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LAY SUMMARY

When a person is diagnosed with cancer, they may wish to consider undergoing fertility preservation procedures. These procedures give patients a chance to have their own biological child after completing cancer treatment. However, research suggests that cancer patients who have a poor prognosis are less likely to be offered fertility preservation treatment. In this paper, we consider the ethical implications of offering (or not) fertility preservation to this patient group, including using their sperm or eggs to reproduce after their death. We conclude that fertility preservation treatments should be offered to all cancer patients who might benefit from it, and we outline the many ways that benefit from this treatment can be gained. The decision to withhold the offer of fertility preservation treatment should be made between the patient's clinician and their wider care team. They must be able to provide good reasons to explain why it was withheld.

1 **Reproduction in life and death: should cancer patients with a poor prognosis be offered**
2 **fertility preservation interventions?**

3

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19 **ABSTRACT**

20 In the context of a cancer diagnosis, fertility preservation interventions are used to mitigate the
21 potential impact of gonadotoxic cancer treatment upon fertility. They provide patients with
22 cancer the option to freeze their reproductive material to have their own biological child
23 following treatment. The evidence suggests some clinicians are less likely to have fertility
24 preservation discussions with patients who have an aggressive or metastatic cancer which has
25 a poor prognosis. Although this is contrary to current policy recommendations, there is a lack
26 of guidance relating to offering fertility preservation in the context of a poor prognosis to
27 support clinicians. Controversy surrounds posthumous reproduction, and whether the wishes
28 of the cancer patient, when living and deceased should take precedence over others' wellbeing.
29 We consider the question of whether cancer patients with a poor prognosis should be offered
30 fertility preservation from an ethics perspective. We structure the paper around key arguments
31 to which multiple ethical principles might pertain, first establishing a central argument in
32 favour of offering fertility preservation based on respect for autonomy, before exploring
33 counterarguments. We conclude by proposing that a defeasible assumption should be adopted
34 in favour of offering fertility preservation to *all* cancer patients who might benefit from it. It is
35 important to recognise that patients could benefit from fertility preservation in many ways, and
36 these are not limited to having a parenting experience. The burden of proof rests on the clinician
37 in collaboration with their multi-disciplinary team, to show that there are good grounds for
38 withholding the offer.

39

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42 preservation procedures. These procedures give patients a chance to have their own biological
43 child after completing cancer treatment. However, research suggests that cancer patients who
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51 it was withheld.

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53 **Key words**

54 fertility preservation, poor prognosis, cancer, posthumous, ethics, reproduction

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71 **INTRODUCTION**

72 Cancer treatments (e.g., chemotherapy, radiotherapy and some surgery) can result in loss of
73 fertility - denying cancer patients the opportunity to have their own biological child in the
74 future. Loss of fertility does not affect all patients treated for cancer (ESHRE, 2020), but
75 predicting who will be affected is challenging because cancer treatments variably affect
76 reproductive function depending on the patient's age, cancer diagnosis, and specific treatment
77 regimen.

78 Procedures are now available which, if undertaken before cancer treatment, may preserve
79 fertility (such as egg, embryo, sperm and ovarian/testicular tissue cryopreservation). Given that
80 loss of fertility is often reported by cancer patients to be one of the most distressing side-effects
81 of cancer treatment (Peate et al., 2009), fertility preservation (FP) options can provide much
82 needed hope at a time when they are coping with significant uncertainty.

83 Crucially, the value of FP procedures lies in their ability to preserve the opportunity to have,
84 and to then parent, genetically related children, and the best chances of success for these
85 procedures are when they are offered prior to commencing cancer treatment. Consequently, at
86 cancer diagnosis, international guidelines recommend that cancer teams should discuss the
87 impact of cancer treatment on future fertility with the patient (National Institute of Health and
88 Care Excellence 2017; ESHRE, 2020; Loren et al., 2013; Lambertini et al., 2020; Yasmin et
89 al., 2018). Ensuring that patients are supported to make the right FP decision for them is
90 essential, because patients surviving cancer will live with the consequences of the choices made
91 about their fertility for the rest of their lives, so it is vital that they are supported to make the
92 right FP decision for them.

93 Some cancer patients will have a poor prognosis, perhaps the result of a cancer which responds
94 poorly to treatment, or one with widespread metastasises to other parts of the body, and there
95 is little chance of cure. In these circumstances, the requirement to discuss FP options seems
96 less clear, as patients in this position are very unlikely to be able to use their stored material to
97 have and raise children.

