Public Health - Medical Informatics

Digital Health

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Educational objectives

Define the fields of digital health or eHealth -Knowing how to evoke the challenges of digital health, its health, socio-professional, legal, ethical, and economic impacts and the conditions necessary for its use; Give examples of the domains of application that it covers B- Know the digital supports of clinical practice (generalist sites and HON certification, databases, best practice recommendations, decision support systems, data warehouses, AI techniques, etc.), Digital supports of clinical practice A- Explain the principles of digital integration (traceability, computerized records, connected prescriptions, m-health, decision support, connected objects, AI, etc.) in the care process, the coordination of professionals, and the sequencing of care. Principles of digital integration in the care process A- Know the ethical issues related to digital health B- Know the potential impact of digital health on the management of care and research,

as well as on the professions, functions and responsibilities of health care professionals.

Educational objectives

- B- Know the regulations on health data protection and the legal issues related to digital health
- A- Know the basics of health information processing (coding, management, publication, evaluation). Health information management
- B- Know the possible applications of algorithmic health data processing methods (e.g., big data, artificial intelligence/machine learning) in health at the individual and collective levels
- A- Understand the significance and involvement of digital self-measurement in the monitoring of people's health
- A- Understand the significance and involvement of m-health (mobile applications) and social media in interprofessional communication and people's health
- B- Recognize how to integrate decision-support tools in medicine into one's practice by being able to critically assess their contribution, risks, and constraints (for example, of the SMR / ASMR type)
- B- Identify the key elements necessary for using new digital tools (legal aspects, organizational aspects, technical aspects, patient and professional educational aspects). Use of new digital tools

Digital Health

E-health SIH/SIS DPI EDS Vigilance Terminologies Semantic Web **Artificial Intelligence** (machine learning, including deep learning)

Telehealth E-health services Training Serious Games Web 2.0

Robotics

M-health

Telemedicine

Remote monitoring Teleexpertise Teleconsultation Remote assistance Home Automation Sensors

Linked

objects Sensors

Intelligent

textiles

Pattern CNOM

Digital health

- Digital health includes in particular
 - telemedicine and
 - Mobile health (mHealth),
- Digital health is defined by WHO :
 - eHealth refers to the transfer of health resources and health care through electronic means. It comprises three main areas :
 - providing health information to health professionals and patients over the Internet or other means of telecommunication,
 - the use of information technology and electronic commerce (e-commerce) to improve health systems, for example through education and training of health care workers,
 - the application of e-commerce and e-business practices to health systems management.

Telemedicine & Telehealth

• See specific course on the subject

Mobile Health (m-health)

- Mobile health is:
 - a sector of digital health and
 - refers to medical and public health practices that rely on mobile devices.
- It includes in particular :
 - the use of mobile communications for accessing health and wellness services and for information purposes,
 - as well as mobile health applications.
 - By 2016, more than 4,000 health apps in French (source DMD)

Digital health challenges in France

From GCS NES digital health Normandy



- Improve access to care for all users (to be demonstrated)
- Enable healthcare professionals to have access to simple, inexpensive, secure and interoperable tools for their daily practice
- Enable links between the different fields: city/hospital, public/private, health/medical/social
- Enable all users to have access to their health data, their itinerary, their appointments, their practitioners... thanks to digital technology
- Innovating to improve access to care, management
- ... while respecting the security and confidentiality of health data.

State of the art of digital health in France

- The domain of health care is still delayed when it comes to digital technology
 - Banking sector (7-8% of revenues) vs. 1-2% in hospitals.
- The Digital Health Agency (ex ASIP) in charge of digital health development ... with many other parties (too many?)
- The Digital Health Delegation (created in 2019) has the possibility of forcing publishers to become interoperable
- Proof of effectiveness: to be demonstrated!!!

Digital health roadmap 2019-2022

- 1. Strengthen digital governance in health
- 2. Intensify the security and interoperability of health information systems
- 3. Accelerate the deployment of basic digital services
- 4. Deploy digital health platforms at the national level
- 5. Supporting innovation and encouraging the commitment of stakeholders

The transformation of our healthcare system cannot be achieved without a *significant* and *coherent development* of *digital healthcare* in France. Digital technology is not an aim in itself. It is a **means to better coordinate** healthcare professionals, to develop therapeutic and organizational innovations, to fight against the health disparity, to reposition the citizen at the heart of the healthcare system, in short to provide better care.

