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Abstract

Should there be a female age limit on public funding for assisted reproductive technology (ART)? The question bears significant economic and sociopolitical implications and has been contentious in many countries. We conceptualise the question as one of justice in resource allocation, using three much-debated substantive principles of justice—the capacity to benefit, personal responsibility, and need—to structure and then explore a complex of arguments. Capacity-to-benefit arguments are not decisive: There are no clear cost-effectiveness grounds to restrict funding to those older women who still bear some capacity to benefit from ART. Personal responsibility arguments are challenged by structural determinants of delayed motherhood. Nor are need arguments decisive: They can speak either for or against a female age limit, depending on the conception of need used. We demonstrate how these principles can differ not only in content but also in the relative importance they are accorded by governments. Wide variation in ART public funding policy might be better understood in this light. We conclude with some inter-country comparison. New Zealand and Swedish policies are uncommonly transparent and thus demonstrate particularly well how the arguments we explore have been put into practice.

Keywords

female, be, allocation, resource, justice, conceptions, differing, technology?, there, reproductive, should, assisted, funding, public, limit, age

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Abstract Should there be a female age limit on public funding for assisted reproductive technology (ART)? The question bears significant economic and sociopolitical implications and has been contentious in many countries. We conceptualise the question as one of justice in resource allocation, using three much-debated substantive principles of justice—the capacity to benefit, personal responsibility, and need—to structure and then explore a complex of arguments. Capacity-to-benefit arguments are not decisive: There are no clear cost-effectiveness grounds to restrict funding to those older women who still bear some capacity to benefit from ART. Personal responsibility arguments are challenged by structural determinants of delayed motherhood. Nor are need arguments decisive: They can speak either for or against a female age limit, depending on the conception of need used. We demonstrate how these principles can differ not only in content but also in the relative importance they are accorded by governments. Wide variation in ART public funding policy might be better understood in this light. We conclude with some inter-country comparison. New Zealand and Swedish policies are uncommonly transparent and thus demonstrate particularly well how the arguments we explore have been put into practice.

Keywords Reproductive techniques, assisted; Ethical analysis; Distributive justice; Health care rationing; Health policy; Need; Capacity to benefit; Disinvestment

Introduction

Levels of public funding for assisted reproductive technology (ART) vary widely internationally. Some countries do not publicly fund ART at all, while others do so to different degrees and for different sub-populations (Chambers et al., 2009). Many countries that do publicly fund ART do so with a female age limit. For example, women over the following ages usually cannot access ART public funding in their respective countries: 37, the Southern Health Care Region of Sweden (Lindström and Waldau 2008); 39, New Zealand (Farquhar, Wang, and Sullivan 2010); 39, United Kingdom (National Collaborating Centre for Women's and Children's Health 2004); 45 (or 51 with donor oocytes), Israel (Birenbaum-Carmeli and Dirnfeld 2008, 184). By contrast, Australia's ART public funding policy may be unique in the world in not

featuring any female age limit (Assisted Reproductive Technologies Review Committee 2006, 50). Should there be a female age limit on ART public funding?

The question is important for at least two reasons. First, it may have significant economic implications for the health care system of the country concerned. For instance, Australian expenditure on Medicare benefits for ART increased from AUD39.3 million in 2000 to AUD248.3 million in 2009 (Medicare Item Reports n.d.).¹ The sustainability of such expenditure is questionable. A female age limit on ART public funding represents one means by which to curb expenditure. Indeed, savings would increase as ART is increasingly sought by older women. In 1992, 9.3 percent of all women initiating in vitro fertilisation (IVF) cycles in Australia and New Zealand were aged 40 and over (Lancaster, Shafir, and Huang 1995).² By 2007, this proportion had steadily increased to 22.8 percent (Wang et al. 2009).³ The question of a female age limit on ART public funding also bears significant sociopolitical implications. It raises questions of discrimination. Is a female age limit on ART public funding discriminatory—on the basis of sex, age, or medical condition? Does it discriminate between individuals on the basis of a characteristic that is properly *irrelevant* in the prevailing context, therein perpetrating an injustice?

Watt et al. chronicle how “the public subsidy of ART has been a perennially contentious health policy issue in Australia” (2011, 201), just as it has been in other countries. In this paper, we invite consideration of the possibility that historical and geographical variation in ART public funding policy reflects underlying variation in conceptions of justice when it comes to resource allocation.

Mladovsky and Sorenson (2010) review a number of differing government rationales for ART public funding and its multivarious restriction. Governments often fail to make explicit these rationales, and so too their underlying conceptions of justice. There is a recognised need for research into these (Mladovsky and Sorenson 2010), and we intend this paper to contribute toward meeting that need. We conceptualise the question of whether there should be a female age limit on ART public funding as one

¹ These amounts use calendar years and combine benefits paid under ART Medicare item numbers 13200, 13203, 13206, 13209, 13212, 13215, 13218, and 13221.