98 Instead, it may be possible to use posthumous assisted reproduction (PAR), whereby
99 cryopreserved eggs, embryos or sperm are used after the death of an individual for the purpose
100 of expanding a family (Lawson et al., 2016). The notion of posthumous reproduction was first

101 proposed by Montegazza in 1866, who first discovered that sperm could be frozen and
102 suggested that women whose husbands may have died during war could benefit from this
103 discovery (Elliot, 2004).

104 In these circumstances, where posthumous reproduction is the only likely option, we consider
105 the question of whether a FP discussion should take place and whether cancer patients with a
106 very poor prognosis should be offered fertility preservation.

107 Current available guidance for clinical teams is unclear on this question. Whilst there appears
108 to be a consensus that cancer teams should discuss the impact of cancer treatment on future
109 fertility with the patient at diagnosis, some professional and regulatory bodies such as The
110 American Society of Clinical Oncology (Lee et al., 2006) and the American Society for
111 Reproductive Medicine (2005) state that this should also apply to those with a poor prognosis,
112 and discussion should take place irrespective of prognosis in female cancer patients of
113 reproductive age (Munoz et al., 2016, Loren et al., 2013, Peccatori et al., 2013, Lambertini et
114 al., 2016). Others such as the NICE Clinical guideline [CG156] in the UK and ESHRE
115 recommendations (2020) do not. However, the NICE guideline does state that when deciding
116 to *offer* FP to people diagnosed with cancer, cancer teams should take into account factors
117 including diagnosis and prognosis, and the viability of stored or post-thawed material. This
118 distinction might reflect differences between publicly vs self-funded health systems rather than
119 different ethical commitments, but it nonetheless provides evidence of varied positions and
120 practices that warrant ethical scrutiny.

121 To provide that ethical scrutiny, we first consider what the *purpose* of FP is, which we then use
122 as backdrop against which to consider various arguments for or against offering FP to late stage
123 or prognostically poor cancer patients.

124 **What is the purpose and process of fertility preservation?**

125 It is important, at the outset, to consider what the purpose of FP treatment in the context of a
126 cancer diagnosis is, because this allows us to clearly articulate the goods that purportedly flow
127 from it. Whilst our aim is not to undertake a simple consequentialist analysis that balances
128 goods against harms, it is nonetheless important to have a clear sense of how people benefit
129 from FP and why it is valuable to them.

130 It seems that there are two kinds of goods that can flow from FP. The first is the good of being
131 able to reproduce genetically, and the second is the ability to be a parent to those genetically
132 related children. The former is independent of the latter, by which we mean it is possible to
133 reproduce genetically without having the experience of parenting the resulting children. In
134 contrast, the latter is dependent on the former. One cannot have the good of parenting
135 genetically related children without first reproducing genetically.

136 We contend that the purpose of FP, in the context of cancer treatment, is to allow people to
137 experience the second good. The benefit derived from offering FP to patients undergoing
138 cancer treatment is that it leaves open a future where they could be a parent to their genetic
139 offspring. This seems clear for two reasons. First, if we were not concerned with preserving
140 the opportunity to parent *genetic* offspring specifically, we would not be concerned about
141 fertility preservation at all. We would simply reassure patients that notwithstanding the likely
142 loss of fertility, they will have the opportunity to parent non-genetically related children
143 through gamete donation or adoption. Second, although it is possible to simply preserve
144 reproductive material so that it might be used at some point in the future by *someone*, which
145 would be enough to actuate the first good, the fact that people tend to want to preserve their
146 material for their *own* use, rather than to donate, suggests that they do not simply want to
147 reproduce, but that they are looking for a parenting experience. That said, we feel it is
148 reasonable to say that the primary aim of FP is to preserve a patient's ability to experience
149 being a parent to their genetically related child, as opposed to merely being a genetic progenitor
150 in the absence of a parenting experience. Thus this includes the possibility of using surrogacy
151 where, while another person carries the pregnancy, the original patient has both a genetically
152 related child and a parenting experience.

153 Of course, in the context of an adult patient with a partner, the aim of FP can also be to preserve
154 the opportunity for that partner to have the experience of being a parent to children genetically
155 related to the patient and the surviving partner. Consistent with what we have said above, we
156 contend that the good derived from this is that of enabling the surviving partner to have a
157 parenting relationship in a way that connects them to the deceased patient, rather than the good
158 of simply having genetically reproduced (which could be achieved by donation to a stranger).

159 Having now established that the purpose of FP is not simply to facilitate genetic reproduction
160 *qua* genetic reproduction, but rather to preserve the option of having a parenting experience

161 with one's genetic progeny for either oneself or one's partner, we will go on to consider
162 arguments for and against routinely offering FP.

