

# When are infection risks of blood transfusion tolerable? Towards understanding the ethical views of stakeholders in the blood supply

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## Vox Sanguinis

**Background and objectives** The perception of transfusion-transmitted infections (TTIs) is sensitive to various concerns besides the probability and impact of infection, and some of these concerns may be ethically relevant. This paper aims to advance thinking about blood safety policies by exploring and explaining stakeholders' reasons to consider TTI risks tolerable or intolerable.

**Materials and methods** Inspired by critical empirical ethics and phenomenological hermeneutics, we held interviews and focus group discussions to explore the moral experience of policymakers, hematologists, blood donors and recipients. Respondents were invited to discuss general concerns about the blood supply, to address the tolerability of TTI risks compared with other hazards and to comment on the costs of blood safety. Arguments for tolerance or intolerance towards TTI risks were analysed qualitatively.

**Results** Stakeholders' views could be clustered into seven categories: (1) clinical impact; (2) probability of infection; (3) avoidability of infection; (4) cost and health benefits; (5) other consequences of safety measures; (6) non-consequentialist ethical arguments; and (7) stakeholders' interests. Various arguments were offered that resonate with current ethical thinking about blood safety. Assuming that resources spent on inefficient blood safety measures could be applied more beneficially elsewhere, for example, responders typically expressed tolerance towards TTI risks. Some other arguments seem novel, for instance arguments for risk intolerance based on the low probability of infection and arguments for risk tolerance if patients have a poor prognosis.

**Conclusion** Understanding the moral experience of stakeholders enriches ethical debate about blood safety and prepares developing more widely acceptable policies.

**Key words:** acceptability, blood donation, blood donor, blood recipient, risk, transfusion-transmitted infection.

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## Introduction

Certain tests to detect transfusion-transmitted infections (TTIs) in donated blood rank among the least efficient healthcare interventions. Incremental cost-effectiveness ratios exceeding €1 000 000 per quality-adjusted life year

(QALY) have been reported, for example for serologic testing on human T-cell lymphotropic virus (HTLV) and nucleic acid testing (NAT) for hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) in low endemic countries [1–4]. This reflects how few infections these safety measures prevent, given the presence of other safety measures. For example, if effective donor selection and sensitive serological screening for HBV, HCV and HIV are in place, the residual risk will be low, and adding NAT screening will barely

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increase safety. While cost-sensitive decision-making approaches have recently been proposed [5], initiatives to downscale inefficient safety measures have been scarce [6], and blood services continue to introduce safety measures of questionable efficiency (e.g. Zika-NAT in the United States and hepatitis E virus NAT in Ireland, the UK and the Netherlands).

The continuation or introduction of inefficient safety policies shows intolerance for TTI risks, which presumably reflects public attitudes towards such risks. Risk perception studies (see Ref. [7] for an overview) have found that blood transfusion is seen as more risky than many activities with a comparable or a higher mortality rate. It was also shown that TTI risks are sensitive to three 'risk dimensions' from psychometric theory: the extent to which risks are dreaded and considered severe; the extent to which they are considered controllable and well-understood; and the extent to which the activity that generates these risks is considered beneficial. Compared with other hazardous activities, blood transfusion was perceived as very beneficial, and its risks as moderately severe and uncontrollable [7–10].

Some might conclude that the perception of TTI risks is affected by irrational biases. For example, whereas Ngo *et al.* [7] call a probabilistic approach to risk 'rational', 'systematic' and 'reliable', they call the public's perception of risk 'intuitive' and 'subjective'. Such a view might lead to a conclusion that policymakers have to choose between a rational blood safety policy that largely ignores public attitudes towards TTI risks or irrational policies that are in line with the public's risks perceptions.

However, this may be a false dilemma that stems from inadequate accounts of risk perception and rationality [11,12]. Public estimates of the probability that hazards will strike, for example the chance of contracting a TTI, may indeed be unreliable. However, risk perception may not (only) concern probability. Risk perception appears sensitive to ethically relevant characteristics of risks, including the extent to which risk is voluntarily chosen or consented to; the distribution of risks and benefits; and the existence of alternatives to hazardous activities [11–14]. Furthermore, insofar as risk perceptions are based on emotion, these emotions may point to valid ethical concerns. Anger might, for example, signal a concern for justice and fear a concern for well-being [12]. Thus, public risk perception should not be dismissed as irrational too hastily. But neither need public perceptions be accepted at face value. Perceptions of risks can be analysed to uncover ethical concerns, but might prove to include questionable empirical assumptions or dubious ethical implications [12,13].

