Change in outlook in Healthcare through Technology and Patient-Centeredness

L. Sarah[1], C. Leonard[2]
Department of Psychology, DePaul University, Chicago, Illinois, USA[1, 2.]

Abstract— In the midst of the foundation of various difficulties going up against the social insurance division, (for example, increasing costs, incessant sickness upsurge and issues identified with patient wellbeing), this story audit plans to reveal insight into the open doors given by patient-focused consideration and innovation use as a way to improve and reshape the medicinal services part. The development of innovation use in social insurance from telemedicine to the present time of associated wellbeing is featured and talked about as a relevant rising model to reinforce the patient-focused consideration and connection the parts of the medicinal services division. Different patterns in the innovation field which maintain the fundamentals of patient-focused consideration are additionally delineated. Finally, a portion of the basic perspectives about digitalization of wellbeing that have obstructed the across the board appropriation have been contacted.

Keywords— Diagram, Digital wellbeing, Connected wellbeing, Healthcare conveyance.

1. Introduction

The social insurance segment in the advanced period, in spite of seeing various achievements in the field of prescription and pharmacology together with an astounding human services use which in the United States alone has extended to $3.2 trillion out of 2015 [1], mirrors a horrid situation since moderate, open and quality medicinal services to each section of the populace keeps on residual an inaccessible dream which is accelerated by the overall absence of exceptionally talented human services experts [2]. Moreover, modernization of way of life and a quickly maturing populace have set the conditions ready for a plenty of incessant infections, for example, cardiovascular sicknesses,

diabetes, and hypertension which require long haul consistent treatment and the executives prompting a generous financial weight on the medicinal services framework just as representing 70% of passings all around [3,4]. To exacerbate the situation, transferable maladies, for example, lower respiratory contaminations, diarrheal infections, and tuberculosis keep on frequenting worldwide wellbeing by including among the main ten reasons for death in 2015 and along these lines lead to a twofold weight of illness [5]. Moreover, quiet wellbeing has turned into a consuming issue, with the World Health Organization (WHO) evaluating that 1 out of 10 patients are hurt while getting emergency clinic care in created nations because of preventable medicinal mistakes [6,7]. Additionally, anti-infection opposition has surprised the restorative world attributable to the abuse and abuse of anti-infection agents and it is anticipated that in the US about 23,000 passings happen every year because of bacterial contaminations which are impervious to anti-microbials and henceforth place an impressive burden on the medicinal services division [8,9]. In conclusion, the "storehouse" mentality uncontrolled in the human services area is a reason for worry since it prompts divided and awkward procedures of consideration subsequently hampering the quality, proficiency, and security of the consideration conveyed [10,11].

2. Open doors for Improvement in Healthcare

2.1 Understanding focused consideration

Against this aggravating foundation, there have been some consoling prospects which have given chances to the medicinal services area to make changes. Right off the bat, even with the bunch of difficulties standing up to the social insurance area, in a much-broadcasted milestone report, the Institute of Medicine proposed a methodology for development and "intersection the quality gorge" by sketching out six goes for human services to be sheltered, viable, tolerant focused, auspicious, proficient and impartial [12]. Among the rules that had been proposed, the one that earned most consideration was the go for social insurance to be "understanding focused by giving consideration that is deferential of and receptive to singular patient inclinations, needs and values and guaranteeing that patient qualities direct all clinical choices" [12]. Eight elements of patient-focused consideration as sketched out by the Picker Institute include: 1) Respect for patients' qualities, inclinations and communicated need; 2) Coordination and combination of consideration; 3) Information, correspondence and instruction; 4) Physical solace; 5) Emotional help and lightening of dread and nervousness; 6) Involvement of family and companions; 7) Transition and coherence 8) Access to mind [13]. Likewise, the WHO pushed individuals focused consideration as an expansive term to incorporate patients at each degree of the wellbeing frameworks and characterized it as "care that is engaged and composed around the wellbeing needs and desires for individuals and networks instead of on maladies" [14,15].

Therefore, by bringing persistent focused human services to the front line, the patient is never again a uninvolved beneficiary of medicinal services administrations and the ideas of patient commitment and strengthening have made progress since they encourage the job of patients to proactively take an interest in self-care rehearses particularly in this time of incessant infection upsurge [16,17].