163 **Respecting autonomy**

164 Respecting autonomy is a cornerstone of Western medical ethics, and this requires us to respect
165 a person's right to make decisions for themselves, including about their medical care. Respect
166 for autonomy does not mean we must do whatever people want, but that we take their wishes
167 seriously and allow them to choose when a choice is available. In order to act autonomously,
168 people need to be sufficiently informed about what their options are and the likely
169 consequences of decision options - a fundamental prerequisite for ensuring informed consent.

170 Increasingly, patients (including cancer patients) expect to participate and be involved in their
171 treatment decisions (Brietsameter, 2010; Siminoff and Thomson, 2010). Shared decision-
172 making is a process whereby clinicians share information about treatment options, empowering
173 the patient to actively decide based on their preferences (Elwyn et al., 2012) and this process
174 is considered a quality benchmark for the delivery of dignified care (Department of Health,
175 2012; Coulter and Collins, 2011).

176 As such, in order to respect autonomy, a high-quality fertility discussion in oncology is critical
177 to ensure that cancer patients are sufficiently informed about the potential impact of cancer
178 upon fertility. This will support them to make autonomous, fully informed decisions that give
179 them control over their reproductive future, before giving consent to any subsequent
180 intervention.

181 Hudson et al. (2016) have noted that the need to respect patient's freedom of thought, intention
182 and action while delivering healthcare, seems to suggest that everyone should be offered FP.
183 This seems plausible. An autonomy-based argument can clearly be made for having a FP
184 conversation with every patient or the patient's proxy decision maker (i.e. a parent) if they are
185 not able to make a decision by virtue of their age, or a best interest decision made in accordance
186 with the Mental Capacity Act (2005) if they are an adult who is otherwise incapacitous. Not
187 to raise the issue of fertility loss, and inform patients of FP options, would be a *de facto*
188 deception by omission and this is an insult to autonomy.

189 Hudson et al. (2016) do sound word of caution about drawing this conclusion, however, asking
190 whether cancer patients with a poor prognosis are really able to make autonomous decisions?
191 For example, the extent to which cancer patients can actually make informed decisions
192 regarding post-humous reproduction PAR has been debated, as a result of the time pressure
193 needed to make a FP decision and emotional and cognitive factors which may inhibit the ability
194 to retain information (Lawson et al., 2015). In our view, whilst it is of course possible that some
195 patients in this position will not have the capacity to make a complex future looking decision
196 about their fertility, capacity is person and decision specific, and no blanket assumption can be
197 made.

198 That said, although there is a strong prima facie argument for respecting autonomy by giving
199 (capacitous) patients the option of FP, various studies suggest that doctors aren't providing all
200 patients with information about FP (Meyer and Farrell, 2015). Many healthcare professionals
201 report a decreased likelihood of initiating discussions related to FP with patients who have a
202 poor prognosis. Poor prognosis has been cited as a major barrier for talking about FP with
203 patients by 66.9% of oncologists (Zhang et al., 2020), with other studies citing that over 50%
204 of oncologists state that a patient's poor prognosis may dissuade them from discussing FP
205 (Sallem et al., 2018; Forman et al., 2009). Comparable findings have been reported in other
206 studies, with 41%-88% of clinicians citing poor prognosis as a factor that would either
207 influence FP discussions or lead them to not offer the option to patients (Chung et al., 2017;
208 Adams et al., 2013; Louwé et al., 2013; Collins et al., 2011). Similarly, a survey of paediatric
209 oncologists' attitudes and practices toward FP in adolescents reported that a patient having a
210 poor survival prognosis was one of three most likely reasons for the physician to not
211 recommend sperm banking (Köhler et al., 2011).

212 Quinn et al. (2009) reported that the majority of oncologists included in their research do not
213 discuss FP with patients with a poor prognosis. One oncologist reported that they experienced
214 discomfort at the thought of talking about "future babies" with a patient that is unlikely to be
215 alive within months. The authors concluded that although guidelines suggest healthcare
216 professionals should discuss FP with all patients, the majority appear to not follow these
217 guidelines. Takeuchi et al. (2017) observed an internal conflict in clinicians regarding whether,
218 and when, it was appropriate to discuss FP with patients with a poor prognosis.