Previous risk perception studies offer limited insight into the ethical views behind TTI risk perceptions. Such studies quantified public perceptions regarding TTIs risks in terms of the three risk dimensions of general risk

perception theory (dread, control and benefit). Yet there might be elements in TTI risk perception that do not fit these risk dimensions, such as the symbolic nature of blood, or the relation between donor and recipient. Moreover, as these studies typically used surveys with closed answer formats, the reasons behind TTI risk perceptions have rarely been researched. In what sense are risks of blood transfusion considered controllable or uncontrollable, for example, and why are they dreaded? On what beliefs and emotions are such perceptions based? Finally, most studies investigated the risk perception of the general public rather than the views of people closely involved in the blood supply.

Understanding such views can advance academic and regulatory thinking on blood safety, including the emerging discussion on reasonable limits to blood safety given the high cost-effectiveness rates of some safety measures [6,15]. Understanding stakeholder perspectives on the tolerability of blood transfusion risks also aides consulting stakeholders on risk issues, which has been advocated in recent years [5]. This paper investigates the views of stakeholders in the Dutch blood supply and prepares integrating these into ethical theorizing.

## Methods and materials

Our research followed *critical empirical ethics* [16,17]: the idea that ethical theorizing should be informed by empirical research into (e.g.) people's views and experiences regarding ethical issues, but without accepting these at face value. The approach called *phenomenological hermeneutics* [18,19] adopts a cyclical process, which typically starts by studying ethical literature. Instead of bracketing all views on what matters in the issue studied, which would be unproductive and seems impossible, researchers develop a provisional ethical perspective before they engage in empirical work. Subsequently, researchers aim to understand perspectives informed by first-hand experiences by having in-depth interviews or group discussions with stakeholders. They finally reconstruct the views that have emerged in ethical language (insofar as possible), which enables either enriching ethical theory or reflecting on stakeholders' views critically. The validity of the research consists in presenting stakeholders' views understandably and evaluating them fairly [18,19].

### Step 1: literature study

Our provisional literature study was informed by our earlier work on ethics and blood safety [6,15,20,21], and in addition covered the perception of blood transfusion risks and the ethical significance of emotions concerning risks.

This enabled the design of interviews and focus group discussions.

### Step 2: interviews and group discussions

We conducted twenty-five semi-structured interviews and two focus group discussions. First, broad questions were asked concerning our respondents' involvement in the blood supply, their experiences with the blood supply and issues that worried or upset them. Such questions enabled exploring issues and perspectives suggested by our respondents. Respondents then compared TTI risks to a number of other risks (including both risks that are similar and risks that are dissimilar according to risk perception theory) and commented on their tolerance for each risk. Finally, respondents commented on the tolerability of TTI risks in relation to some claims about the costs of the Dutch blood supply, including the claim that blood products are more expensive in the Netherlands than in neighbouring countries [22]; the claim that the Dutch blood service applies more safety tests than most blood services abroad [22]; and the claim that some of these tests have incremental cost-effectiveness ratios exceeding €1 000 000/QALY [1]. For all questions, the interviewer pressed respondents to explain the reasons and emotions behind their views. The interviews took as long as necessary to complete the interview guide, assuming the respondents had sufficient time available, which ranged from an hour to two hours.

As we sought to understand the various experiences and perspectives of those involved in the blood supply, our research included blood product recipients, donors, haematologists, policymakers and policy advisors. (See Table 1 for respondent data.) We strived to maximize the variety of perspectives included by selecting respondents whose demographic variables and relation to the blood supply were as diverse as possible. Recruiting an ideal set of respondents faced various practical obstacles, however, including the hesitance of politicians and representatives of the Dutch Ministry of Health to participate; several last-minute cancellations for the group discussion with blood product recipients; the lack of suitable communication channels for open calls to haematologists, policymakers and policy advisors; and the low response of donors and blood product recipients to open calls. We nonetheless kept striving for diversity in our recruitment efforts, for example by approaching multiple donor societies (DVNL and DAR) and patient advocacy groups (NVHP, Hematon and SZB) and asking them to approach members of diverse backgrounds and demographic status. Note that our selection of respondents was not intended to be representative; the point was to include diverse perspectives. On the methodological assumption that every

minority view may hold some relevant insight, if it is understood properly, hearing various voices may open new directions for thinking.