Various problems encountered

- Healthcare professionals (HCPs) are confronted with a *fragmented digital offer* that complicates their daily practice, and the digital tools available to patient-users are still too limited.
 - Some counter-examples: Doctolib, one of the few digital health services in France
- As for our digital health systems, they are highly exposed to cyber
- attacks with considerable associated risks.
 - Attack at the Rouen University Hospital; ransomware

Theory = State-Platform

- It is the assumption that all public and private initiatives can and must advance, as long as they respect the values and framework defined by the public authorities as the choice of the citizens.
- The state-platform also consists of sharing certain basic technical infrastructures that are required for flexible and secure exchanges between the participants.
- The state-platform is especially the conviction that the state should not build cathedrals on its own, but that it should define the basic rules of construction, make the keystones, and invite everyone to contribute to the building, in the service of a work built collectively.

Improving the governance of digital heal

- The digital transformation will be conducted by the Ministerial Delegation for Digital Health (DNS), directly attached to the Minister for Solidarity and Health.
- It will provide closer supervision of the Digital Health Agency (ANS), whose mission will be focused on the operational implementation of the digital health policy (action 1).
- Major orientations of the digital health policy will be discussed within the Digital Health Council (action 2).

Intensify the security and interoperability of health information systems

- Improving the digital identification of health care providers (HCPs) = an essential condition for the effective operation of health information systems (HIS)
- Digital identification based on the same national reference system will be generalized (action 4)
- The dematerialization of authentication methods (**action 5**) will enable secure access to teleservices, in particular with the Vitale card application or the e-CPS.
- In order to ensure continuity of care, the same patient must be recognized in all IS uniquely.
- For this purpose, the deployment of the national health identifier (INS) will be accelerated (**action 6**).... White paper in 1996... remain patient !!!
- The availability of the Vitale card application (**action 7**) will enable digital authentication of health system users.

Intensify the security and interoperability of health information systems

- In addition to access and security issues, a study on the opposability of common interoperability reference systems will be launched (action 8) to ensure that all old and new systems can communicate. Support for the concerned participants will be implemented to ensure convergence.
- To protect themselves against risks collectively, all healthcare practitioners will be able to benefit from the safety incident reporting system (inspired by vigilance systems known to health professionals). Neologism: software vigilance, linked to materiovigilance. A national health cyber-surveillance service will be deployed(**action 9**).

Accelerate the deployment of basic digital services

- Four main services to exchange and share health data with confidence:
 - The deployment of the Shared Medical Record (SMR) will be followed up in order to store all the data that it is useful to share between the patient and the professionals who care for him or her throughout the treatment process (action 11); see below for its content +++
 - The use of secure health messaging systems to protect the exchange of health information between professionals will be expanded and supported (action 12).
 - E-prescription (or computerized prescription) will be developed to simplify and secure the prescription transmission process from the prescription to the dispensing by the pharmacist (action 13).
 - **The territorial digital services** of pathway coordination included in the *e*-*parcours* program will be deployed (**action 14**).

Deploy digital health platforms at the national level digital health platforms

- Implementation of three platforms to gain agility while maintaining sovereignty by mastering the rules of urbanization, interoperability, security and ethics:
 - The Digital Health Space (ENS) will allow each citizen, actor of the health system, to choose and access digital health services in a secure framework and with a seamless navigation (action 15).
 - Professionals will be able to access a platform of communicating service packages (action 16).
 - By gathering health data in a single secure urbanization scheme, public authorities will be able to analyze it on a large scale for the benefit of all. This is the objective of the Health Data Hub (HDH), a platform for health data (action 17).

Health Data Hub (HDH)

- Health Data Platform (HDP) (in French)!!!
 - URL : https://www.health-data-hub.fr/
- Objective = easy and unified, transparent and secure access to (deidentified) health data to improve the quality of care and support for patients
- Facilitate the sharing of health data from a wide variety of sources to support research
- Highlight the data legacy
- Protect citizen data
- Innovate with all public and private actors
- Idea of the HDH follows the report of the MP and mathematician Cédric Villani on artificial intelligence (AI)

Stimulate innovation and encourage the commitment of stakeholders

- Investment programs, such as the HOP'EN program to support hospital information systems (action 19)
- « Digital social and medico-social establishments and services (ESMS) » plan (action 20) to help medico-social structures to be fully involved in the digital conversion process
- Innovation in digital health services will be encouraged through the creation of the « Lab e-santé » (**action 23**). Its role will be to identify, develop and disseminate new concepts, technologies, solutions and uses in e-health

Stimulate innovation and encourage the commitment of stakeholders (2)

- Finally, all stakeholders will be invited to discuss the national digital health policy and its implementation methods. With the « tour de France de la e-santé » (action 25), meetings will be organized in all territories, over a period of six months.
- In « d'ateliers citoyens du numérique en santé » (digital health citizen workshops) (**action 26**), users will be able to define the needs of their future Digital Health Space, validate the ergonomic principles and test the first models.