219 This evidence about clinician practice tallies with studies reporting patient experience, with
220 Jones et al. (2022) reporting patients saying they were not informed about or offered FP at

221 cancer diagnosis. One explanation for this may be that clinician preferences can be limited by
222 ‘implicit persuasion’. This is a process whereby clinicians subconsciously place greater
223 emphasis on the treatment options they consider to be better suited to the patient, a phenomenon
224 frequently observed in oncology settings (Englehardt et al., 2016). When an oncologist’s goal
225 is to save lives and treat the cancer, they may see that as taking precedence and discussion
226 about FP a distraction that could delay treatment and thus worsen prognosis at the detriment to
227 the patient (Hudson et al., 2016). This may be a conscious omission (e.g. due to the pressure to
228 initiate cancer treatment), or an unconscious bias. The former could be either an unethical
229 insult to autonomy or an act of beneficent paternalism, whereas the latter would seem to be a
230 form of negligent or unprincipled omission.

231 Whilst some clinicians may take a conscious position against offering FP, or simply not think
232 to mention it, a number of studies have reported that many healthcare professionals take a
233 neutral stance or have a mixed responses to fertility issues in cancer patients with a poor
234 prognosis. Quinn et al. (2012)’s findings revealed that 45.2% of oncologists had a neutral
235 stance on the issue of patients with a poor prognosis pursuing FP. When questioned about
236 posthumous parenting, 16.2% of oncologists expressed their support of this, whilst the majority
237 (51.5%) did not have an opinion on the matter. Oncologists who were aware of the American
238 Society of Clinical Oncology guidelines (which highlight the importance of patient education
239 and acknowledge the need for oncologists to provide fertility-related information) were more
240 likely to discuss fertility issues with patients with a poor prognosis. Rosenberg et al. (2017)
241 found that 58% of oncologists believed that patients with a poor prognosis should not pursue
242 FP. However, overall, this belief did not appear to dissuade the majority of oncologists from
243 discussing fertility issues with this patient group. When asked whether they discuss fertility
244 issues with this patient group, 84% of oncologists reported that they either always, or usually,
245 had these discussions (43% and 41%, respectively), whilst 15% rarely did and 1% never had
246 these discussions.

247 Some studies suggest that nurses may be more inclined to discuss FP with all patients,
248 regardless of prognosis. In a study by Vadaparampil et al. (2007), paediatric oncology nurses
249 were asked about discussing FP options with patients. The majority (68%) of nurses stated that
250 a patient’s poor prognosis would not affect the discussion being carried out. Just over one
251 quarter (28%) of nurses stated that they would be less likely to discuss FP options with this
252 group of patients, and 4% stated that a patient’s poor prognosis would make them more likely

253 to discuss FP options. Comparable findings were observed by Krouwel et al. (2017), who
254 carried out a survey study with 421 oncology nurses to investigate their knowledge about FP
255 and possible barriers to discussions of this topic. When asked to rate their agreement with the
256 statement: “*I would tend not to discuss FP with a patient because the patient has poor*
257 *prognosis*”, over half of nurses (55.2%) strongly disagreed with this statement. Over a quarter
258 (28.4%) of participants stated that they neither agreed nor disagreed with this statement, with
259 16.4% strongly agreeing with the statement. Similarly, in a study comparing nurses’ views on
260 FP in patients with a poor prognosis between 2006 and 2005 (Clayton et al., 2008), regardless
261 of the survey year, the majority of nurses reported that a poor prognosis would not affect the
262 likelihood of FP discussions. The number of nurses reporting that FP discussions were more
263 likely for patients with a poor prognosis also increased from 2005 (5%) to 2006 (22%), in
264 addition to a slight decrease in the number of nurses reporting that they would be less likely to
265 discuss FP with patients with a poor prognosis (this figure was 27% in 2006 and 28% in 2005).
266 However, King et al. (2008) reported that the odds of a patient surviving was a factor that
267 determined whether nurses discussed FP with their patients.

268 What we can take from this is that there is mixed practice, but whereas the clinicians who
269 always offer FP will always be respecting autonomy, those who never or only sometimes do
270 seem to be acting, at least *prima facie*, unethically, in light of the strong autonomy argument
271 outlined above. The question, then, is whether these data evidence an ethical failure on the part
272 of many clinicians, or whether this variation in practice should give us pause to ask whether
273 there are valid reasons that override the *prima facie* autonomy argument. It is the latter
274 possibility that we will now explore.

