

Annex 3: Extraction Table

Reference	Abstract	Year	Country	Does the article discuss AI in primary care, in healthcare in general, or any other specific healthcare setting?	Type of article/study e.g. original research, review articles, discussion, report, research or qualitative or quantitative?	Short summary of content (if Discussion/Whitepaper) PICD only if relevant?	Most significant findings/conclusions	Objective 1A: Does the article discuss on inequality match the themes in the conceptual model? Which themes? Give numbers 1-12 as per attached figure. What are the main points?	Objective 1B: Does the article introduce any themes on AI and inequalities not covered in the model?	Objective 2: Does the article discuss how the implementation of AI can affect the patient-doctor relationship, and how this could have implications for healthcare equality?	Objective 3: Does the article describe the role of structures, organisational processes and personal involved in implementing an AI system, and how the implementation could affect healthcare equality?	Interesting references?	Added after peer reading?
Leslie, D., et al. (2021). "Does 'AI' stand for augmenting intelligence in the era of COVID-19 healthcare?" The BMJ 372.	Artificial intelligence can help tackle the covid-19 pandemic, but bias and discrimination in design and deployment risk exacerbating existing health inequality argue David Leslie and colleagues	2021	UK	General Healthcare	Discussion	Risk of widened inequality in the context of COVID-19 AI is implemented broader.	Main focus on data representation and societal biases, interesting point about trust of doctors in system.	9, 10. Bias and underrepresentation. 3. Trust, but the article focuses on trust of doctors, and how doctors may suspect the AI of being biased and thus mainly use it on "majority" patients.	Trust of doctors, and how doctors may suspect the AI of being biased and thus mainly use it on "majority" patients.	"Cascading" health inequalities through three different mechanisms: Datasets/algorithms, application injustice (only some benefit, widening gap), and power imbalances in problem formulation and agenda setting. Illustration! Also useful advice re			
Abramoff, M. D., et al. (2020). "Lessons Learned About Autonomous AI: Finding a Safe, Effective, and Ethical Path Through the Development Process." American Journal of Ophthalmology 214: 134-142.	Artificial intelligence (AI) describes systems capable of making decisions of high cognitive complexity, autonomous AI systems in healthcare are AI systems that make clinical decisions without human oversight. Such rigorously validated medical diagnostic AI	2020	USA	General Healthcare, Primary care (sub discussion re: retinopathy system)	Discussion	Discussion AI ethical issues in ophthalmology, focusing on algorithmic bias, privacy and accountability.	Potential to do good if well managed. Discusses importance of not just talk about algorithmic fairness in equality, as this required knowledge of all the degrees of potential impact.	2- Increased accessibility 10-11: Concerns of ethnic and gender bias (refers to Chelmsley) Design so that operations are reduced to scientific characteristics and clinical knowledge rather than process (which could be race etc), "algorithmic fairness", or the ability to computationally	No	Very briefly discusses the importance of correct implementation, but no examples or theories.	Challen R, Conry J, Pitt M, Gompers L, Edwards T, Tranevskaya Z, et al. (2018). Machine learning, Artificial intelligence, bias and	Goodman, S. (2018). N. Goel, S. & Cullen, M. R. (2018). Machine learning, health disparities, and causal	
Alami, H., et al. (2020). "The World Health Organization and other institutions are considering Artificial intelligence (AI) as a technology that can potentially address some health system gaps, especially the reduction of global health inequalities in low- and middle-income countries." Globalization and Health 16(1).	The World Health Organization and other institutions are considering Artificial intelligence (AI) as a technology that can potentially address some health system gaps, especially the reduction of global health inequalities in low- and middle-income countries.	2020	Canada	General Healthcare	Discussion	AI's potential to improve global health equity, advice for implementation of AI in LMICs.	Five points to maximize benefits and avoid worsening inequalities: 1. Training for AI involved in basic AI, 2. Robust monitoring, 3. Contractual needs must be addressed, 4. Proven benefit compared to other interventions such as doctors retention, 5. Inclusive development and	1. Increased availability, affordability, 6. Improved accessibility for stigmatized illness, 8. Underrepresentation in LMIC in datasets, 10. Bias.	Creates risk for intentional ethnic discrimination through proxy classifying. Risk of medicating issues that is best addressed through SDH	Importance of community involvement and a holistic approach to SDH to maximise gains and avoid risks.	World Health Organization, big data and artificial intelligence for achieving universal health coverage an		
Aman, J., et al. (2020). "Explaining for artificial intelligence in healthcare: a multidisciplinary perspective." BMC Med Inform Decis Mak 20(1): 310.	BACKGROUND: Explainability is one of the most heavily debated topics when it comes to the application of artificial intelligence (AI) in healthcare. Even though AI-driven systems have been shown to outperform humans in certain analytical tasks, the lack of explainability continues to spark	2020	Switzerland	General Healthcare	Discussion	Explainability explained from a bioethical perspective. Under Justice, there is the case that application of artificial intelligence (AI) in healthcare. Even though AI-driven systems have been shown to outperform humans in certain analytical tasks, the lack of explainability continues to spark	Bias is ineliminable, explainability is bioethical perspective. Under Justice, there is the case that application of artificial intelligence (AI) in healthcare. Even though AI-driven systems have been shown to outperform humans in certain analytical tasks, the lack of explainability continues to spark	1. Risk of inequality if trust difference, 10, 11. Bias, risk and need to mitigate,	Strong focus on explainability, as a way to manage bias.		Chelmsley Z, Powers B, Vogel C, Kuhlman S. Dissecting racial bias in an algorithm used to manage the		
Baars, S. N., et al. (2020). "SHEETS (Healthcare in primary care, Part 2): Exploring the ethical implications of its application in primary care practice." Eur J Gen Pract 26(1): 25-32.	Background: Health promises to increase self-management and personalised medicine and improve cost effectiveness in primary care. Paired with these promises are ethical implications, as health with affect patients' and primary care professionals' (PCPs) experiences, values, norms, and	2020	Netherlands	Primary care	Discussion	Discuss equality and general ethical aspects of ethics in general, and "personalised digital decision making" i.e. AI.	Risk of disparities increasing due to both algorithms and preferences in usage among different population. General risk of dehumanisation, which seen as generally negative, but positive re some sensitive issues.	1. (Burton) and physical access, 5 and 6 but not specifically equity, 10 (bias).	0	Risk of dehumanisation and pushing responsibility to patients, potentially widening gaps.	Importance of defining the role of the human provider in the system to avoid adverse effects of AI, not specifically equality, but more generally quality.	Baars, S. N., B. Duijts, M. F. (2020). The ethical implications of artificial intelligence in health care: findings from	
Balthazar, P., et al. (2018). "Protecting Your Patients' Interests in the Era of Big Data, Artificial Intelligence, and Predictive Analytics." J Am Coll Radiol 15(3 Pt 8): 580-586.	The Hippocratic oath and the Belmont principles for how physicians interact with patients and research subjects. The increasing use of big data and artificial intelligence techniques demands a re-examination of these principles in light of the	2018	USA	General Healthcare	Discussion	Focus on data rights and ethical implications of AI in radiology, but generalisable.	Need for active discussion and frameworks.	1. Digital divide.	Risk of availability bias due to cost. More relevant to private healthcare settings?				
Buch, V. H., et al. (2018). "Artificial intelligence in medicine: Current trends and future possibilities." British Journal of General Practice 68(668): 143-144.	Artificial intelligence (AI) research within medicine is growing rapidly. In 2016, healthcare AI projects attracted more investment than AI projects within any other sector of the global economy. However, the excitement, there is	2018	UK	Primary care	Discussion	What will AI mean for primary care? Will it support GPs, not replace.	Generally very positive, conducting AI's ability to complement on suitable tasks.	2. Increased availability	Improved efficiency.	The biggest hindrance is likely the public perception of AI in medicine. Thus incremental that GPs remain in control.			