As of late, investigate has given convincing help for patient anti-extremism since it has been demonstrated that executing patient focused consideration is connected to more noteworthy consistence by the patients, better recuperation and wellbeing results and declined readmission rates [18]. For example, a methodical survey on the advantages of patient-focused consideration among patients with interminable heart disappointment uncovered an expansion in their personal satisfaction, just as a lift in their physical and mental status [19]. Viable correspondence between the specialist and patient by producing a superior relational relationship, data trade and including patients in basic leadership have been appeared to improve persistent fulfillment which is valuable for specialists since it prompts more noteworthy occupation fulfillment and diminished burnout [20]. Various fiscal advantages have likewise been credited to quiet anti-extremism, for example, diminished medical clinic remain, lower cost per case, decreased working expenses and misbehavior guarantees, all of which add to improving the nature of the social insurance conveyed [21]. Obviously, a success win circumstance at each degree of human services has developed because of this change in perspective in social insurance conveyance.

2.2 Innovation use

The other light emission lies in the data innovation field, whose age making creation and advancement have been at the vanguard of human advancement, in ongoing history. Today, innovative progressions have made computerized apparatuses generally available and convenient to the majority with roughly 46% of the total populace approaching the web in 2016 [22] and about 7.683 billion individuals having portable cell memberships in 2017 [23]. Inferable from this availability to the computerized world, individuals have

now turned out to be acquainted with an unfathomable circle of data, easy correspondence, and unlimited open doors by actually a tick of the finger.

Outfitting upon this monstrous infiltration, technology has been conveyed in human services which was advocated by the Institute of Medicine as a crucial way to air conditioning accomplish the previously mentioned six intends to improve quality in social insurance [12] and has demonstrated convincing potential in relieving the issues looked by the health awareness division by empowering available, proficient and improved wellbeing results [24]. Moreover, the WHO additionally resonated with the basic job of innovation in realizing the 2030 Sustainable Development Goals identified with wellbeing [25]. All the more especially, the utilization of innovation in human services maintains the fundamentals of patient-focused consideration by directing new ways to deal with advance patient engagement and improve the correspondence between the patient and the social insurance experts and consequently upgraded consideration [26].

3. Outline of Technology Application in Health-care and its Evolution

A look into the advancement of innovation use in social insurance displays a dynamic and intriguing succession of occasions that prompted the computerized wellbeing period as we probably am aware it, keeping in view the advancement in innovation has been exceedingly quick paced and is progressively situating towards patient-driven standards. During the 1960s, combined with the headways made in data and correspondence innovation (ICT) and the critical need to make social insurance open in remote districts, prepared for mechanical application in the human services field and the introduction of Telemedicine which truly signifies "mending at a separation" [27] and as indicated by the Institute of Medicine, it is characterized as "the utilization of electronic data and interchanges advancements to give and bolster social insurance when separation isolates the members" [28].

Before long, it was perceived that the methodology towards the remote arrangement of human services expected to envelop a progressively far reaching viewpoint by joining non-doctor related consideration, for example, nursing and drug store and components of general wellbeing, for example, wellbeing training and wellbeing advancement to enable the patients for self-care. This more extensive extent of telemedicine was instituted as Telehealth [29,30]. The turn of the century saw a gigantic upsurge of the web and each area including healthcare got onto to profit by the new open doors that presently lay before them. This prompted the ascent of Elec-tronic Health (eHealth) which is characterized as "a rising field in the crossing point of medicinal informatics, general wellbeing, and business, alluding to wellbeing administrations and in-development conveyed or improved through the Internet and related advancements. In a more extensive sense, the term describes a specialized advancement, yet in addition a perspective, a perspective, a frame of mind, and a dedication for organized, worldwide speculation, to improve social insurance locally, territorially, and worldwide by utilizing data and correspondence innovation" [31].

In any case, what might be viewed as a distinct advantage was the expansion of cell phones under the control of a typical man. Underwriting upon this openness to innovation, the medicinal services area found better approaches to address the social insurance difficulties confronting them, envoy ing the ascent of portable wellbeing (mHealth) which is a sub-set of eHealth and gives therapeutic and general wellbeing administrations and data by means of versatile advancements, for example, cell phones and individual computerized colleagues (PDAs) [32]. mHealth offers a method for medicinal services calling als to keep their patients refreshed by means of updates, alarms and wellbeing related data [33]. Various investigations

have concentrated on the job of versatile SMS as a method for affecting conduct change, self-adequacy and improving information in territories, for example, sexual and regenerative wellbeing [34].

With the happening to the Internet of Things (IoT) into the innovation situation, it wound up conceivable to make a system between various gadgets through software's, sensors and system availability consequently empowering a trade of information between them [35]. This moved the ascent of Digital Health which is characterized as "an improvement in the manner in which human services arrangement is considered and conveyed by social insurance suppliers using data and correspondence advances to screen and improve the prosperity and soundness of patients and to enable patients in the administration of their wellbeing and that of their families" [36] and incorporates classifications, for example, mHealth, wellbeing data innovation (IT), wearable gadgets, telehealth and telemedicine, and customized prescription [37].