275 **Justice and Opportunity Cost**

276 The argument from justice and opportunity cost is concerned with resource prioritisation, and
277 might contend that FP, in cases where it will not lead to a parenting experience, is futile and
278 therefore not a good use of resource. Crystallising this more generally for a publicly funded
279 health system, where treatment prioritisation decisions will be based on cost-effectiveness
280 metrics, this is because the decision to fund FP where the prognosis is poor cannot be justified
281 at a societal level as a reasonable distribution of scarce resources. It can also plausibly be argued
282 that having genetically related children, whilst very important to many people, is not a need
283 but rather a desire (McTernan, 2015). Even without taking a position on that, however, it seems
284 that FP cannot achieve its aims unless it has a chance of resulting in a parenting experience -

285 which it does not if the prognosis is very poor, and the patient is unlikely to survive to be a
286 parent. This argument would, then, suggest that FP should not be offered to patients where FP
287 will not result in a meaningful parenting experience for either them or their partner – and so
288 would rule out FP for children and single adults who are unlikely to survive to become parents.

289 This perhaps gives us reason to revisit our previous claims about the purpose of FP. If we are
290 going to rule out FP for some patients on the basis of futility, we ought to be sure that there are
291 not other reasons that might justify providing it, even when a parenting experience cannot be
292 achieved.

293 **Hope and Imagined Futures**

294 There are two linked arguments to consider here, one centred around FP providing hope for a
295 future, and the other around an imagined future as a parent.

296 **Hope for a future**

297 It is well evidenced that the experience of infertility can lead to distress which can influence
298 the individual emotionally in the short-term, and also their sense of identity and expectations
299 for the future (Letherby, 1999). Franklin (2022) has suggested that IVF and its related
300 technologies are ‘hope technologies’, because they offer a seductive techno-solution to the
301 enigmatic problem of infertility, and in this context, clinicians become providers of hope. It
302 can be argued that for cancer patients with a poor prognosis, FP treatments, which will often
303 involve assisted reproduction techniques, are also hope technologies. Hope has also been
304 conceptualised and operationalised by Snyder (1995), who contends that its existence is
305 essential as a psychological coping strategy, and it could be argued that everything that can be
306 done to better support poor prognosis patients at this time should be done. However, cognitive
307 rules which govern the appropriateness of hope include such criteria as the goal being under
308 some control and at the mid-range in terms of probability (Averill et al., 2012).

309 When the prognosis is good, it is not contentious to assume that offering FP treatment is
310 appropriate because it is nurturing realistic hope of future parenthood. In contrast, where
311 patients have a poor prognosis, where even the probability of using the stored material is low
312 (yet alone success rates from any subsequent IVF/surgery), it may be deemed that nurturing
313 hope by offering procedures, in these circumstances, is considered inappropriate.

314 Furthermore, the act of offering FP to a patient with a very poor prognosis might itself offer
315 unrealistic hope of survival, and may be interpreted as saying that there is good chance of living
316 to become a parent – because why offer it otherwise? Indeed, Vadaparampil et al. (2008) found
317 in their qualitative study that many of the 24 paediatric oncologists described how just
318 mentioning the need for FP was seen as a sign of hope for patients and families.

319 The offer of FP, then, essentially becomes an offer of hope for a future which is false hope. It
320 may be that in some cases hope, false or not, can provide benefit, and so becomes a benevolent
321 lie – but in other cases giving false hope will be harmful, leading to a loss of trust and increased
322 trauma when the falsehood becomes apparent. The potential harm arising from false hope
323 exposed might be amplified if the retrieval intervention was burdensome to the patient, and the
324 wrong amplified if it was costly to the health service or patient (if self-funded).

325 As such, we feel that offering FP to provide false hope as a therapeutic intervention is highly
326 problematic, akin to a lie. Such a benevolent lie might on occasion be justified but would be
327 the exception rather than the norm. However, it may be possible for a patient to benefit from
328 an imagined future as a parent, even in the knowledge that they will never become one.

329 There is one further important argument to make here. It could be argued that the speed of
330 medical progress is high; so that what is an incurable cancer today may be treatable tomorrow.
331 Furthermore, clinical judgement is fallible and patients who are believed to be terminal may
332 not be. This could lead to the argument that we should offer FP treatment to everyone because
333 a) the terminal diagnosis may be wrong, and b) the currently terminally ill patients may end up
334 surviving due to advances in medical treatments. In both cases, the surviving patients will lose
335 their ability to reproduce if not offered FP. Therefore, not offering FP to a patient due to their
336 poor prognosis may not be justified. Some patients may survive and deeply regret their lost
337 fertility, while those who do not survive and have their fertility preserved are no worse off.

338 This argument has some merit, but it is grounded in the assumption that it is preferable to
339 provide a costly service to ensure that no-one might miss an opportunity to parent, and it is not
340 clear that this is a proportionate or justifiable response, especially when the potential benefit of
341 a live birth is not guaranteed. The possibility of diagnostic error, or the possibility that cure
342 may be around the corner, is not, in our opinion, enough to offset entirely the problems we
343 have outlined. Rather, the possibility and likelihood of both would (and we suggest usually

344 would) be routinely factored into prognostication and therefore into the decision about whether
345 to offer FP.