Bigham, V. E., et al. (2021). "Threat of racial and economic inequality increases preference for algorithm decision-making." Computers in Human Behavior 122.	Artificial intelligence (AI) algorithms hold promise to reduce inequalities across race and socioeconomic status. One of the most important domains of racial and economic inequalities is medical outcomes. Black and low-income people are likely to die from many diseases.	2021	USA	General Healthcare	Quantitative	P-rTurk in US and Korea. 1. Threat of inequality in treatment, choice of AI or doctors, 2. Choice of threat, 3. Amount chosen to have an AI decide their care. Added results in Korea and tTurk in US as to whether they would want to see an AI or a doctor in a hospital stage interventions was to introduce a	Threat of inequality increases acceptability of AI. Black Americans more keen for AI after trustworthiness initially, no worse for Black.	11. Less risk, 10. Risk of bias, but less than human. 4. More trustworthiness 3. Equal trustworthiness initially, no worse for Black.	D	Threat of current inequality makes patients more accepting of AI.	Lal, M. C., Brant, A., B. Fleisher, M. F. (2020). The ethical implications of artificial intelligence in health care: findings from		
Clark, C. R., et al. (2021). "Health Care Equity in the Use of Advanced Analytics and Artificial Intelligence Technologies in Primary Care." J Gen Intern Med 36(10): 1188-1193.	The integration of advanced analytics and artificial intelligence (AI) technologies into practice of medicine holds much promise. Yet, the opportunity to leverage these tools carries with it an equal responsibility to ensure that principles of equity are incorporated into their	2021	USA	Primary care	Discussion	Importance of GP in general to consider SDH, and a general lack of SDH data collected in GP inequalities goes beyond healthcare and should be addressed accordingly. All AIs should be evaluated for equality also with regards to access and not only accuracy. Pre-equality	1, 2, 9, 10, 11.	Diffusely focuses on having an equity perspective beyond the algorithms, and to focus on SDH with the help of AI in PC.	Diffusely focuses on having an equity perspective beyond the algorithms, and to focus on SDH with the help of AI in PC.		Matthew ME, Thaddeus S, Ahmad M, White D. AI in Health Care: The Hope, the Hype, the		
Coiera, E. (2019). "The Price of Artificial Intelligence." Yearbook of medical informatics 28(1): 14-15.	INTRODUCTION: Whilst general artificial intelligence (AI) is yet to appear, today's narrow AIs already good enough to transform much of healthcare over the next few decades. OBJECTIVE: This is much discussion of the potential benefits of AI in healthcare and the paper reviews the cost that	2019	Australia	General Healthcare	Discussion	Summarises issues with AI in medicine.	AI is narrow. May help simple quick patients more.	1. Lower functional access for disadvantaged populations, 5. Dehumanisation/medicalisation worse for complex patients.		The most demanding and influential patients are young and healthy, and are likely to push for AI. "To not engage [in the transformation] is to pay the highest price"	Marshall M, Shah R, Stokes J, et al. (2019). Online consulting in general practice: making the most from		
Embi, P. J. (2021). "Algorithmic bias: Advancing Methods to Analyze and Monitor Artificial Intelligence-Driven Health Care for Effectiveness and Equity." JAMA Network Open 4(4).	In recent years, there has been rapid growth and expansion in the use of machine learning and other artificial intelligence approaches applied to increasingly rich and accessible health data sets to develop algorithms that guide and support health care. 1. AI, they make their way into practice, such	2021	USA	General Healthcare	Discussion	Refers to another article, discusses three different ways of debiasing an algorithm predicting post-partum depression, 1. present more in White than Black women, due to societal bias.	Debiasing studies very important.	10, 11. Bias and debiasing.		Emphasises the importance of careful implementation, no details			
Ferryman, K. (2020). "Addressing health disparities in the Food and Drug Administration's artificial intelligence and machine learning regulatory framework." Journal of the American Medical Informatics Association 27(12): 2012-2019.	The exponential growth of health data from devices, health applications, and electronic health records coupled with the development of data analysis tools such as machine learning offer opportunities to leverage these data to mitigate health disparities. However, these tools	2020	USA	General Healthcare	Discussion	Recommendations to FDA on updated, more holistic equity review processes for new products.	The actual usage of AI system affects equality as well - a system can be chosen to be implemented only of disadvantaged groups, for example, in order to reduce disparities.			Risk of over-emphasis on equity re regulation, due to the fast pace of development and change.	Chen H, Bobrovs P, Ghahramani M. Can AI help reduce disparities in general medical and health		
Chen, S., et al. (2021). "Using AI ethically to tackle covid-19." Emj 37(2): r364.	Taking a principled approach is crucial to the successful use of AI in pandemic management, say Stephen Cave and colleagues	2021	UK	General Healthcare	Discussion	Discussed AI in the context of COVID-19 but expanding into AI in general.	Benefits and challenges - AI can be good but needs caution.	1. Digital divide, 2. Increased availability, 3. Distinct among historically discriminated groups, 9. Underrepresentation, 10. Underlying bias.			Yvonne TC, Mitchell H, Ancker JS. Good intentions are not enough: how informatics interventions		
Bleise, C., et al. (2018). "Computerization and the future of primary care: A survey of general practitioners in the UK." PLoS One 13(12): e0207418.	OBJECTIVE: To describe the opinions of British general practitioners regarding the potential of future technology to replace key tasks carried out in primary care. DESIGN: Cross sectional online survey. PARTICIPANTS: 1,474 registered GPs in the United Kingdom. MAIN	2018	UK	Primary care	Quantitative	Survey of GPs re what tasks in GP they think will be replaced by AI in the future, and timelapse.	Mostly administrative tasks. Very few GPs thought AI could replace GPs empathy. Diagnosis and prognosis was the two most "AI likely" tasks. Also "However, as leading informatics caution, cycles often camouflage broader historical trends: Amara's Law is the observation that we tend to	No	No	The article implies that a partial or total replacement of GPs with AI for certain tasks requiring empathy would result in reduced quality, if done. NB that GPs are not AI experts.			
Bleise, C., et al. (2019). "Artificial intelligence and the future of primary care: exploratory qualitative study of UK general practitioners' views." Journal of Medical Internet Research 21(3).	BACKGROUND: The potential of artificial intelligence in the field of medical informatics and related fields. OBJECTIVE: This study aimed to explore general practitioners' (GPs) opinions about the potential impact of	2019	UK	Primary care	Qualitative	P, 66 GPs in UK. 1. Hypothetical replacement of GPs on different primary care tasks, limitations and benefits. 2. D. GPs views vs limitations, benefits and ethical concerns.	Limitations and concerns focused on lack of patient-centredness and empathy, non-verbal cues. No GPs mentioned bias.	5. Dehumanisation, 2. availability poorly impacted.	General scepticism. GPs do not mention bias.	Effective implementation may be hindered by current high workload of GPs.	Bleise C, Bonvicini MH, Gabb J, Kapchuk T, Kosowsky J, Mandl KD, et al. Computerizat on and the		

Crippa, D., et al. (2020). "Sex and gender differences and biases in artificial intelligence for biomedicine and healthcare." <i>npj Digital Medicine</i> 3(1).	2020	Spain	General healthcare	Review	Lists several kinds of intrinsic bias, but also underscores the opportunity of AI to include "wanted" bias.	Distinguish between desirable and undesirable bias. Explainable algorithms.	9 underrepresentation, 10 underlying bias, 11 opportunity to introduce desirable bias.				Can, A. I. Help reduce disparities in general medical and mental health care? <i>AMA J. Ethics</i> 21, E167-E179
Hofford, W. D. (2020). "The repression of algorithms/employees: digital organizations." <i>Prometheus</i> 36(3): 253-276.	2020	Canada	General	Discussion	Digital technology represses "metes", which is a loss for the opportunity of AI to include "wanted" bias.	When something that used to include human skills is digitized, "metes" gets repressed; nuances and intuition is very hard or impossible to translate straight to computer systems and AI. This "truncates knowledge" and is a threat to personalized and compassionate care.		AI can not outright replace humans without a loss of quality, merely complement.	AI can not outright replace humans without a loss of quality, merely complement.		