As of late, with the acknowledgment of bringing tolerant driven estimations of patient commitment and strengthening to the cutting edge, selection of the most recent innovation in medicinal services and perceiving the need to avert the hazards of a dismantled human services part, another sociotechnical idea of "Associated Health" appeared with the expect to make wellbeing and health administrations protected, viable and effective and subsequently improving the personal satisfaction and bringing down the expenses [38]. Associated Health, an all-encompassing model that incorporates all parts of innovation use in social insurance, for example, telemedicine, telehealth, mHealth, and eHealth, mirrors an unmistakable equalization of innovation use for data sharing and connectedness together with proactive consideration and coordinated human services administrations [39]. In addition, it has opened up another vista in human services by carefully interfacing clinicians to clinicians, patients to clinicians and patients to different patients [30].

Thus, as a period of associated wellbeing calls, tricked by an energizing prospect of long haul health of the patient and improved results, conspicuous wellbeing innovation organizations, for example, Philips [40] and Partners Healthcare [41] have propelled their particular Connected Health stages. Furthermore, in the Middle East, RAHAH (Remotely Accessible HealthCare At Home), a novel associated wellbeing model from Saudi Arabia, is good to go to cut a specialty for itself in this consistently advancing environment [42-44].

4. Patterns in the Digital Health Landscape Today

4.1 e-Patients, e-Physicians and shrewd clinics

As per quiet focused consideration, an organization has created between the patient and supplier and a patient is urged to proactively take an interest in ailment the executives just as being occupied with the basic leadership process. In addition, a patient currently progressively depends on the web to look for wellbeing data. Therefore, a patient today is "engaged, connected with, prepared, and empowered" other than being advanced wellbeing insightful prompting the introduction of an e-Patient [45]. Gradually yet without a doubt, innovation is being embraced and actualized by the specialists too. e-Physicians are progressively utilizing from the open doors passed on through cell phones in clinical basic leadership and better consideration coordination through more brilliant booking and association of their errands [46,47]. Emergency clinic offices also are advancing in parallel by using mechanical advancements to improve the consideration and wellbeing of the patient during their stay at the medical clinic, for example, by introducing robotization frameworks in the structure to manage temperature, ventilation, and fixing

brilliant locks. Interconnected clinical data frameworks, for example, Laboratory Information Systems guarantee shrewd patient consideration forms. Also, ID frameworks empower validation and following of patients, staff, and emergency clinic hardware [48].

4.2 Teleconsultation and remote patient observing

The sufficient open doors for viable communica-tion coming about because of mechanical progressions have laid the foundation to empower continuous conferences between wellbeing suppliers and patients isolated by land separation, a procedure known as teleconsulta-tion and hence connecting the correspondence hole between them. An increasingly vigorous type of teleconsultation is remote patient checking (RPM) which conveys the most recent IT apparatuses to give analytic and treatment administrations to the patients situated in remote and rustic regions [49]. For example, Alentejo, an underserved district in Portugal as to satisfactory and available social insurance, effectively started telemedicine and teleconsultation in 1998 as a way to improve human services and is currently a basic piece of administration conveyance there [50]. Besides, an orderly audit featured the plausibility of tele-prescription in the field of dentistry for remote screening, analysis, and counsel [51]. Furthermore, telecon-sultations with the wellbeing supplier have been found to advance patient fulfillment because of improved results, usability, minimal effort, better correspondence and re-duced travel time [52]. Besides, ponders have un-derlined solid help for telemedicine in the part of patient wellbeing since it has been uncovered that utilization of telemedicine for discussion cut down the quantity of medicinal mistakes in the middle of clinical visits, be-sides having an influence in bringing down prescription blunders [53]. As over the top holding up time at the medical clinic keeps on being a squeezing issue looked by patients [54], the effi-ciency of e-meetings to give helpful access to medicinal services experts might be considered.

4.3 Web as the wellspring of wellbeing data

With the entrance to the web achieving a crescendo, roughly eight out of ten Americans utilize the web as a wellspring of wellbeing related data [55]. This has aired out a boundless universe of data for a computerized age tolerant. Online therapeutic reference books, for example, MedlinePlus gives far reaching data with respect to ailments, tests, side effects, and treatment [56]. Help-chasing conduct utilizing on the web data with respect to emotional wellness issues is on the ascent among youthful grown-ups [57].

4.4 Online classes

Online courses, alluded to as "online classes" offer patients a chance to for all intents and purposes go to workshops introduced by medicinal services experts from any area with respect to different points identified with wellbeing and health. This empowers them to acquire data identified with parts of self-care through sound video sustains, slide pictures and enables them to connect with the moderator by asking inquiries [58].