The national digital health strategy: information systems to improve the quality of care and efficiency of the healthcare system

Pr Brigitte Séroussi

Delegation for Health Information Systems Strategy (DSSIS) General Secretariat of the Ministries in charge of Social Affairs Ministry of Social Affairs, Health and Women's Rights

Health in a few numbers

Health care services

- 1.2 million healthcare professionals
 - 355 000 doctors and pharmacists
 - 820 00 medical auxiliaries (620 00 IDE)
- 22 000 pharmacies, 1000 biology laboratories,
- 3000 health care facilities
- 26 Regional Health Agencies (ARS)
- \rightarrow 17 since January 1st 2016
- Health care expenses
 - 240 billion € = 12% GDP
 - 77% financed by a public payer (Health Insurance)
- Information systems
 - 2 to 3 billion € = 1% of health expenditures
 80 to 140 M€ for telemedicine,
- •→ expected growth = 15 to 30% per year Over 200 different eHealth solutions





- Increase in health care utilization
 - Aging population
 - Chronic diseases
 - Multi-pathology patients
- Increased complexity of support (plural / multi-professional / health and social)
- Budgetary restrictions
- Digital shift and promotion of eHealth
 - Efficiency lever to optimize the health care system
 - Promise of quality, safety of care, innovation and progress... to be objectified !!!

The National Health Strategy (2013)

1. Choose prevention and act on everything that has an influence on health

- Reduce social and geographic inequalities in health
- Improving health risk assessment and management,
- 2. Organizing care around patients: the primary care revolution
 - Offering a local solution for all French people
 - Fight against inequalities in access to health care (mutual insurance companies, excess fees, third-party payment)
 - Rely on new technologies
- 3. Deepening health democracy and focus on deconcentration
 - Taking patient rights to the next level
 - Revisiting the national steering system
 - Strengthen the ARS's room for maneuver

Strengthened governance and identified actors Complexity of actors +++



Governance of health information systems

- Two additional operators under state supervision:
 - The Agence du Numérique en Santé (ANS), formerly ASIP Santé (agency for shared health information systems)
 - promote the use of ICT and the deployment of digital health
 - establish the conditions for the development and regulation of digital health
 - to promote innovation for the benefit of professionals and users and to assist the public authorities in conducting digital projects of national interest
 - ANAP (National Performance Support Agency)
 - improving the efficiency of health and medico-social institutions
 - Supporting the programs « Hôpital numérique » and « Territoire de soins numérique », and some PREPS (System of Care Performance Research Program) (ex : EVALSI)

Concrete measures in the draft law on modernizing our healthcare system

- Health Data Sharing and Disclosure (art.25) : simplify the legal framework and extend the concept of the care team
- **DMP and secure health messaging** (art.25) : deploy the IS tools for the coordination of care
- References of opposable interoperability and security (art.25)
- **Territory hospital groups (**art.27) : exchange and sharing of information at the territorial level
- National Health Identifier (art.47) : the NIR to simplify and secure patient identification
- **Public health information service SPIS** (art. 21) : coordinate and enhance the availability of public health information sources

A pragmatic first step

- Identification of the business content of coordination support documents
 - VSM : medical summary section, structured summary of the patient's condition (history, allergies, contraindications, current pathologies, current treatments), attending physician, at least once a year, ROSP → DMP
 - PPS : personalized care/health program, structured description of care, identification of the different actors, coordinated organization → DMP
 - CRH / release liaison letter: structured summary of a hospitalization episode, given to the patient on the day of release, sent to the city correspondents including MT → DMP
 - FRCP : clinical description of cancer patients, anatomo-pathology, therapeutic decision, sent to city correspondents including MT → DMP

Digital technology at the service of professionals

- Objective of digital health: to help health professionals in their practice, to improve the coordination of care +++
- Difficult to objectify; MATRIX project: 3 years to demonstrate a certain effectiveness of the pharmaceutical record in hospitals
- Simplification of uses; example of Doctolib which has simplified the booking of appointments... homogeneous and coherent ergonomics

Digital health services must exist regardless of the conditions of practice: in an institution, in town, in shared practice, in mobility, etc.