Potential respondents were informed that all data would be anonymized and stored locally, and that they could opt out of the research at any time. Oral permission was acquired before making audio recordings.

### Step 3: analysis

Our first 12 interviews (three in each category) were transcribed verbatim. Lacking resources to fully transcribe all

**Table 1** Characteristics of participants in interviews and focus group discussions

Code	Age	Sex	Education
Blood product recipients, interviews			
R01	70–79	M	Mid-level professional
R02	40–49	M	Mid-level professional
R03	50–59	F	Mid-level professional
R07	50–59	F	High-level professional
R09	50–59	M	Mid-level professional
R10	50–59	M	Mid-level professional
R12	50–59	M	Academic
Blood product recipients, group discussion			
R11	20–29	M	Academic
R13	70–79	M	High-level professional
Blood and plasma donors, interviews			
D01	40–49	M	Academic
D02	60–69	F	Academic
D03	30–39	M	Academic
D04	60–69	M	High-level professional
D08	40–49	F	High-level professional
Blood and plasma donors, group discussion			
D05	50–59	M	High-level professional
D06	60–69	M	Academic
D11	60–69	M	High-level professional
D15	20–29	F	High-level professional
D16	40–49	M	Academic
Haematologists, interviews			
H01	40–49	M	
H02	40–49	F	
H03	30–39	F	
H04	50–59	M	
H05	50–59	F	
Policymakers and policy advisors, interviews			
P01	60–69	M	
P02	60–69	M	
P03	60–69	M	
P04	40–49	M	
P05	70–79	M	
P06	50–59	M	
P07	60–69	M	
P08	60–69	M	

the interviews and focus group discussions, the remaining interviews were analysed directly from tape, but we transcribed all fragments that seemed to contain views regarding the tolerability of TTI risks.

Like some other studies based on phenomenological hermeneutics [17,18], our analysis was inspired by grounded theory. Fragments that addressed issues relevant to our research subject were first listed and then open coded, that is given initial labels, based on their content. Subsequently, fragments with related labels were grouped and captured under increasingly general categories. Where appropriate, we used ethical terminology as labels, to enable the integration of our research results with existing ethical theory. This simultaneously suggested which views or arguments current ethical terminology could not capture.

## Results

Fragments in which similar arguments regarding risk tolerance were addressed could be clustered into seven main categories. Below, we expound the arguments captured under these categories, focusing on arguments that are novel or remarkable and might thus enrich thinking about blood safety. (Tables listing these arguments are offered as Tables ).

### Clinical impact of infection

Respondents connected risk tolerability to the extent to which TTIs were serious, lethal and curable. Some respondents considered non-lethal TTIs no more tolerable than lethal TTIs; they argued that even non-lethal TTI can be serious or argued that patients with certain health conditions are especially vulnerable when contracting a TTI, for example patients with pre-existing liver disease contracting hepatitis E. Some respondents considered TTIs that are typically asymptomatic more tolerable, but one respondent objected that the infection could be transmitted further, that carrying the infection might affect one's social interactions, and that the infection might develop into disease later in life. The existence of especially vulnerable patient groups for whom TTIs might progress more seriously was considered a reason for risk intolerance. Remarkably, one respondent argued that risks could be tolerated more easily for patients who have a poor prognosis (even without contracting a TTI):

When you're dealing with a bottomless pit, you could accept some more risk. (...) [It makes a difference whether someone] needs a blood transfusion just one or two times, but whose life-expectancy is not affected, or whether you're talking about

someone whose life expectancy is very limited anyway. (Fragments D01-19 & D01-20)

### Probability of infection

Risk tolerability was also connected to the probability of contracting a TTI, but with some notable twists. Respondents usually considered the risk of contracting a TTI small and well-managed compared with many day-to-day risks, medical risks, transfusion hazards other than TTIs and infection risks with other modes of transmission (e.g. eating). This small chance was often offered in support of risk tolerance, for example by respondents who argued that risks are ubiquitous and cannot be eliminated completely. Other respondents, however, objected that TTI risks are unevenly distributed. The risk may be small for many patients, but patients who need blood products regularly run significantly more risk.