Blease, C., et al. (2020). "US primary care in 2029: A Delphi survey on the impact of machine learning." <i>PLoS One</i> 15(10 October).	2020	USA	Primary care	Qualitative	P 16 health informaticians; I impact on patient care, acc, workforce and long term future for GP, C, O, D, Delphi	Informaticians are here generally very positive	2. Increased availability by amounts. However risk for divide due to cost. 11. Less bias.	Risk of availability bias due to cost. More relevant in private healthcare settings? <i>Balance empathy, for undisclosed reasons.</i>	2029 AI will affect GPs a lot, but they will not be replaced.	One participant predicted that doctors will have to learn more informatics to be able to properly manage AI.	Dorawany PAM, Blease C, Kooder K. Artificial intelligence and the future of psychiatry: Insights from a global
Holmeyer, C. (2021). "Beyond AI for Social Good (A4SG): social transformations—not tech fixes—for health equity." <i>Interdisciplinary Science Reviews</i> 46(1-2): 94-125.	2021	USA	General Healthcare	Discussion	Risks of AI hype in society and health	Precision medicine can take focus from equity wise more important public health interventions and social care. Also risk for bias in data.	10. Bias. 1. Digital divide and cost	Focusing on narrow interventions instead of upstream sources of inequality.		As mentioned, risk of AI being "precision medicine focused", which is inherently prone to inequalities, compared to public health applications. For example, what if US scientific, health and business leaders were equally or more enthusiastic about acting on current research	
Cordeno, I. V. (2021). "Digital Technologies and Data Science as Health Enablers: An Outline of Appealing Promises and a Compelling Ethical, Legal, and Social Challenges." <i>Frontiers in Medicine</i> 8.	2021	Portugal	General Healthcare	Review, narrative	Summarises issues with AI in medicine.	Various points along ethical principles. Trust, fairness and dehumanisation important theme.	1. Lower functional access for disadvantaged populations, but 2. more availability. 5. Dehumanisation/medicalisation worse for complex patients. 9, 10, 11: Risk for bias in datasets, but opportunity to visualise and mitigate.				McAuliffe A. Digital health interventions: widening access or widening inequalities? <i>P Public Health</i> , (2024)
Kayo, C., et al. (2021). "Truth from the machine: artificial intelligence and the materialization of ideology." <i>Interdisciplinary Science Reviews</i> 46(1-2): 158-175.	2021	USA	General	Discussion	Kayo et al (5) set out to describe the relation between AI and ideology, and as part of that the relations between ideology and scientific studies. They theorise that AI, as a consequence of both "mythology" and the black box dynamics of deep learning systems, may be seen as an objective truth, as such	Risk that AI is seen as objective truth due to both black box and mythology. This may lead to false interpretations of causation and ignoring the social context. Austin's correlation with genes is taken as an example.	5. (but does not discuss equality)		Tricky one to read that!		
Deffero, J. J., et al. (2019). "Social determinants of health in mental health care and research: a case for greater inclusion." <i>J Am Med Assoc</i> 326(9): 855-859.	2019	USA	General Healthcare	Discussion	The case for AI tools to extract socioeconomic data	AI can improve access to psychiatric care through identifying low SES, enabling targeted interventions.		The ability to highlight general socioeconomic drivers of poor health, and target interventions.			
Kotler, N. (2020). "Artificial Intelligence: A Private Practice Perspective." <i>J Am Coll Radiol</i> 17(11): 1398-1404.	2020	USA	Radiology	Discussion	Experiences from a private radiology company who is using AI	Close contact with stakeholders important for acceptability and adoption. Clear feedback system to developers important to keep trust and engagement.	2. Increased capacity. 9, 10, 11. Bias in datasets.	no	No	Implementation needs to be done in close contact with stakeholders. In this case, the importance of involving radiologists in the implementation and choice of AI tasks was important for acceptability.	
Fjerskov, A. M. (2021). "Algorithmic Bias and the (Pseudo) Promise of Numbers." <i>Global Policy</i> 12(16): 101-103.	2021	Denmark	General Healthcare	Discussion	Bias is complex and multifactorial.	Transparency is not just a data question, it is also a question of business ethics - it's not all in the code.	10, 11.				
Maitland, S., et al. (2020). "AI: simply reinforcing medicine's worst biases?" <i>BMJ Innovations</i> 6(4): 117-120.	2020	UK	General Healthcare	Discussion	Focus on algorithmic bias, no system effects.	Risk of bias from data, need to properly evaluate systems in various socioeconomic settings, ensure social data is being captured to allow evaluation.	9,10,11.	Risk of confirmation bias: we trust the AI when it says what we want but not when it doesn't.	No	Need for testing in real life socioeconomicly diverse areas to ensure no biases.	Academy of Medical Royal Colleges. Artificial intelligence in healthcare [Internet]. 2019 [cited 2019 May 9].
Marshall, M., et al. (2018). "Online consulting in general practice making the move from disruptive innovation to mainstream service." <i>Bmj</i> 360: k1195.	2018	UK	Primary care	Discussion	Written by the leadership of RCGP on risks of disruption from eHealth (not specifically AI, mainly remote in some way)	Risk of cherry picking and undermining the current funding system. On the other hand, change to increase accessibility and acceptability. Could also free up resources.	1, 2, 5, 6.			Importance of finding the right application for new interventions with a system perspective.	
Martinez-Martin, N., et al. (2021). "Ethical issues in using ambient intelligence in health care settings." <i>Lancet Digit Health</i> 3(2): e115-e123.	2021	USA	General Healthcare	Discussion	Ambient intelligence; a subset of AI continuously monitoring data in health settings "from the outside". Lots of focus on privacy issues specific to ambient monitoring.	From an equality point-of-view: Bias may come all the normal ways but also from the people labelling and developing the datasets - important to keep a diverse workforce there to avoid skewed perceptions of "normality".	9, 10.	Risk of skewed perception of "normality" if developers and evaluators consist of homogenous groups. Related to 10, hidden biases.		Implementation needs to be done with an equality perspective, as there is a risk of only benefiting the already well off.	
Chen, L. Y., et al. (2019). "Can AI help reduce disparities in general medical and mental health care?" <i>AMA Journal of ethics</i> 21(2): 147-179.	2019	USA	Psychiatry	Qualitative	Ethnicity, socioeconomic and gender data compared when modelling ICU mortality and youth readmission probability on free text data.	More accurate for white men. Predicts (rightly, but biased?) higher mortality for ethnic minorities and women.	9, 10.	No			
Monteu, J. T., et al. (2020). "Biased intelligence: on the subjectivity of digital objectives." <i>BMJ Health Care Inform</i> 27(3).	2020	Canada	General Healthcare	Discussion	Unequal distribution of both AI development, research and sampling.	Big opportunities also for improving availability and lowering costs, but needs to be promoted more equally, both geographically and socioeconomically. For example, "top of hand" catering to well-off, young patients.	2. Increased availability/lowered cost. 5. Worse for socially complex patients. 9, 10. Bias and underrepresentation.		Human-centred AI is key to ensure equal AI, from production to implementation. See reference 2, here to the right	Sujan M, Furniss D, Grundy K, et al. Human factors challenges for the safe use of artificial intelligence in 2019;1:33-6.	Nickl MD. Human-center ed artificial intelligence and machine learning. Hum Behav Emerg Technol 2019;1:33-6.
Nordling, L. (2019). "A faster way forward for AI in health care." <i>Nature</i> 573(7775): S103-S105.	2019	South Africa	General Healthcare	Discussion	Focus on bias, discussed Obermeyer's findings among other	Important to mainstream equity throughout the whole development and implementation process, including both datasets and evaluation.	9,10,11. 1. Increased availability in low cost settings possible.	In unequal societies, AI may only benefit the rich. E.g. you need an X-ray machine to be able to use AI for X-ray analysis.		Mentions the need to locally anchor initiatives to avoid unexpected biases due to surrounding infrastructure, particularly reg EMCC.	Forsythian, K. (2020). Addressing health disparities in the Food and Drug Administration's artificial
Pagliari, C. (2021). "Digital health and primary care: Past, pandemic, and prospects." <i>J Glob Health</i> 11: 01005.	2021	UK	Primary care	Discussion	This article reflects on the breadth of digital developments seen in primary care over time, as well as the rapid and significant changes prompted by the COVID-19 crisis. Recent research and experience have shown further light on factors influencing the implementation and usefulness of these		1, 2, 3 (but no equality), 9, 10.			If AI systems are not implemented in an efficient way together with GPs/NCPs, they may increase workload and take resources rather than the other way around, as GPs have to double check and/or fix mistakes.	