4.5 Wearable sensors

Scaled down, sensor-empowered wearable gadgets have made it conceivable for patients with unending sicknesses, for example, cardiovascular malady [59] and diabetes [60] to screen their fundamental signs, for example, pulse and blood glucose level and in this manner enjoy self-care. It further enables the patient to move the information acquired to a medicinal services proficient utilizing remote innovation. An audit featured the plausibility of wearable gadgets in the advancement of physical action and weight reduction

[61]. Additionally, the information got from the wearable sensors alert the patient and the medicinal services group with respect to unfriendly occasions and prompts auspicious therapeutic activity [62].

4.5 Inside able gadgets

Dissimilar to wearable sensors which for the most part stay in contact with the skin, ingestible sensors measure the inward changes in homeostatic irregularity and offer novel intends to analyze and screen the human body [63]. An ingestible sensor has been endorsed to screen drug consistence among patients with hypertension and heart disappointment [64]. Another tale method of observing is by method for implantable sensors which can be situated underneath the skin and allows the estimation of crucial signs, for instance, Cardio MEMS is an implantable gadget which aides in consistently checking aspiratory vein weight and a randomized clinical preliminary uncovered a decrease in hospitalization of patients with unending heart disappointment by half when their everyday weights were checked [65].

4.6 Versatile applications

Cell phones with inbuilt wellbeing applications give an interesting chance to understanding commitment by promoting, embracing and keeping up solid practices [66]. Starting at 2015, around 165,000 wellbeing related applications are accessible [67] and are extensively named 'health the executives applications' which help with changing practices identified with way of life, diet, wellness and so forth and 'wellbeing condition the executives' applications which encourage managing illness conditions by giving data about the sickness, access to mind and drug updates [68]. Unending conditions including emotional wellness conditions, diabetes, cardiovascular infections, sensory system dis-requests and musculoskeletal conditions are among the most widely recognized conditions concentrated on wellbeing condition the executive's applications [68]. Reassuringly, advanced wellbeing applications have as of late seen a generous development in their proof-based adequacy with upwards of 234 randomized controlled preliminaries and 20 meta-examination studies led [68].

4.7 Electronic Medical Records (EMR)

EMR's which can store wellbeing and medicinal information of a patient in advanced structure have generally pulled in doctors; for example, in Canada, roughly 75% of doctors have moved to EMR use [69]. Other than im-demonstrating the correspondence between the medicinal services group, it conveys them comprehensible and composed information which decreases the danger of restorative blunders [70].

4.8 Wellbeing entries

Gone for spanning the correspondence hole between the patient and suppliers, entries are close to home medicinal services related sites that enable the patients to speak with their human services group through teleconsultations. In addition, they license access to lab test outcomes, plan meetings with the specialists and refill remedies [71,72]. A deliberate survey of the impact of patient entryways reasoned that ten out of twenty-seven investigations revealed beneficial outcomes as far as drug adherence, self-care rehearses, improved patient fulfillment [73]; and useful status [74].

4.9 Enormous information

Because of the digitalization of medicinal and wellbeing records (EMR's) and information created from wearable gadgets, a huge and complex volume of information is being delivered known as Big Data. This monstrous supply of data is presently being put to use by helping clinicians in giving an observational

proof base. Enormous Data has additionally encouraged the chance to convey customized treatment by utilizing investigation in acclimatizing genomics with EMR [75].

4.10 The human genome projects

By a wide margin the most fantastic logical revelation as of late was the disentangling of data in regards to the structure, association and capacity of the human genome embraced by a worldwide research joint effort known as the Human Genome Project [76]. This venture was an exemplification of an association among scientists, and technologists since the examination concerning the genome connected registering innovation broadly and nowadays inferable from further advances in biomedical innovation, an ocean change in the finding and treatment of ailments is foreseen [77].

4.11 Customized and exactness prescription

Because of headways made through the Human Genome Project in understanding an individual's hereditary cosmetics which decides their weakness to specific sicknesses, it is presently conceivable to give custom fitted treatments reasonable to every patient, accordingly making them more secure and viable. Customized medication considers the hereditary cosmetics of people as well as their inclinations, convictions, frames of mind, learning and social setting. Then again, exactness medication uses quiet anti-extremism, commitment, computerized wellbeing application, genomics, sub-atomic advancements and information partaking in medicinal services conveyance [78].