² 9.3 percent = $(451 + 54) / (4,878 + 572)$

³ In order to observe the steadiness of the increase, see intervening reports, all available at <http://www.npsu.unsw.edu.au/preruweb.nsf/page/Assisted+Reproduction+Technology+Reports>.

of justice in resource allocation and confine the scope of our paper accordingly. While the paper may prompt still more fundamental questions concerning the nature of medicine and the scope of citizens' responsibilities to one another, it will not address these directly. We also limit the paper's discussion to ART that is intended to overcome what is normally understood by "medical" or "clinical" infertility, i.e., a man and a woman experiencing difficulty in achieving a live birth. When ART is used for different reasons, female age may well be relevant in different ways and to different degrees.

We begin by exploring a complex of arguments for and against a female age limit on ART public funding. We bring order to that complex by expounding each argument under the heading of "capacity to benefit," "personal responsibility," or "need." These terms are common in just resource allocation theory, but they are often used differently. Some theorists (Mooney and Houston 2004) fully equate "capacity to benefit" with "need," while others do not (Cookson and Dolan 2000; Culyer 2001, 2007; Hope, Osterdal, and Hasman 2010). In this paper, we treat all three terms as provisionally distinct and explore some of their contested meanings.

Toward the end of the paper, we summarise the different ART public funding policies of Australia, New Zealand, and the Southern Health Care Region of Sweden, then articulate these more formally in terms of the arguments we explore. The New Zealand and Swedish policies are uncommonly explicit about their rationales and even their underlying conceptions of justice. As such, they demonstrate particularly well how the arguments we explore have been put into practice. When compared with Australian policy, they also demonstrate how policy can be underpinned by different conceptions of justice.

We conclude by formulating questions with which, in light of our exploration, the question of ART resource allocation might be equated. In short, how should a government conceptualise—then assign relative levels of importance to—infertility-related need, infertility-related personal responsibility, and the capacity to benefit by ART rather than some other form of help? Variation in ART public funding policy might be better understood as reflecting different answers to this question.

Principles of Justice: The Capacity to Benefit, Personal Responsibility, and Need

Aristotle's principle of justice—equals should be treated equally—is merely formal insofar as it declines to specify precisely who are equals (Beauchamp and Childress

2009). In just resource allocation theory and practice—relating both to ART and to health care more broadly—equals have been variously identified by, among other things, their capacity to benefit from treatment, their degree of personal responsibility for their health problem, and their degree of need (Beauchamp and Childress 2009; Cookson and Dolan 2000). In other words, the following has been variously asserted:

- Equals in their capacity to benefit from treatment should be treated equally.
- Equals in their degree of personal responsibility for their health problem should be treated equally.
- Equals in their degree of need should be treated equally.

In this way, the capacity to benefit, personal responsibility, and need represent not merely formal but, by contrast, material or substantive principles of justice, principles by which resources might be justly allocated.⁴ We now use these three substantive principles of justice to differentiate and explore arguments for and against a female age limit on ART public funding.

Capacity-to-Benefit Arguments

Reduced Cost-Effectiveness

Perhaps the most widely used argument in favour of some female age restriction on ART public funding goes as follows: ART success rates decline with female age. In this way, older women can be said to demonstrate a comparatively reduced capacity to benefit from ART. This results in ART being less cost-effective for older women. By itself, this does not commend restriction; the argument must continue as follows: When undertaken by older women, ART is insufficiently cost-effective insofar as resources might have been used to greater effect.

In order to more thoroughly assess this argument, we must first canvass relevant empirical data. Australia's Assisted Reproductive Technologies Review Committee observed that "[t]here is undisputed evidence that [female] age is the single most important factor in determining the success of ART" (2006, 67). In this paper, we define ART success as a live delivery (live birth). Figure 1 plots the success rate of autologous in vitro fertilisation (IVF) cycles declining with female age. (In autologous cycles, women use their own oocytes, not those of a donor.) The trend, if not quite its

⁴ "Justly" might be substituted with "fairly," "equitably," or even "best" without changing the intended meaning.

magnitude, is shared by fresh and frozen-thaw cycles alike: The success rate decreases as female age increases. A large body of evidence confirms this trend, in which the age of the woman at the point of oocyte retrieval appears to most heavily influence the probability of treatment success (Watt et al. 2011). A lower probability of treatment success can be regarded as a smaller capacity to benefit from treatment. The success rates of donor cycles tend not to differ with female age, i.e., the age of the oocyte recipient. This significantly weakens capacity-to-benefit arguments for a female age limit in the case of donor cycles. Israel's age limit of 45 *or* 51 *with donor oocytes* likely registers this. However, the use of donor oocytes also introduces additional ethical considerations that make it an exception to the rule of declining success rates, which this paper does not have space to adequately address. For example, conflicts of interest may exist between the clinician, donor, and recipient (Ethics Committee of the American Society for Reproductive Medicine 2009). Also, given particular financial arrangements, "the welfare of the fee-paying recipient patient may be placed above that of the egg donor" (Heng 2008, 414). Furthermore, parties may disagree concerning the disclosure of the donor's identity (Burr and Reynolds 2008)—both to the recipient and to the child. The donor must risk her health without personal benefit: Is this problematic? How can we ensure that donation is sufficiently informed and voluntary (Black 2010)? Ought donation also to be reimbursed? If so, then how can donors be recruited without exploitation (Kalbian 2011) and without the commodification of oocytes (Blyth 2002)? Do we wrong a child by wilfully giving it life at some distance from one of its genetic parents (Frame 2008)? What risks does donation pose to relationships, both relationships among partners and relationships with the child?