Hernandez-Boussard T, et al. (2020). "Minimum Information for Medical AI Reporting" Developing reporting standards for artificial intelligence in health care. <i>Journal of the American Medical Informatics Association</i> 27(11): 2011-2015.	The rise of digital data and computing power have contributed to significant advancements in artificial intelligence (AI), leading to the use of classification and prediction models in health care to enhance clinical decision-making for diagnosis, treatment and	2020	USA	General healthcare	Framework	Reporting standard for AI in medicine: MINIMAA	Focus on bias in algorithms: population behind training data (demographics, ethnicity and socioeconomic, evaluation methods incl external evaluation.	9, 10. No focus on external effects, only "intrinsic".					
Prabhakaran, V. and D. Martin (2020). "Participatory Machine Learning Using Community-Based System Dynamics." <i>Health and Human Rights</i> 22(2): 71-74.	The pervasive digitization of health data, aided with advancements in machine learning (ML) techniques, has triggered an exponential growth in the research and development of ML applications in health, especially in areas such as drug discovery, clinical diagnosis, and	2020	USA	General healthcare	Discussion	Promoting participatory methods to advance fairness in AI.	Own method "Community-Based System Dynamics", CBSD, to facilitate development, use references	0	Without focusing on specifics, they recommend a community-focus approach for equity	Discussing causal chains that lead to false problem formulations: such as that healthcare costs are equivalent to need (Obermeyer). Advise community engagement using CBSD (reference to rights).	D. Martin Jr., V. Prabhakaran, et al., "Participatory problem formulation for fairer"		
Rajkumar, A., et al. (2018). "Ensuring Fairness in Machine Learning to Advance Health Equity." <i>Ann Intern Med</i> 169(12): 864-872.	Machine learning is used increasingly in clinical care to improve diagnosis, treatment selection, and health system efficiency. Because machine-learning models learn from historically collected data, populations that have experienced human and structural biases in	2018	USA	General Healthcare	Discussion	Different ways of defining fairness (this needs a whole section, and perhaps inclusion in the definition). Equal outcome (gold standard, but how?), equal performance (easy but wrong), equal allocation (one step more "advanced" than equal performance since it disregards	Models should be tested for both equal allocation and equal performance, and discrepancies be discussed and potentially mitigated. Also explicit recommendation not to have "colour or gender blind" algorithms.	10, 11 Bias and opportunity to improve		Privilege bias: Models may be unavailable in settings where protected groups receive care or require technology/sensors disproportionately available to the nonprotected class. Informed mistrust: Given historical exploitation and unethical practices, protected			
Smith, M., et al. (2021). "From Code to Bedside: Implementing Artificial Intelligence Using Quality Improvement Methods." <i>J Gen Intern Med</i> 36(4): 1061-1066.	Despite increasing interest in how artificial intelligence (AI) can augment and improve healthcare delivery, the development of new AI models continues to outpace adoption in existing health care processes. Integration is difficult because current approaches	2021	USA	General Healthcare	Discussion	How to use implementation science methods (the POA cycle) to integrate AI into medicine, used a mixed methods approach. Currently applications are developed away from the clinical setting and may thus lack a clear user case or not function in the complexity that is a clinical	A common problem is prioritising science methods (the POA cycle) to integrate AI into medicine, used a mixed methods approach. Currently applications are developed away from the clinical setting and may thus lack a clear user case or not function in the complexity that is a clinical	9, 10, Bias and opportunity to mitigate		Again focuses on the importance of basing the AI on a concrete tangible problem that needs to be solved, and not the other way around. Plan to do study, adjust, in the two last steps, use both quant markers for success and interviews with stakeholders.			
Kartheis, K. E. (2018). "Against the Doctor: why artificial intelligence should not replace physician judgment." <i>Theoretical Medicine and Bioethics</i> 39(2): 91-110.	Experts in medical informatics have argued for the incorporation of ever more machine-learning algorithms into medical care. As artificial intelligence (AI) research advances, such technologies raise the possibility of an "oracle," a machine theoretically capable of replacing the judgment of primary	2018	USA	Primary care	Discussion	Discusses why AI should not and can not replace humans in primary care.	Lack of individualisation, lack of compassion, lack of ability to work with the patient and let the patient be the teacher.	17 Dehumanisation. No explicit equality focus.		Main point of the article: AI can't and shouldn't replace doctors in primary care due to the fundamental patient-focused role of GP.			
Kim, D. and D. C. Kloxoff (2019). "Digital Diabetes Data and Artificial Intelligence: A Time for Healthy Not Hasty." <i>Diabetes Sci Technol</i> 13(1): 123-127.	In the future, artificial intelligence (AI) will have the potential to improve outcomes diabetes care. With the use of new sensors for physiological monitoring sensors and the introduction of smart insulin pens, novel data relationships based on personal phenotypic and genotypic	2018	USA	Diabetes	Discussion	On equality risks with diabetes data and AI applications, the quantitative fallacy. On example if someone has a hypoglycemic event, and the AI is unable to understand the social, "soft" reasons behind this, and thus changes medication/	Continuity of care is associated with better diabetes outcomes - not easily measurable but still true!	9, underrepresentation. 7. Agency for self care (although not explicit, the article does discuss how socioeconomic changes beliefs in diabetes and diabetes management, and that AI likely would fail to grasp that if "one size fits all" based on just quant data).					
Arun, C. (2019). "AI and the Global South: Deeping for Other Worlds."	This chapter is about the ways in which AI affects, and continues to affect, the Global South. It highlights why the design and deployment of AI in the South should concern us. Towards this, it discusses in Myanmar: Lack of established media and diverse and unequal population led to hate speech and discrimination;	2019	UK	General society	Discussion/Book chapter	Examples of ways AI affects equality of various kinds in developing countries. Global South does in some contexts also denote immigrants to "the north". Facebook in Myanmar: Lack of established media and diverse and unequal population led to hate speech and discrimination;	Several issues: implementation problem (e.g. Facebook). Bias in data combined with a lack of questioning the results from doctors and public, and a lack of diversity in development and implementation organizations, allowing all this to happen.	9, 10, 1 (in the case of access to care in India)		Facebook in Myanmar: Lack on established media and diverse and unequal population led to hate speech and discrimination. Facebook worked even worse than in the west!			
Mema, E. and G. McDermid (2020). "The Role of Artificial Intelligence in Understanding and Addressing Disparities in Breast Cancer Outcomes." <i>Current Breast Cancer Reports</i> 12(3): 168-174.	Purpose of Review: The goal of this paper is to explore the role of AI in understanding health disparities in cancer care and its potential role in resolving them. Recent Findings: Multiple studies have shown that with the recent advances in AI, its integration in cancer care has the potential to	2020	USA	Oncology/Breast cancer	Review, narrative	Goes through mechanisms for how artificial intelligence and looks at its effect on them.	Example of bias: low SES have worse prognosis, thus the AI may choose to not give them chemo, further worsening inequalities. AI can work against this, flagging inappropriate T decisions (7)	2, 9, 10, 11		Zou J, Schwingler L. AI can be sexist and racist: it's time to make it fair. <i>Nature</i> . 2018;559(7714):324-6.			
Dankwa Mullan, L., et al. (2021). "A proposed framework for integrating health equity and racial justice into the artificial intelligence development lifecycle." <i>Journal of Health Care for the Poor and Underserved</i> 32(2): 300-327.	The COVID-19 pandemic has highlighted the need to integrate health equity and racial justice into the artificial intelligence development lifecycle." <i>Journal of Health Care for the Poor and Underserved</i> 32(2): 300-327.	2021	USA	General Healthcare	Discussion/Framework	Recommendations to integrate health equity into AI development. Framework introduced. Good framework and introduction!	Important to start by analysing existing inequalities and define desired end targets (such as equity in blood pressure) together with affected groups.	9, 10, 11 - all intrinsic. Also risk of dehumanisation, 5.		Importance of community perspective and stakeholder consultations to ensure equity in implementation.	14. Roodi E, Varghese A. Humanizing Artificial Intelligence. <i>JAMA</i> . 2019;321(11):1299-300.		