Various respondents noted that TTI risks are conditional upon acquiring health problems that require blood product therapy. Small risks per blood product translate into even smaller risks for random persons, who have a small chance of ever needing blood products. According to some respondents, the remote risk that a random person will need blood products justifies tolerating a small risk that blood products transmit TTIs. Interestingly, other respondents reached the opposite conclusion. In the words of one blood product recipient:

The chance of having what I have is one in a million. And the chance that, if I need a transfusion, it is the one transfusion in ten years where something goes wrong, that is just... That is very nasty. (R11-11)

On this view, being stricken by small (conditional) risks means suffering from extreme bad luck, which is dramatic and undeserved. A related view is that TTI risks are especially intolerable because TTIs frustrates attempts to remedy someone's bad luck:

If you need drugs or an operation, you are in a situation and you are dependent, for instance on medication. If that goes wrong, or you develop nasty adverse reactions, that is just very... Because you already are a victim, actually, you become a double victim. (D11-09)

### Avoidability of infection

A third cluster of arguments concerned the avoidability of TTI risks. Clearly, risks that cannot be avoided must be tolerated (or accepted). However, respondents differed on

whether TTI risks are avoidable. Some claimed that TTI risks are typically foreseeable and can be ruled out by taking adequate safety measures. Others argued that TTI risks are unavoidable due to unforeseeable epidemiological developments and technological limitations of safety measures. These claims were apparently made with different TTIs in mind (e.g. well-managed TTIs like HIV versus emerging infections). In addition, 'avoiding risk' sometimes seemed to mean reducing risk drastically and sometimes reducing risk to zero. Many TTIs may be avoidable on the former interpretation but not on the latter.

Another issue was whether individuals (patients and clinicians) could avoid TTI risks. Various respondents claimed (and some contested) that blood product recipients have no choice but to undergo treatment. Similar arguments were that there are no treatment alternatives for blood products and that no choice among suppliers is possible, given Sanquin's monopoly in the Netherlands. Respondents argued that if individuals have no options to avoid TTI risks, blood safety policies should be more risk intolerant.

### Costs and health benefits of safety measures

A fourth cluster of arguments concerned the costs and health benefits of safety measures.

Comparing costs and health benefits was a common strategy to evaluate safety measures. Some respondents considered cost-effectiveness irrelevant because the value of someone's life cannot be expressed in monetary terms. However, when they were asked to assume that resources spent on blood safety could be applied more efficiently elsewhere in the healthcare system, thus helping more people or saving more life-years, these and other respondents would typically tolerate TTI risks. Remarkably, this included recipients of blood products:

Of course I want to run as little risk as possible. But I am realistic in understanding that it's not only about me. (...) You can't expect society to spend its money on an individual rather than helping a larger group. (R07-27 & R07-28)

Other respondents stated that stacking inefficient blood safety measures is indefensible if other patients, who also have a claim on health care funds, lack adequate care:

What if there's someone who needs a heart transplant, for which you don't have the money, but you would apply these safety measures. (...) Then you're telling a patient receiving a transfusion: you are more valuable. (P04-48)

One respondent added that other patients are also entitled to adequate care because they too contribute funds to the healthcare system.

However, various respondents argued that the choice between applying blood safety measures or helping other patients is a false dilemma. Some argued the budget impact, and thus, the opportunity cost of blood safety measures is negligible in the Netherlands. Another argument was that cutting costs on blood safety measures was unnecessary to free healthcare funds; other inefficient processes within or outside the transfusion service should be optimized instead.

Finally, some respondents objected to tolerating TTI risks in order to supply care to more patients. Such respondents typically denied the importance of efficiency in blood safety by referring to the costs of other medical procedures:

If we would all consider how many sports-related injuries there are, and how much costs these injuries entail, I would like to compare that to this figure. (...) You would have to consider carefully why you would do the one thing, but wouldn't do the other. (R10-45)

### Miscellaneous consequences of safety measures

Besides costs and health benefits, some other consequences of safety measures were considered relevant. Logistical problems, supply problems, diminished clinical effectivity of blood products in case of pathogen inactivation and invasions on donors' privacy were mentioned as reasons not to take safety measures and thus to tolerate some risk.