When both successful and unsuccessful cycles are considered, the resources required to achieve a live birth by means of ART increase substantially with female age. Griffiths et al. (2010) estimated that the incremental monetary cost of achieving a live birth on the first cycle of treatment ranged from AUD27,373 for women aged 30–33 to AUD130,951 for women aged 42–45. For estimates comparable in trend and magnitude, see Chambers (2006).

From a certain perspective—one trained foremost on allocative efficiency—ART for older women can seem to represent a poor use of public funds. However, this conclusion meets at least two counterarguments, even from within the perspective of allocative efficiency: (1) ART for older women remains cost-effective relative to

other health care; (2) alternatively, the true cost-effectiveness of ART is unusually difficult to determine due to conceptual difficulties. We now explore each of these counterarguments in turn.

Other things being equal, ART may well be less cost-effective when undertaken by older women, but nonetheless it may remain highly cost-effective relative to other health care (in which case restriction would not be warranted). The following cost-effectiveness analysis certainly suggests this.

Griffiths et al. (2010) found that the incremental cost per live birth at a maternal age of 42–45 years and on a second treatment cycle was AUD187,515. This was the largest figure in their base case analysis (their “worst-case” scenario). Australian life expectancy at birth is 81.5 years per person (Australian Bureau of Statistics 2008). Therefore, even when least effective, the incremental cost of ART per life-year gained is a mere AUD2,301 (AUD187,515 / 81.5).

In calculating the benefit provided by any health care, we may wish to incorporate some preference for current over future health. We might thereby apply a discount rate to the future life-years gained by ART as a measure of the extent to which individuals aggregated across society are willing to forgo current benefits in order to obtain future ones. People who place less importance on future costs and outcomes will apply a higher rate of discount.

Applying a customary 5 percent discount rate, 81.5 future life-years equates to 20.6 discounted life-years gained.⁵ Thus, the incremental cost per life-year gained now equates to AUD9,103 (AUD187,515 / 20.6). In this light, ART appears somewhat less cost-effective than it does above, when we do not apply a discount rate. Applying a 10 percent discount rate, ART appears less cost-effective again (AUD187,515 / 11.0 = AUD17,047). However, even at this uncommonly high discount rate, ART compares acceptably with other previously funded health care (notwithstanding complexities we soon touch on). If Australia were considering a pharmaceutical for public funding, the above amounts would likely be regarded as well within the range that the Australian government is willing to pay for an additional life-year gained. Indeed, incremental costs per life-year gained of up to AUD50,000 and more have been considered acceptable, judging by past public funding decisions (Cleemput et al. 2011).

⁵ We calculate this by successively dividing future life-years by increasing powers of 1.05 and then summing.

ART's life-year benefit should be offset according to the magnitude of any survival and quality-of-life deficits observable over the lifespan relative to non-ART peers. If we assume that, throughout life, some individuals born via ART suffer some quality-of-life deficit relative to their non-ART peers, then this will increase ART's incremental cost per quality-adjusted life-year (QALY) gained. There is significant debate concerning the relative health of those born via ART, but some current major findings are as follows:

- Children born following ART (particularly singletons) are at increased risk of some birth defects compared to spontaneously conceived children (Hansen et al. 2005; Reefhuis et al. 2009).
- In singleton ART infants, there is an increased risk of perinatal mortality, low birth weight, and preterm birth compared to singletons conceived spontaneously; there are few differences in these outcomes between twins conceived spontaneously and those conceived with ART (Bower and Hansen 2005).
- No negative effect on neurodevelopmental outcomes (neuromotor, cognitive, language, and behaviour outcomes) has been identified but studies with longer follow-up are required (Middelburg et al. 2008).

The difficulties associated with undertaking such studies should be noted. For instance, are the findings attributable to ART or to the underlying infertility? How severe is the confounding conferred by multiple births? Do age, socioeconomic status, or other parental attributes contribute to the findings? Studies with longer follow-up are required, as are those that track the consequences of changing clinical practices and new technologies (such as oocyte vitrification and preimplantation genetic diagnosis). Current evidence may be too ambiguous to include in economic evaluation. However, suppose that we do include it. While the magnitude of increased risks for ART-born children is significant in relative terms, these risks are still very small in absolute terms. As such, they are unlikely to greatly increase ART's incremental cost per QALY gained (just focusing on those QALYs gained by the child). Therefore, even accommodating some quality-of-life deficit for those born via ART, it is likely that we could still consider ART to represent comparatively good value for money.

But what complicates and undermines the above cost-effectiveness analysis?