Christopher, M., et al. (2020). "Effects of study population, labeling and training on glaucoma detection using deep learning algorithms." <i>Translational Vision Science and Technology</i> 9(2): 1-14.	Purpose: To compare performance of independently developed deep learning algorithms for detecting glaucoma from fundus photographs and to evaluate strategies for incorporating new data into models. Methods: Two fundus photograph datasets from the	2020	Japan	Ophthalmology	Quantitative	Two different datasets with different populations was trained to detect glaucoma, then tested on independent, multiethnic datasets.	Retraining of models important for different populations, but can be done reliably in this setting.	9, Underrepresentation.					
Shaw, J., et al. (2019). "Artificial Intelligence and the Implementation Challenge." <i>J Med Internet Res</i> 21(7): e13659.	BACKGROUND: Applications of artificial intelligence (AI) in health care have garnered much attention in recent years, but the implementation issues posed by AI have not been substantially addressed. OBJECTIVE: In this paper, we have focused on machine learning (ML) as a form	2019	Canada	General Healthcare	Discussion/Framework	Using the NASSS framework for implementation analysis, looks at AI in other decision support or automation.	This is a great source of reference, on AI and on implementation issues. If not specifically on inequality.	Brief mention of bias issues (9, 10) as a barrier to implementability.		AI needs to add value - simple decision support may not add much value in a clinical setting, but rather visualising complex correlations may be more useful. Explainability is closely related to trust: poor implementation may result if AI is not explainable.			
Us, S. Y., et al. (2019). "Ten Ways Artificial Intelligence Will Transform Primary Care." <i>Journal of General Internal Medicine</i> 34(8): 1626-1630.	Artificial intelligence (AI) is poised as a transformational force in healthcare. This paper presents a current environmental scan, through the eyes of primary care physicians, of the top ten ways AI will impact primary care and its key stakeholders. We discuss ten distinct problem spaces and the	2019	USA	Primary care	Discussion	Focus on performance and workforce rather than equality.	AI needs to complement rather than replace GPs - the focus here is on GPs being able to keep their humanity.	No	AI needs to complement rather than replace GPs - the focus here is on GPs being able to keep their humanity.		Iranzi ST, Varghese A. Humanizing Artificial Intelligence. <i>JAMA</i> . 2019;321(11):1299-300.		
Venot, T. C., et al. (2018). "Good Informatics Interventions are not enough: how informatics interventions can worsen inequality." <i>Journal of the American Medical Informatics Association</i> 25(8): 1080-1088.	Health informatics interventions are designed to help people avoid, recover from, or cope with disease and disability, or to improve the quality and safety of healthcare. Unfortunately, they pose a risk of producing informatics-generated inequalities (IGI) by disproportionately benefiting	2018	USA	General healthcare	Discussion/narrative review	Outlines ways informatics can worsen inequalities. Important framework connected to AAGA.	Baseline, access, uptake, adherence, effectiveness	Access: 1, 2. Uptake: 3. Distrust along ethnic lines. Adherence: 7. Less agency for change when self-care involved. Effectiveness: 7. Also 9, 10 (bias).		Strong focus on inclusive design of interventions rather than implementation. Also mentions importance of evaluating and monitoring for socioeconomic inequality, which in turn necessitates that these demographics are recorded in the first place.			
Clark, C. R., et al. (2021). "Predicting Self-Rated Health Across the Life Course: Health Equity Insights from Machine Learning Models." <i>J Gen Intern Med</i> 36(5): 1181-1188.	BACKGROUND: Self-rated health is a strong predictor of mortality and morbidity. Machine learning techniques may provide insights into which of the multifaceted contributors to self-rated health are key drivers in diverse groups. OBJECTIVE: We used machine learning algorithms to predict self-	2021	USA	General Healthcare	Quantitative	(50000+50000) persons over two years, used AI to predict self-rated health based on social and behavioural reported factors.	Equal prediction for different groups, but helped identify socioeconomic drivers of perceived ill-health	0	The ability to highlight general socioeconomic drivers of poor health, and target interventions.		Lin SY, Mahony MR, Stucky CA. Ten ways artificial intelligence will transform primary care. <i>J Gen Intern Med</i> .		
Gao, Y. and Y. Cui (2020). "Deep transfer learning for reducing health care disparities arising from biomedical data inequality." <i>Nature Communications</i> 11(1).	As artificial intelligence (AI) is increasingly applied to biomedical research and clinical decisions, developing unbiased AI models that work equally well for all ethnic groups is of crucial importance to health disparity prevention and reduction. However, the biomedical data	2020	USA	General healthcare	Quantitative	Most majority of cancer genomics data (91%) from caucasians. "Transfer learning" instead of "mixed learning" given more equal algorithms on such datasets.		9, underrepresentation					
Martin Jr, D., et al. (2020). "Participatory problem formulation for fairer machine learning through community-based system dynamics." <i>arXiv preprint arXiv:2005.07572</i> .	Introduces "Community-based system dynamics" (CBSD) as a way to create a more representative problem formulation (leaves a theory of change), and the build fairer AI. Compares with Obermeyer example of a non-participatory problem formulation.	2020	USA	General healthcare	Discussion			10, 11.	Focus on "problem formulation", could be a new one, could also be 10?		Jean-Francois Trani, Elis Ballaró, Panu Balhoiu, and Peter Hovmand. Community-based system dynamic as an		

Goetz, C. M., et al. (2020). "Perceptions of virtual primary care physicians: A focus group study of medical and data science graduate students." <i>PLoS One</i> 15(12 December).	BACKGROUND: Artificial and virtual technologies in healthcare have advanced rapidly, and healthcare systems have been adopting care accordingly. An intriguing new development is the virtual physician, which can diagnose and treat patients independently. METHODS AND	2020	Italy	Primary care	Qualitative	Interview w med- and engineering students on general thought of virtual primary care (e.g. AI driven)	Generally positive, acknowledges that mainly convenient for young and healthy patients. Insufficient for complex psychosocial needs.	2. Availability better. 4. More fair. 5. Worse for complex patients. 6. Less stigma.			Students emphasise that AI should not become a low-cost alternative to in-person care.	Razzaki S, Baker A, Phary Y, Middleton K, Blawie J, Mullick O, et al. A comparative study of		
Hendrix, N., et al. (2021). "Artificial intelligence in breast cancer screening: primary care provider preferences." <i>Journal of the American Medical Informatics Association</i> (JAMIA) 28(6): 1117-1124.	BACKGROUND: Artificial intelligence (AI) is increasingly being proposed for use in medicine, including breast cancer screening (BCS). Little is known, however, about referring primary care providers' (PCPs') preferences for this technology. METHODS: We identified the most important	2021	USA	Primary care	Quantitative	91 GPs ranked attributes important for breast cancer screening AI, through choosing between made-up products with varying properties.	Sensitivity, transparency and diversity of training data was in order the three most important factors. GPs generally positive about this kind of application.	9. Underrepresentation			GPs generally positive to this, but want radiologists to be accountable and "in the loop" for their own acceptability.			
McCartney, M. (2017). "General practice can't just exclude sick people" <i>BMJ British Medical Journal</i> 359.		2017	UK	Primary care	Discussion	Reg Babylon Health and "GP at hand"	AI is being used to reap easy money for easy patients, whilst difficult patients are being left behind (or have less money left)	1. Digital divide 5. Worse for complex patients.			System-wide effects of switching resources to easy, young, IT-literate patients.			