Secure Messaging

- Objective: secure the exchange of health information between professionals
- MSSanté
- Available to many health professionals
- Collection and exchange of personal data
- Encryption of these exchanges
 - Securing exchanges
- Trusted space, operators (white list), SP directory
- Another messaging system widely used by GMs: Apicrypt
 Over 50,000 users



- The PR lists, for each Medicare beneficiary who wishes to do so, all medications provided by a pharmacy during the last four months, whether prescribed by your doctor or recommended by your pharmacist (OTC medications)
- The PR was created by the law of January 30, 2007
- Implemented by Conseil national de l'Ordre des pharmaciens (CNOP)
- Website access (CPS + Carte Vitale) via "Portail DP"



- Experimentation in about 50 French hospitals to give access to hospital pharmacists and physicians: the MATRIX research project
 - Three disciplines (emergency, anesthesia, geriatrics)
 - Normandy: Cedar Clinic
 - Almost real time information (1 hour) => very useful in case of emergency following a medication accident
- Available, since 2016, to all physicians in health care institutions (art. L1111-23 of the CSP)
- Dissemination of health alerts via the PR
- Over 38 million PR opened (June 2019)



- Shared.... After Personnel (art. L1111-14 of the CSP)
- Managed by health insurance
- Eight elements to remember
 - 1. Created after patient consent via a SP or by the patient himself (AMELI account)
 - 2. Data relating to the **identity** and **identification** of the holder
 - 3. Data relating to **prevention**, **health status**, **social** and **medicosocial** follow-up that health professionals feel should be shared [...], in order to serve the **coordination**, **quality** and **continuity of care**, including in emergencies (medical summaries (VMS), hospitalization reports (CRH)/liaison letters, biology reports, medical imaging examinations, diagnostic and therapeutic procedures, prescribed treatments)



Shared Medical Record

- Eight elements to consider
 - 4. Management of access authorization and data **recorded** in the file by the **holder**, the **patient**
 - 5. Data required for **care coordination** (reimbursement data)
 - 6. Data related to the dispensing of medications, from the **pharmaceutical record** (PR)
 - 7. Organ and tissue donation data
 - 8. Advance directive data
- Nine million DMPs open in June 2020... for **500 million euros**!!!
- Objective: facilitate the sharing of patients' medical information with health professionals.
- Digitizing all data will save time.



- Centralized information simplifies access to information
- Doctors update the record in real time throughout the patient's life
- particularly useful in case of emergency
- particularly recommended for people with chronic pathologies or pregnant women, since it facilitates **cooperation between health professionals**
- Undeclared goal: to allow social security to save money by rationalizing care
- not obligatory at all. The reimbursements by the social security will not be conditioned at all by the DMP
- Possibility to create your own DMP URL: dmp.fr

Digital Health Space (ENS)

- One of the three major national-level platforms planned in the digital health policy.
- Objective: to promote the role of each person, throughout his or her life, in protecting and improving his or her health
- ENS = a secure domain, allowing to manage one's health data and to participate in the construction of one's health path in connection with the professionals of the health, social and medico-social sectors, thus promoting prevention, coordination, quality and continuity of care
- Open for free; accessible online
- Access :
 - its administrative data,
 - its DMP,
 - its health parameters,
 - all data related to the reimbursement of its health expenses,
 - tools allowing secure exchanges with the actors of the health system, tools allowing access to telehealth services and, in general, to any service or any digital application referenced.

Digital Health Space (ENS) (2)

- hanks to ENS, the user is an actor in his or her own health and in the health system
- Patients are involved at all levels of digital health policy
 - Their representatives serve on the Digital Health Council (CNS)
 - The « citizen workshops on digital health » will be a space for co-construction of their ENS

Numerical Health Identifier (INS)

- Key health system identifier
- Core project of the digital shift roadmap of My Health 2022
- INS makes the referencing of health and administrative data of users more reliable. It thus facilitates the exchange and sharing of data.
- Essential in order to avoid errors in the identification of the persons under care; creation of duplicates, triplicates, Nuplicates!!!
- In its absence, a new « sub-discipline » : **identitovigilance**, in order to remedy identification errors as much as possible
 - A responsible (doctor) at the Rouen University Hospital!
 - \exists in France network of regional identity vigilance referents (3RIV)
- Calculated from five features: birth name, birth name(s), date of birth, gender, place of birth

https://esante.gouv.fr/securite/identifiant-national-de-sante



Quality criteria for health information on the Internet

Pedagogical objectives

- Be able to explain the issue of « Quality criteria for health information on the Internet »
- Define the main quality criteria