4.12 3D Printing

3D printing alludes to the "testimony of materials, for example, plastic, metal, earthenware production, powders, fluids or living cells in layers to create a 3D object" [79]. It is overhauling social insurance since it is currently conceivable to reproduce body parts, for example, customized prosthetics [79]. Astoundingly, Spanish researchers have effectively propelled a model for a 3D bioprinter that can make a completely useful human skin and can be transplanted to consume exploited people [80].
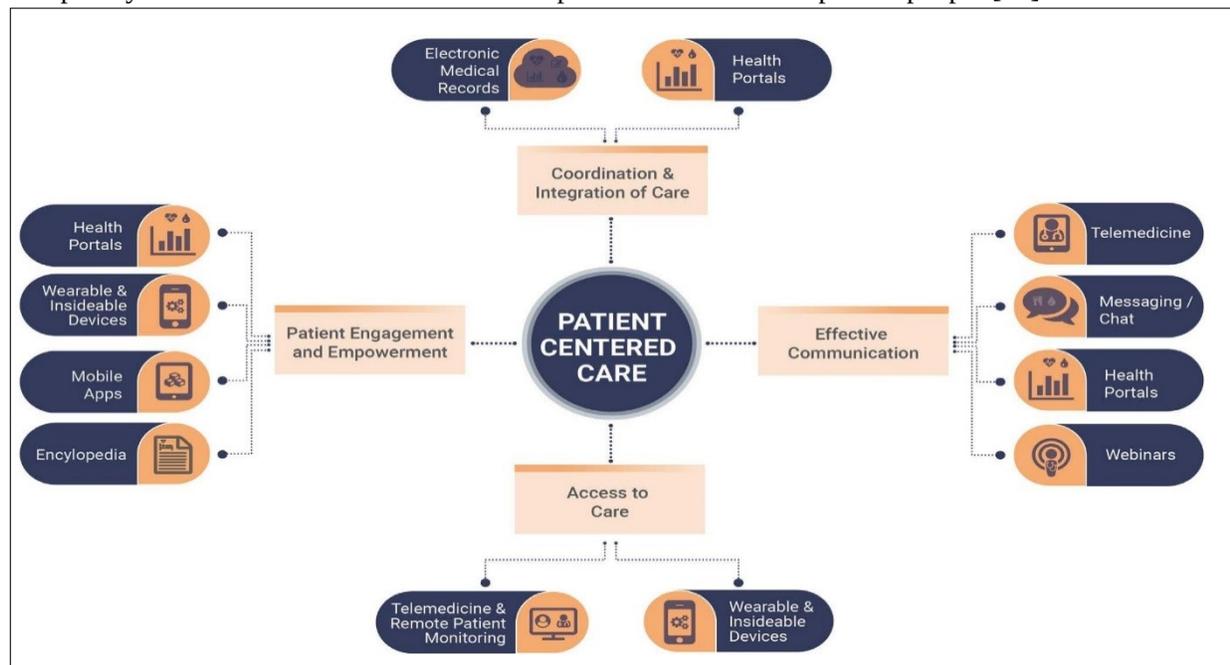
4.13 Artificial reasoning in social insurance

Figure 1: Depiction of health technology tools that enhance patient-centered care.

An energizing measurement to the digitalization of medicinal services is the improvement of keen machines which display intellectual activities closely resembling individuals and are fit for leading ongoing examination utilizing calculations [81]. For example, IBM Watson enables clinicians to settle on choices by utilizing normal language capacities, speculation age, and proof-based learning. This is especially valuable given the flood in Big Data and will help with unearthing data and help the specialists in making snappier and exact determination [82]. The potential job a fake discussion specialist or Chatbot which uses discourse or literary techniques to lead a discussion is being investigated in human services to give help to conduct change in diabetes and corpulence the executives [83]. Furthermore, Babylon Health is a conversational wellbeing specialist co-op which uses man-made reasoning to have interviews with specialists [84].

5. Critical Views on Digitalization of Healthcare

Notwithstanding the proof supporting the execution of computerized apparatuses as completely referenced above, it merits investigating a portion of the basic perspectives in connection to the digitalization of the human services segment. There is concern with respect to the protection and classification of the patient's electronic therapeutic records and framework interoperability [85]. Correspondingly, it has been delineated that EMR use has increased the remaining burden of the doctors which could prompt occurrences of medicinal blunders [86]. Unexpectedly, where advanced wellbeing professes to advance more noteworthy patient-supplier cooperation, it is contended that the nearness of a PC between the two gatherings may demonstrate to have a turnaround impact [87]. In addition, standard power outages and loss of web availability is a frequently experienced obstruction to the usage of computerized wellbeing, particularly in creating nations [88]. Another reason to get excited is the sea of wellbeing data accessible on the web and how any inconsistent data can prompt unfriendly wellbeing impacts [89]. Also, in spite of a progressive ascent in the collection of proof encompassing computerized wellbeing instruments, there remains scope for all the more particularly the proof that can control the scale-up of mHealth [90] in like manner, the guidelines that manage innovation use in human services have not kept pace with the quick headways made in the innovation field [91].