Mladovsky and Sorenson contend that the economic arguments for and against publicly funding ART are currently inconclusive due to difficulties that are largely conceptual: Economic assessments frequently fail “to sufficiently capture the broader costs and benefits of IVF” (2010, 114). What are we to include among the benefits and harms involved in both successful and unsuccessful ART? For instance, a life-year gained for a person who would not otherwise have existed (but for ART) may differ conceptually in some important way from a life-year gained for a living person. For instance, the benefit of 81.5 life-years mooted above does not in itself relate to the benefit enjoyed by the infertile patient but rather to that enjoyed by his or her offspring. Devlin and Parkin argue that ART’s benefit should be assessed in terms of the increased quality of life enjoyed by those (already living) who undertake ART:

QALYs are intended to capture improvements in health among patients.

They are not appropriate for placing a value on additional lives. Additional lives are not improvements in health; preventing someone’s death is not the same as creating their life and it is not possible to improve the quality of life of someone who has not been conceived by conceiving them. CUA [cost-utility analysis] might instead proceed by focusing on the health related improvements in quality of life by prospective parents seeking treatment for infertility (Devlin and Parkin 2003, S4).

A central question is whether to include among ART’s benefits those enjoyed by the child, those enjoyed by the parents, or both. (The same question applies to ART’s risks of harm, which might be counted negatively on the benefits side.) Including only those benefits (and risks of harm) applicable to the parents (namely those already living) has the potential to greatly reduce the cost-effectiveness of ART. This applies to older and younger women alike. Conversely, ART would appear even more cost-effective relative to other health care if its benefits were considered to include the sum of quality-of-life improvements for patients *in addition* to the life-years gained for children born. Therefore, much turns on what is included among ART’s benefits. Any quality-of-life deficits should be counted negatively on the benefits side. These might be accentuated for those patients whose ART fails, for instance. There is some evidence (albeit limited) that leaving a program of treatment childless confers “clinical[ly] relevant emotional problems” on a subset of women (Verhaak et al. 2007). Conversely, Ryan measured some psychological benefit “in going through the

service, even if you leave it childless” (1996, 196). Does the opportunity of trying for a baby via ART, irrespective of the outcome, itself constitute a benefit?

Conceptual difficulties in ART cost-effectiveness analysis cut both ways, providing reasons for caution in both availing and restricting ART funding *solely on cost-effectiveness grounds*. However, if one chooses to proceed despite these difficulties, then available cost-effectiveness analysis, combined with contestable assumptions on the benefit achieved by ART, can be used to support the argument that ART for older women remains sufficiently cost-effective relative to other health care.

Medical Futility

The generally reduced capacity of older women to benefit by ART is relevant to age-restriction debates not only for its negative impact on comparative cost-effectiveness but also because it prompts questions about medical futility. These questions are important because futile treatment can be considered not merely wasteful but potentially harmful. We might venture that the providers (and funders) of futile treatment wrong their patients and not simply those whom expended resources might otherwise have helped. There is a marked conceptual—and, we would say, ethical—difference between (1) prioritising one patient above another in order to maximise the aggregated net benefit and (2) seeking to protect a patient from harms that are risked merely for the sake of a vanishingly small probability of benefit.

At what point should ART be considered futile? How small must be the capacity to benefit? That is, how small must be the probability of a live birth, or (better) the increase in that probability, or the associated increase in the patient’s quality of life?

Australia’s Assisted Reproductive Technologies Review Committee contended that

[g]iven the success rate of less than 2 percent noted in the most recently available age-specific data, it is not clinically appropriate to initiate a new cycle of in vitro fertilisation (IVF) treatment in women using their own eggs at 44 years and over (2006, 16).⁶

The rationale of “clinical appropriateness” implies a concern to avoid treatment that is futile and not merely cost-ineffective. Considering harms and the point at which they ought not to be risked for only very small benefits can strengthen the argument for

⁶ Australian ART public funding policy is itself silent on this issue. As we explain below, Medicare covers part of the cost of all ART that an appropriate clinician deems to be medically needed.

some female age restriction on ART public funding. However, in attempting to assess the magnitude of potential harms and benefits, we run into the same conceptual difficulties facing cost-effectiveness analysis. We also run into a surprising lack of empirical data on the *age-relative* risks of harm that ART may incur (Bewley, Foo, and Braude 2011; Watt et al. 2011). (Independent of ART, older women face greater risks of complications when pregnant. Independent of female age, ART poses particular risks. In this way, a linked-evidence approach could be used as part of an assessment of ART's risks of harm.)

Personal Responsibility Arguments

What personal responsibility do we bear for our health and how, if at all, should this impact on how our health needs are assessed and prioritised in the provision of public funding? This is a contentious question. Older women may be held personally responsible for their diminished fertility to the degree that some *chosen* deferral contributed to it. Their claim on public funding may thereby be undermined. This broadly equates to a fair-innings argument of the kind “you had your chance.” It might also lead to an argument concerning moral hazard, in the economic sense: By rescuing those whose chosen delays have contributed to diminished fertility, does ART public funding for older women thereby encourage more people to make the same risky choices?

Though defensible, these arguments should guard against callousness. They should also consider what Steele calls “underlying structural determinants of older motherhood and foreshortened reproductive careers” (2011, 1). Prominent among these determinants may be “economic uncertainty for young people in Western countries,” considered in the light of, among other things, “non-permanent employment arrangements for individuals and, where relevant, their partners; higher education debt; and the high cost of home ownership (and consequent delay in, or nonattainment of, first home ownership).” Such structural determinants, or risk factors for delayed childbearing, challenge arguments that presume a full, and thereby fully accountable, reproductive freedom.