McCadden, M. D., et al. (2020). "Patient safety and quality improvement: Ethical principles for a regulatory approach to bias in healthcare machine learning." <i>Journal of the American Medical Informatics Association</i> 27(12): 2024-2027.	Accumulating evidence demonstrates the impact of bias that reflects social inequality on a performance approach to bias in healthcare machine learning. Learning (ML) models in health care. Given their potential placement within healthcare decision making more broadly, ML tools require attention to	2020	USA	General Healthcare	Discussion	Recommendations for evaluation of AI systems, ethics	Need to record protected characteristics when developing products to be able to analyze for auditing of product reliability for target audience, systemic effects, ongoing monitoring to reduce risk of worsening bias loops.	9. Underrepresentation. 10. Hidden bias.			Risk of bias in AI to be worse than human bias as it may be perceived as "objective" and thus uncritically acted upon.	Chen H, Oakland-Rayner L, Scahill M, Dunmore L, Carron G, Kik C. Hidden disparities in general medical and mental health		
Morley, J., et al. (2020). "The ethics of AI in health care: A mapping review." <i>Soc Sci Med</i> 200: 113172.	This article presents a mapping review of the literature concerning the ethics of artificial intelligence (AI) in health care. The goal of this review is to summarise current debates and identify open questions for future research. Five literature databases were searched to support the following	2020	UK	General Healthcare	Review, narrative	Listing ethical concerns with AI in health care. Explicitly focused on issues relating to AI. A comprehensive review of 156 papers on AI in healthcare ethics.	Dividing ethical issues by "epistemic", "normative", and "overarching" and by level (individual, interpersonal, group society etc.). Acting on AI for a patient included gaining knowledge (ie telling them), awareness/reflection and action, all which potentially pose	7. AI may push responsibility from PCPs patients, putting the blame for poor outcomes on the patients "poor usage".			Not only is the algorithm opaque, the whole chain of actors and event behind and AI decision is very complex.			
Li, M. C., et al. (2020). "Perceptions of artificial intelligence in healthcare: findings from a qualitative survey study among actors in France." <i>Journal of Translational Medicine</i> 18(1): 1-13.	Artificial intelligence (AI), with its seemingly limitless power, holds the promise to truly revolutionize patient healthcare. However, the discourse carried out in public does not always correspond with the actual impact. Thus, we aimed to obtain both an overview of how	2020	France	General Healthcare	Qualitative	Interviewed various stakeholders (not including patients) on how AI will affect healthcare and the doctor-patient relation.	Most doctors were sceptical about how much AI would impact practice. Does not elaborate on individual doctor relationship. Concerns about accountability.							
Miller, S., et al. (2020). "Perceptive utilization and perception of an artificial intelligence-based symptom assessment and advice technology in a British primary care waiting room: Exploratory pilot study." <i>BMJ Human Factors</i> 7(3).	BACKGROUND: When someone needs to know whether and when to seek medical attention, there are a range of options to consider. AI will have consequences for the individual (primarily considering time, convenience, usefulness, and opportunity costs) and for the wider health system	2020	UK	Primary care	Qualitative	123 patients chose to participate in a trial of Ada, a triage bot. Answered survey afterwards.	83% of patients claimed the app reduced their GP visits. The vast majority of participating patients was under 50, and younger patients also found it more beneficial and more likely to change their decision on care level. (32% of under 24, 0% of over 70).	The article does not discuss equity in such, but clearly touches on 1 and 5. Digital divide and risks for unequal benefits to easy patients. This also connects to system-wide effects i.e. resource drain.			Patients were generally very positive, mainly relating to accessibility. "Although speculative, the fact that older people found the app just as easy to use but reported less engagement might suggest that the issue is not one of usability or familiarity with technology.	"It also became clear that patients often misperceived. We worked with our product team to address this issue, and Ada is now able to recognize and automatically correct a wide range of inaccurately spent terms."	S. Torstein I, Patients find GP online services cumbersome. <i>BMJ</i> 2019 Jul 22;366(14800).	
Murphy, K., et al. (2021). "Artificial intelligence for good health: a scoping review of the ethics literature." <i>BMC Medical Ethics</i> 22(1).	BACKGROUND: Artificial intelligence (AI) has been described as the "fourth industrial revolution" with transformative and global implications, including in healthcare, public health, and global health. AI approaches hold promise for improving health systems worldwide, as well as	2021	Canada	General Healthcare	Review, narrative	Four ethical themes: Accountability, trust, bias and privacy.	Noted asymmetry in previous research with focus on clinical practice and less on public health and society-wide effects.	9, 10. Bias and underrepresentation. 7. AI may increase inequalities due to commonly pushing self-management						
Sierburg, J. A. and J. Yam (2021). "Is There an App for That? Ethical Issues in the Digital Mental Health Response to COVID-19." <i>AOB Neurosci</i> 1: 4.	Well before COVID-19, there was growing excitement about the potential of digital mental health technologies such as tele health, smartphone apps, AI chatbots to revolutionize mental healthcare. As the SARS-CoV-2 virus spread across the globe, clinicians warned of the mental	2021	Canada	Psychiatry	Review, narrative	Discussing the opportunities for AI in psychiatry and the risk of inequalities. Potential benefits/low risk of inequality high!	Many digital and AI tools suggested as useful for CDS response in mental health are likely inefficient. Resources should instead be put on fixing existing inequalities with evidence-based methods. Only 2 of 73 apps on Google Play had evidence of efficacy.	1. Digital divide. 2. Increased underrepresentation. 5. Skewed datasets high SES. Also risks pushing SDH interventions aside.						
Obermeyer, Z., et al. (2019). "Dissecting racial bias in an algorithm used to manage the health of populations." <i>Science</i> 366(6404): 447-453.	"Dissecting racial bias in an algorithm used to manage the health of populations." <i>Science</i> 366(6404): 447-453.	2019	USA	General Healthcare	Quantitative	Comparison of biomarkers for mobility (HRAC and crosswalk) and recommendations by an AI to offer them extra care on their health insurance, by race.	Black Americans needed to be significantly more ill to be recommended "premium formulation" of using costs as a proxy for need. In a society where Black communities spend less money on care for all kinds of reasons (access, cost etc)	10, 11.			The importance of involving target communities along the whole development process to avoid faulty problem formulations.			
Razzaki, S., et al. (2018). "A comparative study of artificial intelligence and human doctors for the purpose of triage and diagnosis." <i>arXiv preprint arXiv:1808.10696</i> .		2018	UK	Primary care	Quantitative	Comparison of Babylon Triage with four GPs for triaging patients to A&E, GP, nurse, home.	Babylon slightly surpasses GPs "safety" (i.e. sensitivity) and slightly underperforms in "appropriateness" (specificity), is around 90/80 percent correct respectively. Notably no mention of equality or risk of bias.							
Romero-Brufau, S., et al. (2020). "A lesson in implementation: A pre-post study of providers' experience with artificial intelligence-based clinical decision support." <i>Int J Med Inform</i> 137: 104072.	BACKGROUND: To explore attitudes about artificial intelligence (AI) among staff who utilized AI based clinical decision support (CDS). METHODS: A survey was designed to assess staff attitudes about AI-based CDS tools. The survey was anonymously and voluntarily	2020	USA	Primary care	Qualitative	Qual study of primary care staff before and after an AI decision support tool for diabetes management. Focus on implementation. Survey before and after for different parts of the consultation.	Users were not satisfied. Reasons cited that clinicians wanted to see why something was recommended, explainable, otherwise not trustworthy.	5. (sort of): AI not able to work with SDH and psych as not as quantifiable.			AI in this form poorly suited to work with SDH and individual factors such as unemployment etc.	Poor acceptance as doctors found it obvious that it did not take SDH into account. Need to be clear what the AI can and cannot do, so it can complement doctors instead of replacing/repeating.		
(2018). Artificial Intelligence in Healthcare, Academy of Royal Medical Colleges.	The contents represent a series of one-to-one interviews conducted over the spring and summer of 2018 and two focus groups held in July 2018. Most quotes are attributed where practical while some other quotes have been aggregated to provide a more general view. Dr Farzana Rahman	2018	UK	General Healthcare	Report	Commissioned by NHS Digital, report on various aspects of AI in healthcare. Very comprehensive.	Holistic and human care hard to replicate, health promotion may suffer. Discussion bias. Also is it publicly acceptable to stratify patients by ethnicity, postcode, socioeconomic etc. It may improve healthcare. AI could enable doctors to be more human and do more of what they	1, 2, 5. Loneliness and social needs unlikely to be dealt with well by AI (but are they dealt with at all that will right now) 9, 10, 11			Risk that the healthcare system becomes overwhelmed by the "worried well" due to these using AI systems excessively and interpreting it wrongly (e.g. Babylon)	Some degree of delusion likely long term. Would the role of the doctor as trustworthy and "ringed" change if everyone can have an AI in their pocket? Who would they trust the most?	Risk that the healthcare system becomes overwhelmed by the "worried well" due to these using AI systems excessively and interpreting it wrongly (e.g. Babylon). A risk that AI is used where the actual health gains are the least, e.g. Babylon etc. A risk of undermining what happens if an AI detects self-harm when there is none overlooking it? It is still better than not having a doctor? And again, risk of using AI to replace real services in rural/underserved communities, worsening care.	