346 **Imagined future as a parent**

347 One reason sometimes cited for pursuing FP when diagnosed with a cancer with a poor
348 prognosis, is the desire for a ‘genetic legacy’ (Hudson et al., 2016). As mentioned above, FP
349 can result in the production of an offspring that can continue the cancer patient’s bloodline
350 through the process of post-humous reproduction (Quinn et al., 2012). There is some evidence
351 to suggest that the public view PAR favourably (Barton et al., 2012; Hans and Dooley, 2014),
352 although PAR may be viewed negatively by oncologists when it comes to teenage and young
353 adult and paediatric cancer patients (Quinn and Vadaparampil, 2011) and a therefore a barrier
354 to a FP discussion.

355 The argument from imagined futures is different to an argument from genetic legacy. As
356 mentioned above, there is reason to be sceptical about a genetic legacy motivation purely
357 because people exploring FP do not tend to do so with the aim of donating their material for
358 just anyone to reproduce with (which would satisfy the need for genetic legacy), but for either
359 their own use or the use of someone they already have a relationship with. The argument from
360 imagined futures, instead, is based on the good that might come from the dying cancer patient,
361 who knows they will never have a parenting experience, taking comfort in imagining their
362 future child. For those patients where future parenthood had always been part of their sense of
363 identity and long-term goals and, then the comfort gained from taking concrete steps that allow
364 them to vividly imagine the existence of their child, and a parent-child relationship, may in
365 itself be enough to justify offering FP even to patients who know and understand they will
366 certainly not survive to parent.

367 This imagining might also include imagining a future in which their partner and child are
368 flourishing and getting comfort from each other, which leads to the argument from gifting.

369 **Gifting**

370 Here, a cancer patient might see FP as a way to gift the opportunity to become a parent to the
371 partner who will survive them, and with whom they may have planned to have children. This
372 may be linked to the argument from imagined futures, but it need not be. It may simply be an
373 act of generosity, where they wish to gift something to someone they love, even though they

374 will never see or experience the result – and there seems little to object to ethically in such an
375 act.

376 Something that ought to be considered in light of both of these arguments however, is the
377 pressure that cancer patients may feel under to act as though they value reproduction, and
378 engage with FP simply to please others because they feel it is expected of them. We live in a
379 pronatalist society, where reproduction is the norm (Greil et al., 2011), and in which people are
380 more often required to explain their decision not to have children than their decision to have
381 them. Indeed, the act of simply offering FP is enough to suggest that it is important to preserve
382 fertility. In this context, where people may feel under pressure to ‘gift’ their reproductive tissue
383 or act as if the thought of having children brings them comfort, it is important that if and when
384 FP is raised, it is presented as a genuinely neutral choice.

385 So far, we have considered the argument from autonomy, which gives us good reason to offer
386 FP to everyone, followed by the argument from justice and opportunity cost that suggests it
387 would be justifiable to not offer FP to patients with poor prognosis because they would never
388 experience the goods of being a parent. We then considered two arguments, the argument from
389 imagined futures (including hope) and the argument from gifting, which support the idea that
390 patients may nonetheless wish to consider FP for reasons other than having a parenting
391 experience themselves. These latter two argument do, however, appear to limit the scope of to
392 whom FP should be offered, to include cancer patients who have a partner to whom they wish
393 to give the gift of becoming a parent, or anyone who would be comforted by imagining a
394 relationship with their future children (even if they will not experience it). This would seem to
395 exclude, however, in all cases, child patients, who would not have a partner to gift to, and seem
396 very unlikely to be able to imagine a parental relationship and gain comfort from it.

397 This exclusion of children with poor prognosis from FP might be supported by other arguments,
398 notably the need to protect them from undergoing interventions that will not benefit them, and
399 which they might consent to undertake in order to please others, because they think they ought
400 to do it (see above comment about pronatalism).

401 Essentially, there are good reasons to think that FP can and should be offered to patients with
402 poor prognosis, but only when they have the capacity to benefit in some way. In the absence
403 of that capacity to benefit, there is little justification for offering FP and indeed given the risk
404 of the offer itself being pressuring there are prima facie reasons not to offer it.

405 So far, the arguments we have considered have been patient focussed, and it is worth briefly
406 considering some wider arguments that could impact on the summary conclusion outlined
407 above.