Need Arguments

Questions concerning personal responsibility for one's medical needs tend to depend on answers to more fundamental questions: namely, questions concerning how

medicine should conceptualise, and accordingly prioritise, different needs and capacities to benefit. When is one need greater than another? In other words, what constitutes a medical need? One answer to this question speaks in favour of some female age restriction on ART public funding, while alternative answers speak against such restriction.

Reduced Disruption to Normal Health

On one conception, need increases with the degree of disruption to normal health. Daniels (1985) has proposed that normal health, in turn, should be conceptualised in terms of “species-typical functioning” or the “normal opportunity range” that, as a species, human beings demonstrate. Hope, Osterdal, and Hasman expand on this conception of need: Person A needs health care X “in order to function normally: that is, above some critical, or threshold, level” (2010, 473). (Notably, this formulation gives more scope to a culturally relative threshold.) We can apply the work of Hope et al. to the context of infertility: An infertile person’s need can be proportionally related to the normal probability of a live birth minus the person’s specific probability of a live birth (all without ART).

Along these lines, it might be argued that infertile younger women generally stand in greater need than infertile older women because, for younger women, the normal (or population average) probability of a live birth is generally higher than it is for older women. In other words, diminished fertility is more normal in older women, therefore the disruption to normal health that it betokens—and the corollary medical need that arises—is comparatively reduced. This argument depends on:

- (1) a view that medicine ought to restore health to normal levels but not take it beyond these levels, at least on some fundamentals; and
- (2) an endorsement of declining fertility with female age as one such fundamental or, in other words, as important to a degree that medicine would do wrong not to defer to it in some way.

Both (1) and (2) are defensible, though contestable and philosophically involved (Carter and Braunack-Mayer 2011).

Equally Important Opportunity

On a competing view, medicine ought to aid people in need without reference to the normal or the natural. It ought to act simply out of mercy, for instance, or in line with

social norms. On this view, medicine ought to overcome not so much disruptions in normal health but, for instance, limits to important opportunities. Relative to infertile younger women, then, infertile older women stand in equal, not reduced, need by virtue of the fact that the opportunity to have a child may be equally important for them.

A need, such as that for a child, might be taken to exist whenever someone testifies to it with sufficient moral force. This might be to say “whenever it would strike us as merciless or cruel to deny the need.” In this way, women might lay claim to a need that is independent of age. Likewise, even some relegation of fertility from the status of need to that of mere desire might weaken equally the claims of older and younger women on ART public funding.

Rawlins and Culyer suggest that sound claims exist “to give a higher priority to novel treatments for conditions for which no alternative specific forms of therapy are currently available, or to conditions associated with social stigma” (2004, 226).

Rawlins and Culyer imply that, in such cases, need is accentuated and that, as such, it is especially important for cost-effectiveness analysis not to dominate decision-making. It can be argued that ART is a novel treatment, with no direct comparator, and that infertility is associated with social stigma (Slade et al. 2007). On both of these scores, younger and older women may stand equally in need.

Increased Severity and Increased Urgency

The severity of a problem may be taken to increase, by degree, the medical need that exists in light of it. Relative to younger women, older women generally suffer an increased severity of infertility by virtue of their lower probability of a live birth without ART. In this regard, they may lay claim to an increased need. Hope et al. identify in such thinking the “poor initial state” conception of need: Person A needs health care X “in order to avoid harm” (Hope, Osterdal, and Hasman 2010, 473). Again, applying the work of Hope et al. to the context of infertility, an infertile person’s need can be proportionally related to the number one minus the person’s specific probability of a live birth without ART (expressed as 0.3, say). The number one signifies the *best imaginable* health and, on this conception of need, replaces *normal* health (or the normal probability of a live birth without ART), which the “normal functioning range” conception of need used (Hope, Osterdal, and Hasman 2010, 473).

Furthermore, an older woman's lower probability of a live birth *with* ART, not without it, may be precisely the thing to entitle her to more, and not less, funding (in the form of additional funded treatment cycles, for instance). This can follow the egalitarian aim of trying to return everyone to an equal (fertility) footing, which may underlie ART funding in the first place.

The severity of infertility may also be regarded as proportional to its duration. Here, too, older women may lay claim to a greater severity of infertility (and therein need) if they have generally been infertile for longer.

Like the severity of a problem, the urgency of a problem may be taken to increase, by degree, the medical need that exists in light of it. On average, an older woman's probabilities of a live birth, both without ART and with it, drop more quickly than do those of a younger woman. In this respect, an older woman's need for treatment can be regarded as more urgent and, therein, greater. Furthermore, menopause may be seen as a critical threshold. If medicine ought only to restore "species-typical functioning" (Daniels 1985), then it ought not to extend female fertility beyond its "species-typical" endpoint. If menopause is seen as a critical threshold in this respect, then a woman's need for ART may become more urgent, and therefore greater, the closer she approaches that threshold.