Fisk, A., et al. (2019). "Your robot therapist will see you now: Ethical implications of embodied artificial intelligence in psychiatry, psychology, and psychotherapy." <i>Journal of Medical Internet Research</i> 21(6).	BACKGROUND: Resources in embodied artificial intelligence (AI) has increasing clinical relevance for therapeutic applications in mental health services. With innovations ranging from "virtual psychotherapist" to social robots in dementia care and autism disorder, to robots for	2019	Canada	Psychiatry	Review, narrative	Impacts of AI on psychiatry, short to long term.	AI should not be used to replace human care, but to complement. AI needs transparency and needs to be aware of biases.	1, 2. Digital divide but more available care. 5. Dehumanization possible. Likely to stoke low SES hatred. 6. Dehumanization may be beneficial in case of stigma.			Risk of using AI as an excuse to reduce care provision (why?). Long term risk of general societal dehumanization and worsened inequalities/less empathy.			
Powell, J. (2019). "Trust Me, I'm a Chatbot: How Artificial Intelligence in Health Care Falls the Turing Test." <i>J Med Internet Res</i> 21(10): e18222.	Over the past decade, one issue which will dominate sociotechnical studies in health informatics is the extent to which the promise of artificial intelligence in health care will be realized, along with the social and ethical issues which accompany it. A useful thought experiment is	2019	UK	General healthcare	Discussion	Chatbots can't and shouldn't pass the Turing test: They need to complement rather than replace doctors.	Identifying the complementary positioning of AI tools in health care in general, and in particular for their use in the medical consultation, is a key challenge for the future. We need to understand how to integrate the precision and power of AI tools and practices with the wisdom				The patient-doctor relationship and the human contact is central in healthcare, and AI needs to complement rather than replace, consultation. A key challenge for the future. We need to understand how to integrate the precision and power of AI tools and practices with the wisdom			
Josh, I. and J. Morley (2019). Artificial intelligence: How to get it right. Putting policy into practice for safe data-driven innovation in health and care. <i>NICE</i> .		2019	UK	General healthcare	Report	Summary of current (2019) state of AI in healthcare. Good numbers on active companies and products in the pipeline. Focus on regulatory frameworks.	Numerous points, mainly on how regulatory frameworks can foster more AI tech in healthcare. Some points about implementation (see the right).	9,10,11 Bias briefly mentioned.			Build "sandboxes" and pilot schemes to evaluate AI systems, including for "biases". No details. Model impact on the whole clinical workflow.			

Matheny, M., et al. (2019). "Artificial intelligence in health care: the hope, the hype, the promise, the peril." NAM Special Publication. Washington, DC: National Academy of Medicine: 154.		2019	USA	General healthcare	Report	National academy of medicine report outlining successful implementation of AI in medicine.	Augmentation rather than replacement. Clear use case for AI imperative for each application. Consumer facing health technologies have often worsened inequalities.	9, 10, 11.		Consumer facing health care services tends to widen inequalities?		Equity and SDH needs to be at the centre of implementation and development. Risk of damaging public trust if unequal.			
Ronquillo, C. E., et al. (2021). "Artificial intelligence in nursing: Priorities and opportunities from an international invitational think-tank on nursing and artificial intelligence (AI). METHODS: We established the Nursing and Artificial Intelligence Leadership Collaborative." J Adv Nurs 77(9): 3707-3717.		2021	UK	General healthcare	Qualitative	Summary of discussions at a nursing think-tank on AI and nursing.	Outlines priorities for how to successfully integrate AI in nursing. 1. Understanding of AI and the importance of good data, including data collected by nurses. 2. Curriculum needs to be complemented by AI teaching. 3. Nurses must be involved in the creation and implementation of					Risk that quantity of care takes over quality of care in nursing of nurses aren't properly involved.			
Organization, W. H. (2021). "Ethics and governance of artificial intelligence for health: WHO guidance."		2021	Switzerland	General Healthcare	Report	Big important piece on successful use of AI in healthcare.	AI will not replace clinicians, but can improve their decisions and provide covering and evaluation tasks in under-resources settings.	1, 2, 3, 5, 9, 10, 11				Risk that AI is seen as panacea for health problems and diverts resources away from public health and SDH.			
Whittlestone, J., et al. (2019). "Ethical and societal implications of algorithms, data, and artificial intelligence: a roadmap for research." London: Nuffield Foundation.		2019	UK	General	Report	Directions for research on ethical implications of AI, with recommendations and identified gaps. Comprehensive!	Highlights the incoherence in the use of "bias", "fairness". Also that a biased system may still be more fair than the human decisions it replaces. Simply stating that a system should be fair is not meaningful.	9, 10, 11. Bias and the meaning of bias.				Public involvement key to clarify the concepts and preferences regarding fairness.			
Samorani, M. and L. G. Blount (2020). "Machine Learning and Medical Appointment Scheduling: Creating and Repeating Inequalities in Access to Health Care." Am J Public Health 110(4): 440-441.		2020	USA	Primary care	Discussion	Discusses how AI may make access worse for low SES.	AI that books in patients for doctors to see is overbooking more black than white people, and are statistically more likely to not show up.	10, 11. See original article in references!				1. Samorani M, Harris S, Blount LG, Lu S, Santoro MA. Overlooked and overlooked: machine			
Samorani, M., et al. (2021). "Overbooked and overlooked: Machine learning and racial bias in medical appointment scheduling." Manufacturing & Service Operations Management.		2021	USA	Primary care	Quantitative	Demonstrating racial inequality in over booking systems (Black patients get overbooked more often and thus have to wait longer, as they statistically are more likely not to show up)	Develops a race-aware model, which optimises waiting time first and foremost for the racial group who waits the longest. This removes the racial divide. My own thoughts: Is this fairness? Is this equity rather than equality? It clearly is transformative rather than transparent.	10, 11.							
World Health Organisation (2021). "Global strategy on digital health 2020-2025"		2021	Switzerland	General healthcare	Report	Advice to governments on how to successfully implement digital health solutions, including AI and including ethics.	Importance of wholehearted commitment by government and need to complement digital health with education, evaluation.	1, 2, 3, 5, 9, 10, 11				AI and digital health will bring big changes and create opportunities to address SDH - they should be taken. Participatory approach important in development and implementation. Special care needs to be taken for minorities and populations at risk to be left outside the digital revolution.			
Fukuda Parr, S. and E. Gibbons (2021). "Emerging Consensus on 'Ethical AI': Human Rights Critique of Stakeholder Guidelines." Global Policy 12(16): 32-44.		2021	UK	General Healthcare	Review, narrative	15 ethical guidelines for AI (in general reviewed)	On terms of equality, strong focus on bias.	10. Bias		Risk of availability bias due to cost. More relevant to private healthcare settings?		Critiquing the vagueness of guidelines on implementation, calling for a Human-Rights based approach for equality, participation, accountability.	WHO. (2019) Draft Global Strategy on Digital Health 2020-2024. Geneva: WHO.		
Gottlieb, K. and G. Peterson (2020). "Limited evidence of benefits of patient operated intelligent primary care triage tools: Findings of a literature review." BMJ Health and Care Informatics 27(1).		2020	Sweden	Primary care	Review, narrative	Review of studies on implementation and performance of primary care AI triage systems	Poor evidence base, and generally inconclusive. Needs better evaluation!					Risk of higher workload and unforeseen consequences from AI triage due to lack of good research.			
Straw, I. (2020). "The automation of bias in medical Artificial Intelligence (AI): Decoding the past to create a better future." Arnt Intel Med 110: 101965.		2020	USA	General healthcare	Discussion	Medicine is a disciplinary crossroads. With the rapid integration of Artificial Intelligence (AI) into the healthcare field the future care of our patients will depend on the decisions we make now. Demographic healthcare inequalities continue to persist worldwide and the impact of	The shift to AI is a paradigm shift that gives opportunity to address healthcare inequalities, if done right. "we do not have datasets that truly reflect rates of disease, instead we have datasets that are representative of diagnoses and the few do not always sing". We must first question the "quality of the AI."	9, 10, 11. Focuses on algorithmic bias.					ACM Policy Council. Statement on algorithmic transparency and accountability 2021. https://www.		