The main objective of this course is to develop a critical reading of health information on the Internet

Post-requisites

APP TIC

Critical reading of scientific articles (Public Health) => ECN +++

Introduction

- Tools and services of the Internet, especially the Web, extend into all sectors of society, including medicine.
- They are and will be of the utmost importance to transmit and disseminate knowledge
- Assessing the quality of health information on the Internet is a fundamental necessity
- Sources of health information are heterogeneous, some are of inappropriate quality (intentionally or not).

Introduction (follow-up)

- Health is the field where false, incomplete or biased information is most dangerous.
- It is often difficult for the user, whether a health professional or a citizen, to determine what information is reliable and credible, and how it can be evaluated, criticized or verified.
- Over the past twenty years, several initiatives have been undertaken to define quality criteria for health information on the Internet

Quality criteria grid

- More than a dozen
- The most known
 - Health on the Net (HON) URL : www.hon.ch
 - Adopted by 5,300 sites => factual standard +++
 - Used since November 2007 in France to certify e-health sites via the HAS +++.
- In France
 - Net Scoring www.chu-rouen.fr/netscoring
 - Min. Santé & CNOM
 - UMVF
 - HAS : a recommendation to promote the quality of health information for patients in preparation (2007)

Main criteria (content)

Source of the information

- Publisher's website
- Name and title of the authors
- \Rightarrow Know how to read a URL

Existence of a clear editorial line

Respect of the rules of confidentiality and ethics (if personal data)

Update

Interactivity

Citation of original sources

Transparency, independence of information

Main criteria (content)

- Relevance of information
 - Very difficult to evaluate
- Readability
 - Is the document readable (understandable) by the target audience?
 - Level of study
- Indication of the level of evidence
 - Applies to « sensitive » documents: RPBC+/- method to calculate it (more than 20 co-exist)
 - Implemented in CISMeF (possible limitation to documents indicating the level of proof)

Slides provided by the ANS

HEALTH DATA PROTECTION

Context

New services for the benefit of patients using their health data:

- access via internet to his medical file, download medical reports, medical images, etc.
- store medical information: « digital safe »
- arrange medical appointments with care professionals
- have access to various services in case of hospitalization (TV, hair appointment, etc.)



Digital health, new opportunities...and new challenges!



New risks to the right to privacy and the protection of personal data

Title of an article summarizing the case (http://sosconso.blog.lemonde.fr/2017/09/14/elle-tape-son-nomsur-internet-et-decouvre-le-dossier-medical-de-sonenfant/?xtor=RSS-3208)

 \ll She types her name on the Internet and discovers her child's medical records \gg

The pediatrician, Ms. Y, was convicted of having processed personal data automatically without prior authorization from the Cnil. She was fined 5,000 euros. **TGI of Marseille, 6th ch. corr. judgment of June 7, 2017**

The steps to secure the legal aspects of a new information system

Step 1 - Defining the project/context



 \rightarrow The answer to this question then allows us to define and assess the measures to be put in place (legal framework (CSP, GDPR, contract, public markets, etc.), security measures, taking into account the rights of individuals, contracts, public markets, etc.).

The steps to secure the legal aspects of a new information system

Step 2 - Description of the life cycle of personal data within the IS project

- What is the **data**? What is its life cycle? What is the retention period?? Etc.





The steps to secure the legal aspects of a new information system

Step 3 - Legal Analysis



Professional confidentiality, right to privacy, exchange and sharing, care team HDS, INS etc.

Protection of personal data Data Protection Act / RGPD

Telemedicine Medical equipment Online Pharmacies Open data in health Certification procedures mHealth

...

General rules for the protection of personal data

- Given the nature of the data processed: personal data, the five key principles of the data protection legislation must be respected
 - The principal of the purpose of the project
 - The principle of relevance and proportionality
 - The principle of a limited period of storage of information
 - The principle of data security and confidentiality
 - The principle of respecting the rights of individuals throughout the processing period.

 \rightarrow Obligation for the data controller to demonstrate, at any time, its compliance with the requirements of the GDPR by tracing all steps taken (accountability principle)

 \rightarrow Obligation for the data controller to perform a data protection impact assessment prior to its implementation

Notion of personal health data



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