6. Conclusion

Without a doubt, the street to accomplishing quality, fair, available and moderate medicinal services for all segments of the populaces is laid with various obstacles, all things being equal, not all is lost. The change in outlook in human services conveyance towards patient-focused consideration has rebuilt the elements of the connection between the patient and the supplier and is enabling patients to assume a vivacious job in protecting their own wellbeing. Moreover, as the data and correspondence innovation segment delights in a few bleeding edge developments with devices like cell phones and tablets ending up progressively accessible to regular man and giving an imaginative way to maintain quiet driven qualities, it ended up basic for the wellbeing part to misuse the advantages of this asset prompting the digitalization of the wellbeing division and driving the energy towards improving wellbeing and prosperity of the general population. Regardless the analysis encompassing the utilization of innovation in medicinal services, the advantages far exceed the difficulties and digitalized wellbeing keeps on prospering. Despite the fact that this territory of medicinal services is in its beginning stages given that grasping it has been snail-paced and has far to go in its usage, developing its proof base and building up an administrative system, an excitement is preparing in perspective on its remarkable potential in infection treatment, malady counteractive action and advancement of wellbeing. It can contact each individual, at each stratum needing

medicinal services and may along these lines demonstrate to be a silver coating in the social insurance framework.

7. References

1. (2017) National Center for Health Statistics Health Expenditures. Centers for Disease Control and Prevention.

2. (2013) Global health workforce shortage to reach 12.9 million in coming decades. World Health Organization.

3. Bauer UE, Briss PA, Goodman RA, Bowman BA (2014) Prevention of chronic disease in the 21st century: Elimination of the leading preventable causes of premature death and disability in the USA. The Lancet 384: 45-52.

4. (2017) Noncommunicable diseases. World Health Organization.

5. (2017) The top 10 causes of death. World Health Organization.

6. (2017) 10 facts on patient safety. World Health Organization.

7. Kohn LT, Corrigan JM, Donaldson MS (2000) To Err is Human: Building a Safer Health System. Institute of Medicine Committee on Quality of Health Care in America, National Academies Press (US), Washington (DC).

8. Ventola CL (2015) The antibiotic resistance crisis. Part 1: Causes and threats. P&T: A peer-reviewed journal for formulary management 40: 277-283.

9. (2013) Antibiotic Resistance Threats in the United States. Centers for Disease Control and Prevention.

10. McCartney M (2016) Margaret McCartney: Breaking down the silo walls. Bmj 354: i5199.

11. Towle A (2016) Nurses must knock down professional "Silos" and create quality, safe and effective interprofessional teams. From the inside looking out: A healthcare providers experience being the family member. Journal of Nursing & Care 5: 341.

12. (2001) Crossing the Quality Chasm: A New Health System for the 21st Century. Institute of Medicine Committee on Quality of Health Care in America, National Academies Press (US), Washington.

13. (2018) Principles of Patient-Centered Care. Picker Institute.

14. (2018) Health Systems Strengthening Glossary. World Health Organization.

15. (2018) Supporting people-centred, integrated health service delivery. World Health Organization Western Pacific Region.

16. Bear RA, Stockie S (2014) Patient engagement and patient- centred care in the management of advanced chronic kidney disease and chronic kidney failure. Canadian Journal of Kidney Health and Disease 1: 24.

17. Anderson RM, Funnell MM (2005) Patient empowerment: Reflections on the challenge of fostering the adoption of a new paradigm. Patient Education and Counseling 57: 153- 157.

18. Groene O (2011) Patient centredness and quality improvement efforts in hospitals: Rationale, measurement, implementation. International Journal for Quality in Health Care 23: 531-537.

19. Ulin K, Malm D, Nygardh A (2015) What is known about the benefits of patient-centered care in patients with heart failure. Curr Heart Fail Rep 12: 350-359.

20. Ha JF, Longnecker N (2010) Doctor-Patient communication: A review. The Ochsner Journal 10: 38-43.

21. Charmel PA, Frampton SB (2008) Building the business case for patient-centered care. Healthc Financ Manage 62: 80-85.

22. (2018) Individuals using the Internet (% of population). World Bank.

23. (2018) Mobile cellular subscriptions (per 100 people). The World Bank.

24. Edworthy SM (2001) Telemedicine in developing countries. May have more impact than in developed countries. BMJ 323: 524-525.

25. (2017) mHealth: Use of appropriate digital technologies for public health. World Health Organization.

26. Demiris G, Kneale L (2015) Informatics systems and tools to facilitate patient-centered care coordination. Yearb Med Inform 10: 15-21.

27. Strehle EM, Shabde N (2006) One hundred years of telemedicine: Does this new technology have a place in paediatrics? Archives of Disease in Childhood 91: 956-959.