Marcus, J. L., et al. (2020). "Artificial intelligence and Machine Learning for HIV Prevention: Emerging Approaches to Finding the Epidemic." Curr HIV/AIDS Rep 17(3): 171-178.		2020	USA	General Healthcare, HIV	Review, narrative	PURPOSE OF REVIEW: We review applications of artificial intelligence (AI), including machine learning (ML), in the field of HIV prevention. RECENT FINDINGS: ML approaches have been used to identify potential candidates for preexposure prophylaxis (PrEP) in healthcare	From an equity point-of-view AI was in one study found to identify a high proportion of black patients as high-risk for HIV (28%), whilst only 4% of PrEP users were black. This could either be due to pre-underestimation, discrimination or overestimation by the AI.	3. Distrust among minorities (MSM) 6. (sort of), being able to detect patients who would not otherwise come. 9, 10, 11 (same: patients who were pre missed)				Given the importance of trust, participatory approaches to implementations is important.			
Straw, I. and C. Callison-Burch (2020). "Artificial intelligence in mental health and the issues of language-based models." PLoS One 15(12): e0240376.		2020	USA	Psychiatry	Quantitative	BACKGROUND: The rapid integration of Artificial Intelligence (AI) into the healthcare field has occurred with little communication between computer scientists and doctors. The impact of AI on health outcomes and inequalities calls for health professionals and data	Need to do these analysis and assess if the results are correct or a consequence of societal data based bias.	10, 11: Biases and how to visualise them.							
The Lancet Digital, H. (2019). "There is no such thing as race in health-care algorithms." The Lancet Digital Health 1(8): e375.		2019	UK	General healthcare	Discussion/comment	Importance of system-wide perspective of inequalities.	Refers to Obermeyer reg underlying biases	9, 10, 11				"need to consider the effect on groups and systems" in a wider cultural context. No further info.			
Straw, I. (2021). "Ethical implications of emotion mining in medicine." Health Policy and Technology 2(1): 151-155.		2021	USA	Psychiatry	Review, narrative	Specifically discusses emotion mining or sentiment analysis using AI e.g. extracting emotion values from big data on patients (both physiological, social, movement etc).	Focuses on algorithmic bias and the importance of looking at false positive/negative (specificity and sensitivity) by ethnic and social group. Important to "Mainstream" an understanding of algorithmic bias and fairness in stakeholders (but does not define beyond the above accuracy).	9, 10, 11. Focuses on algorithmic bias.				Emphasises importance of educating operators/clinical stakeholders throughout the chain of fairness and algorithmic bias (although does not specify).			
Diabni, V., et al. (2021). "Enabling patient and public involvement in the transition to AI-assisted mental health care: A systematic scoping review and agenda for design justice." Health Expect 24(4): 1072-1124.		2021	UK	Psychiatry	Review, narrative	PPI in AI research for mental health, a review of methods and issues to be resolved.	Highlights the need of various forms of PPI to ensure inclusion of population bias, social issues and acceptability in the AI systems.	1, 2, 3, 9, 10.		Need to anchor AI in wider cultural settings for acceptability. Related to theme 3.		Focus on PPI as a way of countering the power imbalance in designing and implementing mental health AI.			
Trocin, C., et al. (2021). "Responsible AI for Digital Health: A Synthesis and a Research Agenda." Information Systems Frontiers.		2021	Norway	General healthcare	Review, narrative and quantitative	Looking at research in ethical AI, and clustering studies by theme, statistically. Interesting methodology. Not directly applicable to my review!	Under "unfair outcomes", focus was on bias and the review highlighted a need to develop methods to measure and mitigate fairness.	9, 10, 11.							

Pham, G., et al. (2021). "The need for ethnoracial equity in artificial intelligence for diabetes management: Review and recommendations." <i>Journal of Medical Internet Research</i> 23(2).	There is clear evidence to suggest that diabetes does not affect all populations equally. Among adults living with diabetes, those from ethnoracial minority communities foreign-born, immigrant, refugee, and culturally marginalized are at increased risk of poor health outcomes. Artificial	2021	Canada	Diabetes	Review, quantitative	118 studies of which 10 reported ethnicity. 10 studies on diabetes management AI, analysis of share of various ethnicities in training data.	Ethnicity rarely reported. When reported, majority white (but smaller share than population in Canada) and no on indigenous people. Gives advice on checking a AI: 1. does the underlying information describe variations in prevalence by ethnicity. 2 + 4. Does the research describe	9. Underrepresentation in diabetes studies/AI. Sometimes poor ways of correcting bias. http://paperkit.com/b/MU3QDF/CN3U											
Khan, S. M., et al. (2021). "A global review of publicly available datasets for ophthalmological imaging: barriers to access, usability, and generalizability." <i>Lancet Digit Health</i> 3(1): e51-e66.	Health data that are publicly available are valuable resources for digital health research. Several public datasets containing ophthalmological imaging have been frequently used in machine learning research; however, the total number of datasets containing ophthalmological	2021	UK	Ophthalmology	Systematic review, quantitative	Oversight of all publicly available retinal photo databases, which is what is used to train AI.	Poor reporting on ethnicity, age, gender in most databases, creating likely bias problems. Also other issues with underrepresentation of some illnesses and poor accessibility to databases.	9											
Ulv, W. and I. A. Kakadiaris (2020). "Primary Care Artificial Intelligence: A Branch Hiding in Plain Sight." <i>Ann Fam Med</i> 18(3): 194-195.		2020	USA	Primary care	Discussion		The 7th challenge is the missing ability of AI to create a bond with the patient.	3. Distrust. 6. AI cannot connect emotionally with patients.											Yes
Howard, A. and J. Bornstein (2018). "The Ugly Truth About Ourselves and Our Robot Creations: The Problem of Bias and Social Inequity." <i>Sci Eng Ethics</i> 24(5): 1521-1536.	Recently, there has been an upsurge of attention focused on bias and its impact on specialized artificial intelligence (AI) applications. Allegations of racism and sexism have permeated the conversation as stories surface about search engines delivering job postings for well-paying	2018	USA	General society	Discussion		The difficulty of reducing biases.	3. Distrust. 6. AI cannot connect emotionally with patients. 11. mitigate previous bias	No										Yes
Urbil, F., et al. (2021). "Diagnosing Diabetic Retinopathy With Artificial Intelligence: What Information Should be Included to Ensure Ethical Informed Consent?" <i>Front Med (Lausanne)</i> 8: 655217.	Purpose: The method of diagnosing diabetic retinopathy (DR) through artificial intelligence (AI) based systems has been commercially available since 2018. This introduces new ethical challenges with regard to obtaining informed consent from patients. The purpose of this work	2021	USA	Ophthalmology, Primary care	Review, qualitative	Discuss both ethical and practical issues with ophthalmology AI in primary care.		2, 9. No elaboration											Yes
Vayena, E., et al. (2018). "Machine learning in medicine: Addressing ethical challenges." <i>PLoS Med</i> 15(11): e1002689.	Ely Vayena and colleagues argue that machine learning in medicine must offer data protection, algorithmic transparency, and accountability to earn the trust of patients and clinicians.	2018	Switzerland	General Healthcare	Discussion	Main ethical issues, short discussion piece.		9, 10											Yes
Williams, C. (2020). "A Health Rights Impact Assessment Guide for Artificial Intelligence Projects." <i>Health Hum Rights</i> 22(2): 55-62.	Artificial intelligence (AI) is being hailed by various actors, including United Nations agencies, as having the potential to alleviate poverty, reduce inequalities, and help attain the Sustainable Development Goals (SDGs). Many AI projects are promoted as making important contributions to	2020	UK	General Healthcare	Framework	This perspective argues that the way to mitigate these risks is to conduct a health rights impact assessment prior to their implementation. It introduces a tool that enables a systematic process of health rights assessment to take place.													Yes