Interactions Between Capacity-to-Benefit and Need Arguments

Thus far, we have explored a series of arguments for and against a female age limit on ART public funding. We have done so largely in relation to concepts of the capacity to benefit and need. Complexities exist not only within each of these concepts, but also in their potential interactions. For instance:

Person A stands to benefit more by treatment X than person B. A therein needs X more than B, though B may need *some* form of help more than A.

Here is a variation on this observation:

You cannot ever need futile treatment. Though you need help, you do not need that help.

If we accept this observation and the conception of need that it implies, then older women generally need ART less than younger women precisely by virtue of their reduced capacity to benefit (considered in terms of lower probabilities of a live birth). The conception of need at work in this observation is consistent with the "significant gain" conception of need identified by Hope et al.: Person A needs health care X "in

order to improve health significantly” (Hope, Osterdal, and Hasman 2010, 473). Again, applying their work to the context of infertility, an infertile person’s need can be proportionally related to *the person’s specific probability of a live birth with ART minus the person’s specific probability of a live birth without ART*. Here, need is essentially identified with, or reduced to, the capacity to benefit from treatment.

How Policies Incorporate These Arguments

In the next section, we demonstrate how three current ART funding policies incorporate the above arguments in the form of a range of criteria that any claim on ART public funding must either meet or be prioritised against. As such, we focus on different ways in which female age has been considered relevant (or irrelevant) to the just allocation of resources within the context of ART. We examine in turn the different policies of Australia, New Zealand, and the Southern Health Care Region of Sweden. First, we describe key policy elements, and then we articulate each policy more formally in terms of the arguments explored above.

Australia

Australia’s Assisted Reproductive Technologies Review Committee observed that “Australia appears to be unique in not limiting access to funding for ART services” (2006, 50). On its own, this comment is misleading. ART funding continues to be limited in Australia on at least three fronts. First, funding is officially available for medical infertility only. (In practice, this requirement is interpreted differently by different health care providers.) Second, a co-payment is frequently required: Patient-borne out-of-pocket costs vary across clinics, ranging from near-zero to approximately AUD2,500 for the first full cycle in a year, AUD2,000 for subsequent cycles, and AUD1,000 for frozen-thaw cycles (Repromed n.d.). By comparison, government expenditure is approximately AUD2,600–2,900 for an individual’s first full treatment cycle in a year, AUD2,500–2,800 for each subsequent cycle, and AUD600 for frozen-thaw cycles (MBS Online n.d.). Third, for any one person, funding is capped annually but not over the course of a lifetime. (Reimbursement under the Extended Medicare Safety Net is capped annually; base reimbursement under the Medicare Benefits Scheme is not.)

Australian ART funding policy features no reference to female age. Nowhere is the capacity to benefit from ART referenced. Implicitly, then, that capacity is either

neglected, actively rejected as irrelevant, or accommodated within the view that ART is always worthy of funding on grounds of allocative efficiency. Futile ART is presumed to be avoided by good medical practice and not funding policy.

Australian ART funding varies neither with a person's capacity to benefit nor with one's degree of need. All women are implicitly accepted as equally in need provided that they or their male partner are medically infertile. The conception of medical need implicit is one of "normal functioning range," with the normal range being identified with perfect fertility before (normal) menopause.

In contrast to Australia, both New Zealand and the Southern Health Care Region of Sweden restrict the amount of ART public funding that is available to an individual over a lifetime. Moreover, they restrict eligibility for funding partly on cost-effectiveness grounds, using numerous criteria that are both explicit and (what is rarer) explicitly justified. Among these criteria, female age figures heavily, primarily due to its impact on ART cost-effectiveness.

New Zealand

Since 2000, New Zealand has used a range of criteria to score a person's claim on ART public funding (Gillett, Peek, and Herbison 2012). The current criteria include: chance of pregnancy without treatment (or "diagnosis"); female age; duration of infertility; number of children; and sterilisation status (Farquhar, Wang, and Sullivan 2010; Gillett, Peek, and Herbison 2012). Only claims that reach the threshold score receive funding, which covers a maximum of two treatment cycles in total. Gillett and Peek, who first devised the scoring system, explain that: "It is intended to benefit those who are most in need of therapy, but balanced by a system that will ensure maximum benefit" (2000, 24). In other words, justice is regarded as adequately achieved when, other things being equal, equal funding is given to those with an equal need *and* an equal capacity to benefit.

It is not clear which criteria are intended to score need. On our interpretation, a person's need is scored by first calculating the probability of pregnancy without ART (or "diagnosis") using a separate, more clinically detailed scorecard. In this way, the New Zealand scoring system implicitly accepts the argument that, next to younger women, older women stand in increased need when they demonstrate a lower chance of falling pregnant without ART. This suggests that a "poor initial state" conception of need is in tow. The need score is then, in effect, later modified under (at least) the

criterion of duration of infertility. If this is the case, then the New Zealand scoring system also accepts the argument that, next to younger women, older women stand in greater need if they have been infertile for longer.