28. Field MJ (1996) Telemedicine: A Guide to Assessing Telecommunications in Health Care. Institute of Medicine Committee on Evaluating Clinical Applications of T, The National Academies Collection: Reports funded by National Institutes of Health, National Academies Press (US), Washington (DC).

29. Weinstein RS, Lopez AM, Joseph BA, Erps KA, Holcomb M, et al. (2014) Telemedicine, telehealth, and mobile health applications that work: Opportunities and barriers. Am J Med 127: 183-187.

30. Kvedar J, Coye MJ, Everett W (2014) Connected health: A review of technologies and strategies to improve patient care with telemedicine and telehealth. Health Aff (Millwood) 33: 194-199.

31. Eysenbach G (2001) What is e-health? J Med Internet Res 3: e20.

32. (2011) mHealth: New horizons for health through mobile technologies: Second global survey on eHealth. World Health Organization.

33. Kallander K, Tibenderana JK, Akpogheneta OJ, Strachan DL, Hill Z, et al. (2013) Mobile health (mHealth) approaches and lessons for increased performance and retention of community health workers in low- and middle-income countries: A review. J Med Internet Res 15: e17.

34. (2018) Digital Health for Social and Behavior Change: New technologies, new ways to reach people. Family Planning High Impact Practices.

35. Zanella A, Bui N, Castellani A, Vangelista L, Zorzi M (2014) Internet of things for smart cities. IEEE Internet of Things Journal 1: 22-32.

36. Iyawa GE, Herselman M, Botha A (2016) Digital health innovation ecosystems: From systematic literature review to conceptual framework. Procedia Computer Science 100: 244-252.

37. (2018) Digital Health. U.S. Food & Drug Administration.

38. Carroll N (2016) Key success factors for smart and connected health software solutions. Computer 49: 22-28.

39. Burmaoglu S, Saritas O, Kıdak LB, Berber İC (2017) Evolution of connected health: A network perspective. Scientometrics 112: 1419-1438.

40. (2018) Open a world of cloud-based connected health care. Philips HealthSuite.

41. (2018) Connected Health Integration Pathway. Partners Healthcare.

42. (2017) Rah@h Remotely Accessible Healthcare.

43. (2017) Rah@h Patient Portal.

44. (2017) Rah@h Staff Portal.

45. Hewitt-Taylor J, Bond SC (2012) What e-patients want from the doctor-patient relationship: Content analysis of posts on discussion boards. J Med Internet Res 14: e155.

46. Mobasheri MH, King D, Johnston M, Gautama S, Purkayastha S, et al. (2015) The ownership and clinical use of smartphones by doctors and nurses in the UK: A multicentre survey study. BMJ Innovations 1: 174.

47. Ventola CL (2014) Mobile devices and apps for health care professionals: Uses and benefits. Pharmacy and Therapeutics 39: 356-364.

48. (2016) Smart hospitals: Security and resilience for smart health service and infrastructures. European union agency for network and information security.

49. Deldar K, Bahaadinbeigy K, Tara SM (2016) Teleconsultation and Clinical Decision Making: A Systematic Review. Acta Inform Med 24: 286-292.

50. Oliveira TC, Bayer S, Gonçalves L, Barlow J (2014) Telemedicine in Alentejo. Telemed J E Health 20: 90-93.

51. Irving M, Stewart R, Spallek H, Blinkhorn A (2018) Using teledentistry in clinical practice as an enabler to improve access to clinical care: A qualitative systematic review. J Telemed Telecare 24: 129-146.

52. Kruse CS, Krowski N, Rodriguez B, Tran L, Vela J, et al. (2017) Telehealth and patient satisfaction: A systematic review and narrative analysis. BMJ Open 7: e016242.

53. Agboola S, Kvedar J (2016) Telemedicine and Patient Safety. AHRQ Patient Safety Network.

54. Charles A. Villanueva MA, Fahad Mahnashi, Saad Alyhya, Osama Alshreef (2017) Waiting time in emergency department in Riyadh. Journal of Biosciences and Medicines 5: 55-60.

55. Fox S (2011) Health Topics. Pew Research Center Internet & Technology.

56. (2018) Medical Encyclopedia. MedlinePlus.

57. Gowen LK (2013) Online mental health information seeking in young adults with mental health challenges. Journal of Technology in Human Services 31: 97-111.

58. (2018) What is a webinar? Company Webcast.

59. Widmer RJ, Collins NM, Collins CS, West CP, Lerman LO, et al. (2015) Digital health interventions for the prevention of cardiovascular disease: A systematic review and meta- analysis. Mayo Clin Proc 90: 469-480.