408 **The welfare of the subsequent child**

409 Arguments based on the welfare of the child are sometimes made to either support or oppose
410 FP in this context. We do not find any of them convincing, and so will outline them only briefly
411 for completeness.

412 First, it might be argued that FP should not be offered to any patient with a poor prognosis
413 because any resultant child will be harmed by not having one of its parents. This argument can
414 be expressed in different ways. Hudson et al. (2016) and Quinn et al. (2012) note that there
415 could be economic and social harms to a child raised without one parent. Taking a different
416 line, Lawson et al. (2016) have suggested children conceived via posthumous reproduction can
417 be compared to ‘replacement children’, a term used by researchers to describe children who
418 are born following the death of an older sibling and may therefore be placed under unreasonable
419 pressure to be a good replacement.

420 We would resist these arguments. First, they speculate about necessary harm to children raised
421 in one parent families, which is not corroborated by evidence. Studies have highlighted that
422 children raised to single mothers through donor insemination display fewer emotional and
423 behavioural difficulties than those raised by married couples who have used donor
424 insemination (Murray and Golombok, 2005), in addition to solo women reporting higher
425 education levels, higher income professions, and equally or higher perceived social support
426 from friends and family in comparison to cohabiting women awaiting fertility treatment
427 (Pettersson et al., 2023). Second, it problematically assumes that the surviving partner would
428 never find another partner who would be a step-parent or that they will themselves be an unfit
429 parent. Third, it assumes that a life with only one parent is not only sub-optimal but is a life
430 not worth living – which seems very problematic and would be contested by many people so
431 raised. A longitudinal study exploring changing family dynamics in over 27,800 single parent
432 households reported no evidence of a negative impact from living in a one parent household
433 on children’s wellbeing, with children reporting equally high, or higher, scores in various
434 measures of wellbeing compared to those who have always lived in a two parent household
435 (Rabindrakumar, 2018). Furthermore, if there is genuine concern about child welfare linked to

436 financial and home situations, then there should be financial and welfare thresholds for all
437 people having children – not only where assistance is needed. We therefore dismiss this
438 concern, and note that the ASRM guidelines state that concerns about the welfare of the
439 offspring are not sufficient cause for denying FP (The Ethics Committee of the American
440 Society for Reproductive Medicine, 2005).

441 Second, it might be argued that by not offering FP, possible children are harmed by not being
442 brought into existence. We raise this only to dismiss it quickly, as it does not seem feasible
443 that we could consider harm being affected to those who are never brought into existence, as
444 there is no subject that could be harmed.

445 **The welfare of the partner**

446 Tremellen and Savulescu (2015) note that, in the context of posthumous reproduction, there
447 could be implications for the welfare and quality of life of the partner, specifically in terms of
448 raising a child in grief. Hudson et al. (2016) also consider this, noting that:

449 *“...research is needed to explore the long-term impact on widowed partners and their offspring.*
450 *Partners in this precarious position should receive counselling and support during this*
451 *decision-making process.”*

452 There are also the general and ubiquitous challenges, both financial and emotional issues of
453 single parenting. One immediate response is to note that a surviving partner is under no
454 obligation to use the preserved material. But it is plausible to think that they may feel under
455 pressure to use it *because it is there*. There may also be a financial cost of continuing storage.
456 That said, this does not, in our view provide reason to not offer FP at all, but rather (as noted
457 by Hudson et al., 2016) to ensure that a surviving partner is appropriately supported, and enters
458 into, or chooses not to enter into, a posthumous parenting project autonomously.

459 **Concluding argument**

460 In the discussion above we have considered a range of arguments both for and against routinely
461 offering fertility preservation to patients with poor prognosis. It is clear that there is a strong
462 *pro tanto* argument, grounded in respect for autonomy, that supports routinely offering to all
463 patients. We have, however, also shown that there are good reasons to sometimes be cautious

464 about making this offer, not least because there are some situations in which fertility
465 preservation would be futile and as such cannot be considered a good use of resource.

466 The way forward is not absolutely clear; however, we propose that we should adopt a defeasible
467 assumption in favour of offering fertility preservation to all patients who might benefit from it,
468 with the burden of proof on the clinician to show that there are good grounds for withholding
469 the offer. Given that the main argument in favour of routinely offering FP is found in a patient's
470 autonomous choice to benefit from the intervention, the most appropriate grounds for
471 withholding the offer (outside of lack of resource) is if a patient cannot benefit from the
472 intervention.