### Non-consequentialist ethical arguments

A sixth cluster contains non-consequentialist ethical arguments for risk intolerance – arguments that appeal to other ethical concerns than the (balance of) good and bad effects of decisions. Some arguments assumed that harm is especially objectionable if it is caused by human action (compared with harm not prevented by human action). One recipient argued that harms caused by taking TTI risks are especially serious, compared with harms caused by other medical procedures, because administering blood products constitutes a serious breach of bodily integrity:

You violate a body's integrity, and that calls for extra safeguards. (...) By infusing something, a barrier is crossed that normally remains untouched. Swallowing, eating and drinking, is something we all do. In that sense it goes further than taking a pill. (P01-12 & P01-14)

Several respondents noted that tolerating risks to patients is inconsistent with the aim of medicine, which is to improve patients' health:

A serious infection through blood products is something you want to avoid at all times, because you want to help someone by giving blood products, and things go completely in the opposite direction if you do this. (D08-09)

Some respondents considered TTI risks especially intolerable if these resulted from a decision to end or withdraw a safety measure that had been in place for some time already. Such risks were deemed less acceptable than the negative consequences of a decision to forego a new measure. Two respondents argued that stopping safety means being causally responsible for harms patients suffer:

If you really remove tests, then someone has consciously made a decision, and that influences your health. I think that is the point. (...) Something's afflicted upon you. (R11-45)

On the other hand, a decision to withdraw safety measures would be accepted more easily if that safety measure could be reinstalled quickly, should that prove to be necessary.

### Stakeholders' interests

Arguments in the final cluster referred to the position or interests of specific stakeholders in the blood system.

Various arguments addressed the interests of blood product recipients and their families, or the special situation they are in. Recipients of blood products being dependent on their clinicians and the blood service were thought to have little control over their own safety. Respondents argued that recipients of blood products deserve solidarity, because patients' health is priceless to themselves and their loved ones, because everyone could have been a blood product recipient and because everyone may become one someday. Another argument for risk intolerance was that TTIs affect victims' families. This was stressed by several blood product recipients who had been infected previously:

I have never really been afraid of what happens to me. I have never been afraid of death or whatever. Yes, I've feared for my relatives more, right. As I said, when the doctor told me, you are indeed infected, the first thing I thought was, oh great, how about her? (R12-12)

One recipient considered financial and practical problems for his family most intolerable. Upon further

questioning, this respondent stated that he would be more tolerant towards TTI risks if families were supported when necessary:

A family has a huge problem, if [the] father falls seriously ill at some point, or dies. (...) You would have to consider carefully how much trouble this causes in the family, and how one can help out there. (...) If you do this [remove safety measures], then take responsibility for problems you might cause. (R10-33, R10-39 & R10-44)

Blood product recipients explained the limited concern for their own safety by appealing to their histories of medical problems and sometimes to their limited life expectancy. Several others noted that receiving blood products was very beneficial – indeed life saving – for recipients. Some considered this a reason to tolerate some risk, and others expressed the opposite view, for example:

You might die if you do not get these drugs, that operation or that blood product, so your life might depend on it. (...) And you might also die because of adverse reactions, serious complications during surgery, or an infection. That makes it very dramatic, and that's why something needs to be done. (H05-16)

A few considerations addressed the interests of donors. Some respondents discussed whether rejecting donors to reduce TTI risks amounts to discrimination or conflicts with a presumed right to donate blood. However, these respondents held that any discrimination involved is legitimate and rejected the idea of a right to donate. An argument *for* extra safety concerned the nature of the donation. One respondent suggested that because donors act from altruistic motives and put effort into donating, blood services should reward this altruism by ensuring that his blood is used safely.

Arguments relating to haematologists' interests centred on haematologists' relation with blood product recipients. Haematologists stressed that they feel responsible for their patients' safety, with whom they have a fiduciary relationship and with whom they are personally and emotionally involved.

Policymakers were taken to have an interest in avoiding being responsible for TTIs. Respondents mentioned several motives to avoid responsibility that they considered inappropriate: policymakers' fear for reputational damage, their fear for liability and the fact that policymakers do not pay safety measures out of their own pockets. Further arguments were based on the political position blood safety policymakers are in. It was argued that policymakers' decisions should be consistent with previous decisions and with the values they express, and

that taking a more risk tolerant decision-making approach would require political support, obtained by legitimate procedures.