60. Cahn A, Akirov A, Raz I (2018) Digital health technology and diabetes management. J Diabetes 10: 10-17.

61. Coughlin SS, Stewart J (2016) Use of consumer wearable devices to promote physical activity: A review of health intervention studies. J Environ Health Sci 2.

62. Wicklund E (2018) Mayo clinic uses an mHealth app to identify epileptic seizures. mHealth Intelligence.

63. Kalantar-zadeh K, Ha N, Ou JZ, Berean KJ (2017) Ingestible Sensors. ACS Sensors 2: 468-483.

64. Bhavnani SP, Narula J, Sengupta PP (2016) Mobile technology and the digitization of healthcare. European Heart Journal 37: 1428-1438.

65. Adamson PB, Abraham WT, Bourge RC, Costanzo MR, Hasan A, et al. (2014) Wireless pulmonary artery pressure monitoring guides management to reduce decompensation in heart failure with preserved ejection fraction. Circ Heart Fail 7: 935-944.

66. Robbins R, Krebs P, Jagannathan R, Jean-Louis G, Duncan DT (2017) Health app use among us mobile phone users: Analysis of trends by chronic disease status. JMIR MHealth and UHealth 5: e197.

67. (2015) IMS Health Study: Patient options expand as mobile healthcare apps address wellness and chronic disease treatment needs: IMS.

68. (2017) The Growing Value of Digital Health. IQVIA Institute.

69. Collier R (2015) National Physician Survey: EMR use at 75%. CMAJ 187: E17.

70. Manca DP (2015) Do electronic medical records improve quality of care? Yes. Can Fam Physician 61: 846-847.

71. Dorn SD (2015) Digital Health: Hope, Hype, and Amara's Law. Gastroenterology 149: 516-520.

72. (2018) Patient portals - an online tool for your health. MedlinePlus.

73. Kruse CS, Bolton K, Freriks G (2015) The effect of patient portals on quality outcomes and its implications to meaningful use: a systematic review. J Med Internet Res 17: e44.

74. Sorondo B, Allen A, Fathima S, Bayleran J, Sabbagh I (2016) Patient portal as a tool for enhancing patient experience and improving quality of care in primary care practices. EGEMs 4: 1262.

75. Murdoch TB, Detsky AS (2013) The inevitable application of big data to health care. JAMA 309: 1351-1352.

76.   (2016) An Overview of the Human Genome Project. National Human Genome Research Institute.

77. Green ED, Watson JD, Collins FS (2015) Human Genome Project: Twenty-five years of big biology. Nature 526: 29- 31.

78. Ginsburg GS, Phillips KA (2018) Precision medicine: From science to value. Health Affairs 37: 694-701.

79. Ventola CL (2014) Medical applications for 3D printing: Current and projected uses. Pharmacy and Therapeutics 39: 704-711.

80. (2017) Spanish scientists create a 3D bioprinter to print human skin. Universidad Carlos III de Madrid (UC3M).

81. The L (2018) Artificial intelligence in health care: Withintouching distance. The Lancet 390: 2739.

82. (2018) Watson in Healthcare. IBM.

83. Ireland D, Liddle J, McBride S, Ding H, Knuepffer C (2015) Chat-bots for people with Parkinson's disease: Science fiction or reality? Studies in Health Technology and Informatics 214: 128-133.

84. O'Hear S (2017) Babylon Health raises further $60M to continue building out AI doctor app. TechCrunch.

85. Ajami S, Arab-Chadegani R (2013) Barriers to implement Electronic Health Records (EHRs). Materia Socio-Medica 25: 213-215.

86. Sinsky C, Colligan L, Li L, Prgomet M, Reynolds S, et al. (2016) Allocation of physician time in ambulatory practice: A time and motion study in 4 specialties. Annals of Internal Medicine 165: 753-760.

87. de Grood C, Raissi A, Kwon Y, Santana MJ (2016) Adoption of e-health technology by physicians: A scoping review. J Multidiscip Healthc 9: 335-344.

88. Kiberu VM, Mars M, Scott RE (2017) Barriers and opportunities to implementation of sustainable e-Health programmes in Uganda: A literature review. Afr J Prim Health Care Fam Med 9: 1277.

89. Fahy E, Hardikar R, Fox A, Mackay S (2014) Quality of patient health information on the Internet: Reviewing a complex and evolving landscape. Australas Med J 7: 24-28.

90. Tomlinson M, Rotheram-Borus MJ, Swartz L, Tsai AC (2013) Scaling up mHealth: Where is the evidence? PLoS Med 10: e1001382.

91. Alami H, Gagnon M-P, Fortin J-P (2017) Digital health and the challenge of health systems transformation. mHealth 3: 31.