473 We must, however, recognise that there are many ways a patient could benefit from fertility
474 preservation, and these are not limited to having a parenting experience. Becoming a parent is
475 arguably the primary goal of fertility preservation, and is one clear benefit, but a patient may
476 also benefit from FP therapeutically in the form of gaining significant comfort from an
477 imagined future, or knowing they have gifted something precious to their partner. That said,
478 the criteria for withholding the offer would hold if and only if FP could not achieve the benefit
479 that is sought. This would make FP a futile treatment, and therefore one which there is no
480 obligation to offer.

481 The challenge here, of course, is that a decision about futility that rests on a clinician's
482 understanding of the patient's ability to benefit assumes that a clinician is able to correctly
483 identify all the benefits that a patient might seek to achieve (requiring an intimate and accurate
484 knowledge of the patient and of their partner where present), and accurately predict that these
485 benefits cannot, or are very unlikely to, be achieved. The former would normally be difficult
486 to do without having had a specific conversation with the patient about FP and the reasons why
487 they might want it, and the latter would require great deal of prognostic certainty.

488 For this reason, we suggest that the presumption in favour of having a conversation with all
489 patients, including those with very poor prognosis is strong, and can and should only be
490 defeated when there is clear evidence, agreed by a multidisciplinary team, that no benefit is
491 possible. In practice, this might describe a relatively rare situation. One obvious example
492 might be a young child with a negligible to zero chance of survival, who lacks the capacity to
493 benefit from an imagined future, and who is not in a position to want to make a gift to a partner.
494 This describes a patient who cannot themselves benefit from FP, and therefore should not be

495 offered it. This would hold true regardless of whether the child's parents wanted FP, because
496 we assume - we think reasonably - that the justification for fertility treatment lies in the benefit
497 to the patient and not to others, and a child in this position should not be used as a means to
498 achieve a good for their parents. (Note that in the gifting argument FP is justified by the benefit
499 to the patient of giving the gift of parenting to their surviving partner, not by the benefit that
500 may accrue to the surviving partner - although they will certainly benefit as well).

501 Given that we are making an argument in favour of a strong presumption of offering FP, one
502 might ask why we do not go so far as to make an argument for it being obligatory. Such an
503 argument might be grounded both in respect for autonomy and a legitimate concern that
504 allowing clinicians any discretion in whether to offer the treatment opens up the possibility of
505 inconsistency and a postcode lottery, where access to treatment depends on the particular views
506 of the clinician in charge. The best way to combat this would be to ensure that every patient,
507 regardless of prognosis, is given equal access. The reason we do not adopt this position is
508 simply that we are more concerned with equity than equality. Nedha (2011, as cited in Paul,
509 2019) defines equality as treating each person the same, regardless of needs and requirements
510 (e.g., in this scenario, providing all patients with the option of FP, regardless of prognosis),
511 whereas equity can be described as treating each individual fairly depending on their needs.
512 Removing clinical discretion and making the offer of FP mandatory in all cases, would ensure
513 every patient is treated equally at a cost of the harms that can follow when the treatment offers
514 false hope, leads to a foreseeable waste of resource, or risks a vulnerable patient feeling
515 pressured into undertaking procedures from which they cannot benefit.

516 Our position does potentially place a great deal of power in the hands of the clinician as
517 gatekeeper, but this is mitigated by our requirement that the offer of treatment is a defeasible
518 presumption with the requirement of the MDT agreement if it is withheld. Placing the burden
519 of proof on the clinical team to show, and agree, that there is no possible benefit to the patient
520 protects the autonomous patient's right to make their own choices in very large part, whilst
521 permitting discretion in a few cases where it might be necessary and correct. In adopting this
522 position, we concur with Hudson et al. (2016) regarding the need to provide cancer and fertility
523 healthcare professionals with appropriate resources and training packages for addressing the
524 ethical and decision-making implications that arise in these scenarios, and to ensure that
525 informed consent processes are high quality and robust. For those patients who wish to proceed,
526 ongoing care should include appropriate counselling in relation to the possibility, or even

527 probability, of posthumous reproduction. It must be assumed that most patients in this position
528 will not survive, and their preferences for using their frozen gametes or embryos must be
529 clearly documented in line with relevant legislation and local regulations.

530 In outlining our arguments, we try to find an appropriate balance between ensuring equity of
531 opportunity to beneficial treatment, whilst allowing for the fact that in some cases FP will be a
532 waste of resource for no patient benefit.

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534 GLJ, AMJ, BP and RAA declare that there is no conflict of interest that could be perceived as
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544 **Author contribution statement**

546 GLJ conceived the manuscript, preparing the initial draft. GLJ, AMF and JI critically
547 developed this further, producing the first version, with additional contributions from BP and
548 RAA. All authors edited, reviewed and approved the final manuscript.

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