen, C., & Singh, D. (2022). Personalized treatment of asthma: the importance of sex and gender differences. *The Journal of Allergy and Clinical Immunology: In Practice*, 10(4), 963-971.

Mortimer, K., Reddel, H. K., Pitrez, P. M., & Bateman, E. D. (2022). Asthma management in low and middle income countries: case for change. *European Respiratory Journal*, 60(3).

Rogliani, P., Cavalli, F., Ritondo, B. L., Cazzola, M., & Calzetta, L. (2022). Sex differences in adult asthma and COPD therapy: a systematic review. *Respiratory Research*, 23(1), 222.

Selroos, O., Kupczyk, M., Kuna, P., Łacwik, P., Bousquet, J., Brennan, D., ... & Haahtela, T. (2015). National and regional asthma programmes in Europe. *European Respiratory Review*, 24(137), 474-483.

## **Ethics for Life Sciences Engineers 2025**

### **Case Study Report Guidelines**

You will write a report in a team of 3-4 people.

Your case study report should be between 2,300 words and 3,100 words long. It should be written in paragraphs in the form of a report (bullet points can be used to present multiple points). It should include references to any literature you cite.

In your report your team will pick one aspect of the case (as identified in the case analysis questions, there are multiple you could choose), identify 3-4 people most closely connected to this aspect of the case, and explore how a care solution might be put in place that meets their needs. I would expect different teams will probably pick different aspects of the case to focus on (and so write very different reports).

Your report should contain the following headings:

- **Introduction:** Briefly (circa 150 words) describe the aspect of the case study you focus on, why this aspect is interesting, and describe the structure of your report (note: we presume different teams will focus on different aspects of the case, so you need to specify what aspect your team is focused on).
- **Case background:** Describe (circa 300 words) the background to the case, highlighting the specific issue(s) in the case that your team will focus on. You can draw from the case as provided and from your wider reading about this case and related issues.
- **Who needs and gives care in this context?:** Identify 3 or 4 actors (circa 100 words) involved in the care that are most directly involved in the aspect of the case you will focus on as needing or giving care (or both). (In an appendix to the report, you should also include the full range of people or entities involved in the network of relationships in this scenario. You can represent this as a list, or graphically as a network, as you prefer).
- **Perspectives:** For each of the 3 or 4 participants that you identified as needing or giving care describe what you think might be their perspective on the situation. You can draw on literature from this case or from wider literature. This should be circa 150 to 200 words per perspective (circa 500 to 800 words in total).
- **Emotions:** For each of the 3 or 4 participants that you identified as needing or giving care describe what you think might be their dominant emotions in this situation.

For each emotion, identify (i) the ethical information about the situation that it raises and (ii) the thought/action tendencies that are linked to the emotion (i.e. how might that emotion lead people to act / think). This should be circa 150 to 200 words per perspective (circa 500 to 800 words in total).

- **Competences:** Briefly (circa 150 words) identify what relevant competences that biological researchers may bring to this situation (think about technical competences such as specific biological knowledge, knowledge of research techniques etc., as well as organisational competences, ethical competences and public advocacy roles).
- **Your care solution:** Describe (300 to 500 words) a solution that would provide care for those who are involved. Your answer to this question should explicitly build on and refer to previous sections.
- **Responding:** Describe (circa 150 words) what information might need to be collected, or what monitoring or review processes put in place to ensure the care solution is operating in a way that meets people's needs.
- **Conclusion:** Briefly (circa 150 words) describe the aspect of the case study you focused on, some of the key points you saw in your analysis of the case, and the key features of your solution.
- **Appendices:** Include here any additional relevant information (including your use of GenAI, your network description...) (please note, for the final report, the appendices and the Generative AI table is included in the grading)

## Use of Generative AI

You can use Generative AI to help you generate ideas, to search for additional literature, and to help you write clearly. Please include an AI use statement in the appendices. A model for what this could look like is:

Tool used	Purpose	Prompt	Input	Output
ChatGPT ( <a href="https://chat.openai.com/">https://chat.openai.com/</a> )	To refine the English used in the report	Give feedback on the academic tone and accuracy of language, including grammar, punctuation and vocabulary	[Link to original text]	[Link to output]
...				

Please note that when generating ideas/ content, GenAI can reproduce content from its training dataset. It may not identify (or be able to identify) the sources for this text. Inclusion

of such non-cited quotations in a report without citation would constitute plagiarism – a form of cheating. You should take care to avoid this.