Gillett et al. report that female age was the only criterion to cause “considerable disquiet in the public submissions that preceded” introduction of the scoring system: “The main argument was that older women had the most urgent need” (Gillett, Peek, and Herbison 2012, 139). On its own, the New Zealand scoring system does not accept this argument. A person is afforded ART public funding when one reaches the threshold score and not before. A projected decrease in the probability of pregnancy, both with and without ART, only decreases the time required for the threshold score to be reached—it does not change the score itself. However, Gillett et al. report that ART public funding is sometimes provided under “clinical override,” when exceptions are made in view of system imperfections (Gillett, Peek, and Herbison 2012, 135). Clinical override is applied (less than 10 percent of the time) when, for instance, waiting for points to accumulate would sufficiently decrease the probability of treatment success. In practice, clinical override enables a clinician to accept the argument that older women stand in greater need in cases of increased urgency. In New Zealand, need-based arguments are outweighed by a capacity-to-benefit argument, however. Gillett and Peek proposed that “criteria should give preference to those who are most likely to benefit,” therefore “factors that are known to have an influence on the probability of a successful outcome ... should be heavily weighted in the point system” (1997, 20). The sole criterion of female age is used to estimate and correspondingly score the probability of treatment success (listed as pregnancy, not a live birth). In calculating the strength of claims on ART public funding, women are allocated point-multipliers of 1.0, 0.5, or 0.1 if their age is ≤ 39 , 40–41, or ≥ 42 , respectively. Theoretically, then, a 39-year-old woman is 10 times more likely to receive ART public funding than her 42-year-old counterpart. While the New Zealand scoring system is designed to use female age as a prioritising criterion, in practice female age functions as a threshold criterion: Current funding levels dictate a threshold of 65 points—only women aged 39 years and under can score as much and thereby access ART public funding.

Gillett and Peek have explicitly stated that the point-multipliers are intended to reflect the probability of treatment success and not the degree of need (which, on one argument above, is generally higher for younger women by virtue of infertility

constituting for them an increased disruption in normal health) (Gillett and Peek 1997; Gillett, Peek, and Herbison 2012). As such, the New Zealand scoring system, with what functions as an age limit, implicitly accepts the argument that, by virtue of their reduced capacity to benefit by ART, older women use ART resources at too great an opportunity cost; that is, those same resources might benefit other (younger) women more. Implicit in the funding threshold of 65 points is also a rejection of the argument that the capacity of older women to benefit by ART is, though less than that of younger women, nonetheless sufficient to justify expenditure in view of its cost-effectiveness relative to other forms of health care.

Gillett, Peek, and Herbison (2012) suggest that the capacity to benefit from treatment is captured by two criteria taken together, namely female age (as a proxy for the chance of pregnancy with treatment) and the chance of pregnancy without treatment (which, above, we identify with need). Analysing both treatment and non-treatment outcomes, Gillett et al. demonstrate that the New Zealand scoring system largely succeeds in selecting for funding (1) those who are most likely to achieve a live birth with ART and (2) those who are least likely to achieve a live birth without ART.⁷ The scoring system is thereby largely effective in using as a substantive principle of justice the capacity to benefit from treatment. Gillett et al. implicitly regard ART's benefit as an increase in the probability of a live birth.

The Southern Health Care Region of Sweden

The Southern Health Care Region of Sweden uses a range of threshold (not prioritising) criteria in order to allocate ART public funding. The criteria include: female age; male age; female body mass index (BMI); follicle-stimulating hormone (FSH) level; duration of infertility; number of children; and previous ART funding (Lindström and Waldau 2008). In order to qualify for funding, women must be aged 37 or under. The “guiding principle” behind this criterion is openly identified as “[c]ost-effectiveness combined with a normal-deviant scale” (Lindström and Waldau 2008, 182). In other words, evidence of differing cost-effectiveness (owing to differing effectiveness) is explicitly cited as justification for the age limit. Older women are thereby, as in New Zealand, denied funding on the basis of their reduced

⁷ An Australia–New Zealand comparison of ART success rates can be cited in support of (1) (Farquhar et al. 2010).

capacity to benefit and the opportunity cost that this entails. Implicit again within the broader Swedish policy is a rejection of the argument that ART for older women is sufficiently cost-effective relative to other health care. Older women are also denied funding by reference to “a normal–deviant scale.” Offered in explanation of this phrase is the reasoning: “At higher age[s women are] closer to [the] natural fertility limit” (Lindström and Waldau 2008, 182). This implies acceptance of the argument that infertility in older women represents less of a deviation from the norm than infertility in younger women and that thereby older women have less need for ART. A “normal functioning range” conception of need underpins this argument, with the normal range being identified with fertility naturally declining with female age.

Conclusion

We have aimed to illuminate conceptual terrain relevant to the question of whether ART public funding should feature a female age limit. We have conceptualised that question as one of justice in resource allocation and explored arguments for and against a female age limit with reference to three much-debated substantive principles of justice, namely the capacity to benefit, personal responsibility, and need. Our exploration of arguments has included exploring differing conceptions of these principles. We have arrived at the following conclusions:

- Capacity-to-benefit arguments are limited by difficulties in conceptualising ART’s benefit and by a lack of data on ART’s age-relative risks of harm, which might be taken to offset benefits.
- As such, there are no *clear* cost-effectiveness grounds for an age limit when older women still bear some capacity to benefit by ART.
- Personal responsibility arguments are challenged by structural determinants of delayed motherhood or, in other words, system factors that may function as risk factors for delayed motherhood.
- Need arguments are capable of speaking both for and against some female age restriction depending on the conception of need used.