Finally, certain arguments addressed the interests and concerns of the general public. The general public was presumed to fear TTIs, to demand that blood products are safe and to attach a special meaning to blood. Maintaining public trust was mentioned by some respondents as an argument not to tolerate risks, but one respondent objected that risk intolerance might actually have adverse effects on public trust:

If a blood bank has to do this often, tell donors: we do not want to draw your blood, because you've visited this or that place, then people will (...) think of blood as something scary. (...) If I start implementing security systems, it means that I don't, uh, that what I supply can't be good. (P02-25)

## Discussion

This study suggests that stakeholders can engage in meaningful deliberation about limits to blood safety and thus confirms that involving stakeholders in the management of risk issues is viable [5]. Their views may be less entrenched than is sometimes supposed – not all blood product recipients may for example demand zero risk whatever the cost – and are based on relevant perspectives and arguments. Giving such perspectives due regard and being committed to offer strong arguments for policies, without discarding arguments that do not fit decision-makers' framing of the issue, is necessary to develop broadly supported policies. This study identifies some perspectives that deserve further ethical reflection and call for stakeholder engagement on a larger scale, for example in different cultural contexts.

Importantly, blood product recipients may not be primarily concerned about their own health. Some recipients said that they were accustomed to facing health risks and that blood products brought them much good, but said they did fear the medical and practical impact of TTIs on their families. Perhaps, then, policymaking should focus not on maximizing safety but on ensuring reasonable safety plus good support for families of patients who contract a TTI.

A remarkable argument for risk intolerance was that because TTI risks are small, contracting a TTI is a dramatic and undeserved fate. A related argument was that TTIs frustrate attempts to remedy patients' bad luck, whose bad luck thus strikes in two steps. One may perhaps support these arguments by appealing to luck egalitarianism: the idea that justice requires neutralizing the

effects of bad luck on peoples' lives [23]. Building on this idea, one could argue that tolerating TTI risks *reinforces* some patients' bad luck and is therefore unjust. At least on a societal level, however, some bad luck must be accepted, as neutralizing everyone's bad luck is beyond our means. Perhaps decision-makers should acknowledge more openly that allocating scarce healthcare resources is inherently tragic: if providing care to some patients means that others must forego care, every allocation decision will have losers. Policymakers who consider introducing or discontinuing inefficient blood safety measures could compare these to therapies that are not publicly funded and may, ideally, identify how funds not spent on blood safety would be used. Various respondents said they would tolerate higher TTI risks if resources spent on inefficient blood safety measures could be applied demonstrably more beneficially elsewhere in the healthcare system.

However, respondents also argued that the budget impact of blood safety measures is small and suggested that healthcare funds can be freed in alternative ways, without compromising care. Any initiative to contain the costs of blood safety measures should address these issues. Perhaps it should be conceded that saving costs on blood safety measures will be neither sufficient nor necessary to make healthcare more beneficial. However, if inefficient healthcare interventions *collectively* lead to suboptimal health outcomes, blood services may still have to take responsibility for the efficiency of their operations. But then, policymakers should not focus exclusively on blood safety measures and should actively endorse similar initiatives in other healthcare domains.

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## Conflict of interests

The authors declare no conflict of interests.

## Author contributions

K.K., M.F.V. and H.L.Z. designed the study. K.K. organized and took part in the interviews and discussions. K.K. performed the primary analysis of the data. K.K., M.F.V. and H.L.Z. performed the final analysis together and wrote the article.

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## Supporting Information

Additional Supporting Information may be found in the online version of this article:

- Table S1. Arguments for tolerance or intolerance toward TTI risks: clinical impact.
- Table S2. Arguments for tolerance or intolerance toward TTI risks: avoidability of infection.
- Table S3. Arguments for tolerance or intolerance toward TTI risks: costs and (health) benefits of safety measures.
- Table S4. Arguments for tolerance or intolerance toward TTI risks: miscellaneous consequences of safety measures.
- Table S5. Arguments for tolerance or intolerance toward TTI risks: clinical impact.
- Table S6. Arguments for tolerance or intolerance toward TTI risks: non-consequentialist ethical arguments.
- Table S7. Arguments for tolerance or intolerance toward TTI risks: the interests/position of stakeholders.