**Ethics for Life Sciences Engineers 2025**  
**Grading Guidelines for the Ethics Case Study Report**

	<b>Excellent (6)</b>	<b>Minimally sufficient (4)</b>	<b>Insufficient (&lt;4)</b>
<b><i>Case background &amp; identification of those needing and giving care (25%)</i></b>	<p>Provides a comprehensive and well-organized description of the case background. Clearly highlights the specific issues the team will focus on, with detailed explanations. Draws from both the provided case and from wider readings (including those beyond the recommended readings). Accurately identifies 3 or 4 actors most directly involved in the aspect of the case, with detailed explanations of their roles.</p>	<p>Provides a basic description of the case background, covering the main points. Identifies the specific issues the team will focus on, but with limited detail. Draws primarily from the provided case, with minimal use of wider readings. Identifies 3 or 4 actors most directly involved in the aspect of the case, but with basic explanations of their roles.</p>	<p>Provides an incomplete or disorganized description of the case background. Fails to clearly identify the specific issues the team will focus on. Relies solely on the provided case, with no use of wider readings. Demonstrates a lack of understanding of the case and its broader context, including ethical considerations. Fails to clearly identify the different actors in the network of relationships.</p> <p>Does not accurately identify 3 or 4 actors most directly involved in the aspect of the case. Presents the information in a disorganized or unclear manner.</p>
<b><i>Perspectives and emotions (25%)</i></b>	<p>Provides a detailed and insightful description of each participant's perspective on the situation. Provides a comprehensive and nuanced description of each participant's dominant emotions in the situation. Identifies the ethical information raised by each emotion and the thought/action tendencies linked to it. Draws extensively from both the case literature and wider</p>	<p>Provides a basic description of each participant's perspective on the situation. Draws primarily from the case literature, with limited use of wider literature. Provides a basic description of each participant's dominant emotions in the situation. Identifies some ethical information and thought/action tendencies linked to each emotion. Shows a general understanding of the ethical</p>	<p>Provides an incomplete or unclear description of each participant's perspective on the situation.</p> <p>Provides an incomplete or unclear description of each participant's dominant emotions in the situation. Fails to identify the ethical information or thought/action tendencies linked to each emotion.</p> <p>Does not draw from relevant literature, relying solely on personal</p>

	<p>literature on participants in medical testing.</p> <p>Demonstrates a deep understanding of the ethical considerations and implications</p>	<p>considerations from each perspective.</p>	<p>opinion or limited sources.</p> <p>Demonstrates a lack of understanding of the ethical considerations from each perspective.</p>
<b><i>Competences, care solution and responding</i> (37.5%)</b>	<p>Provides a comprehensive and well-thought-out solution, described in clear and actionable ways, that addresses the needs of all involved parties. Explicitly builds on and refers to previous sections, integrating insights from the case background, perspectives, emotions, and competences. Demonstrates a deep understanding of the ethical considerations and practical implications of the proposed solution.</p>	<p>Provides a basic solution that addresses the needs of most involved parties. Refers to previous sections, but with limited integration and depth. Shows a general understanding of the ethical considerations and practical implications of the proposed solution. Describes the solution adequately but lacks detailed steps and rationale.</p>	<p>Provides an incomplete or unclear solution that fails to address the needs of involved parties. Does not refer to previous sections or integrate insights from them. Demonstrates a lack of understanding of the ethical considerations and practical implications of the proposed solution.</p>
<b><i>Structure, Introduction and Conclusion</i> (12.5%)</b>	<p>Provides a clear and concise description of the aspect of the case study being focused on. Explains why this aspect is interesting, demonstrating insight and relevance. Clearly outlines the structure of the report, guiding the reader on what to expect. <b>Includes relevant material in appendices including a clear table detailing use of Generative AI.</b></p>	<p>Provides a basic description of the aspect of the case study being focused on. Offers a general explanation of why this aspect is interesting, but lacks depth. Outlines the structure of the report, but with limited clarity. <b>Includes most of the relevant material in appendices including a description of the use of Generative AI.</b></p>	<p>Provides an incomplete or unclear description of the aspect of the case study being focused on. Fails to explain why this aspect is interesting or relevant. Does not outline the structure of the report, leaving the reader uncertain about what to expect. <b>Does not include important relevant material in appendices or an incomplete description of the use of Generative AI.</b></p>