We conclude by formulating a series of questions with which the question of ART resource allocation might be equated:

- Should ART public funding vary according to people’s capacity to benefit?

- If so, then at what point? When should ART be considered cost-ineffective relative to other forms of health care? When should ART be considered not merely cost-ineffective but futile and therein more harmful than beneficial?
- Should ART public funding vary according to a person's degree of responsibility for one's own infertility?
- Should ART public funding vary according to need?
 - If so, then when is one need greater than another? In other words, what constitutes need? Does a person's need depend on how disrupted one's health is, how important one's threatened opportunity is, how severe or urgent one's problem is, or some combination?
- Is female age relevant in determining and comparing (1) people's capacity to benefit from ART, (2) people's degree of personal responsibility for their infertility, and (3) people's degree of need? If so, then in what respects and to what degree? What attributes might be relevant besides female age, and how relatively important are they?
- How relatively important are the capacity to benefit, personal responsibility, and need as substantive principles of justice (in other words, bases on which to allocate resources)? What other principles, if any, are important, and how relatively important are they?

We have attempted to demonstrate the central relevance of these questions and to canvass tenable responses to a number of them. The concepts of capacity to benefit, personal responsibility, and need can differ not only in content, but also in what relative importance they are accorded in just resource allocation. Wide variation in ART public funding policy might be better understood in this light: The variation may well reflect differing conceptions of justice with respect to resource allocation. These differing conceptions can be observed when comparing some of the more transparent ART public funding policies. The relevance of these matters extends beyond ART.

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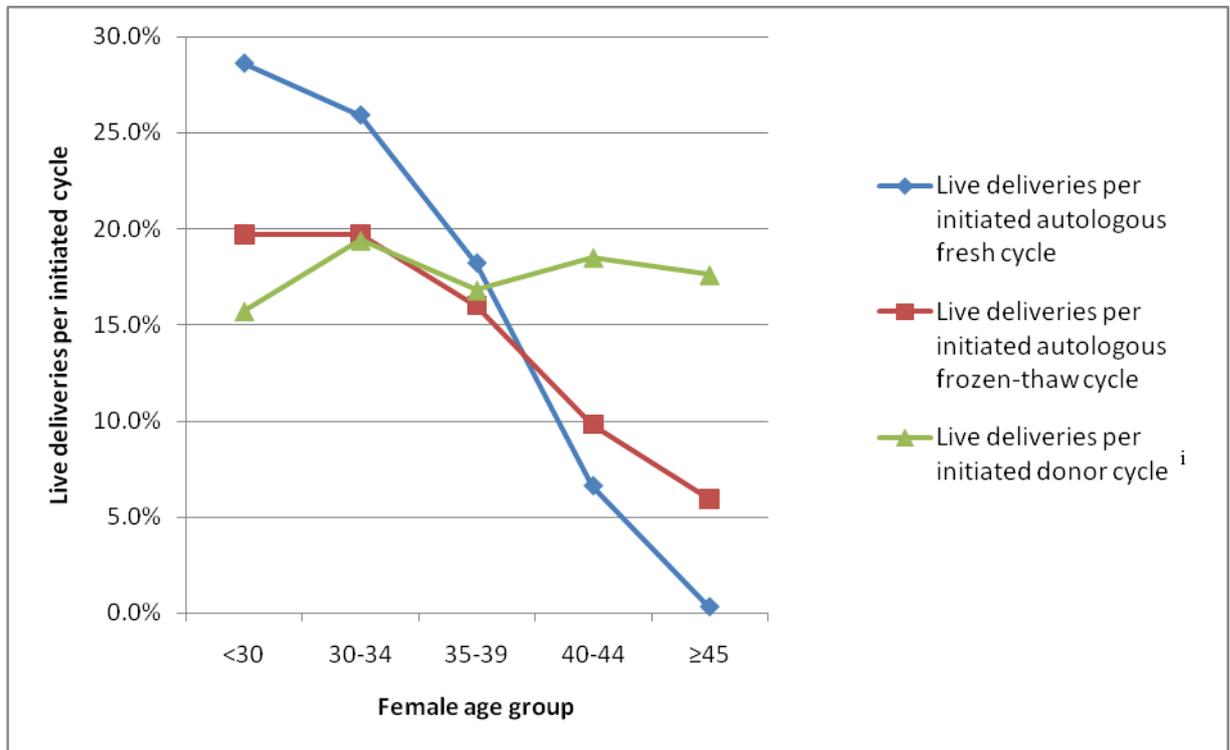
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Figure 1. Outcomes of IVF cycles by female age group, Australia and New Zealand, 2008 (Wang, Chambers, and Sullivan 2010). Autologous success rates decline with female age.



ⁱ The age group of the oocyte recipient, not donor, is plotted.