NIGUARDA 80
CURA E CULTURA PER LA SALUTE DAL 1939

Sistema Socio Sanitario
Ospedale Niguarda Cancer Center
Regione Lombardia

FROM NETWORK TO DIGITAL
FROM DIGITAL TO NETWORK
Feasibility Observational study

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AIMS OF NETWORKING

- Provide all patients a fair and streamlined access to all the diagnostic services involved in a referral clinical pathway, regardless of the structure they are admitted
- Help optimized use of resources avoiding duplication of analysis
- Give the opportunity to all Pathologists to learn from others and train others
- Foster the idea that sharing knowledge and experience is the highest form of Good Clinical Practice

Telepathology for diagnostics

WHY DIGITALISING THE NETWORK

- Boosted by the COViD19 pandemia as a tool for remote consultation
- Demostrated non inferiority of WSI compared to conventional light microscope
- Tool for re-assessment of diagnostic performances (i.e. second opinion, cancer and transplant intraoperative diagnosis).
- Support for the training setting
- Support to track cases

We thought about *Patients*

A way to follow patients' migration avoiding them strong discomfort

We thought about *Biological Specimens*

Preparation of new section slides means specimen consumption, re-run of already done analysis, possibloe loss or missed ship-back of blocks and slides

We thought about *Pathologists*

Need of experts of specific diagnostic field for accurate diagnosis in controversial cases
Need to centralize rare diseases

A project for Multisite Digital Pathology Network in Milan

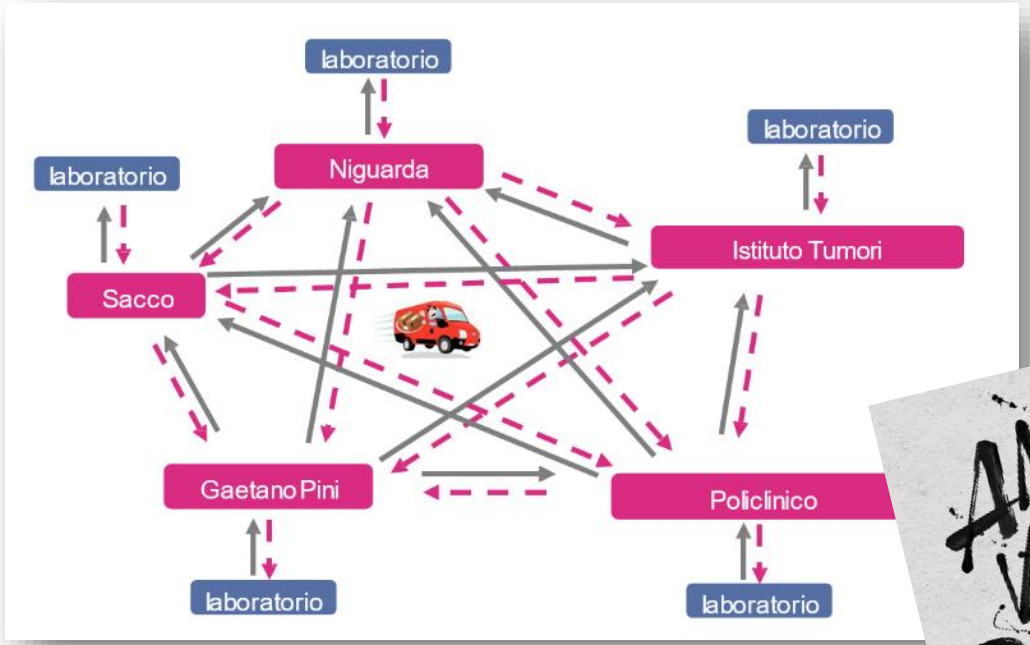
Città metropolitana di Milano

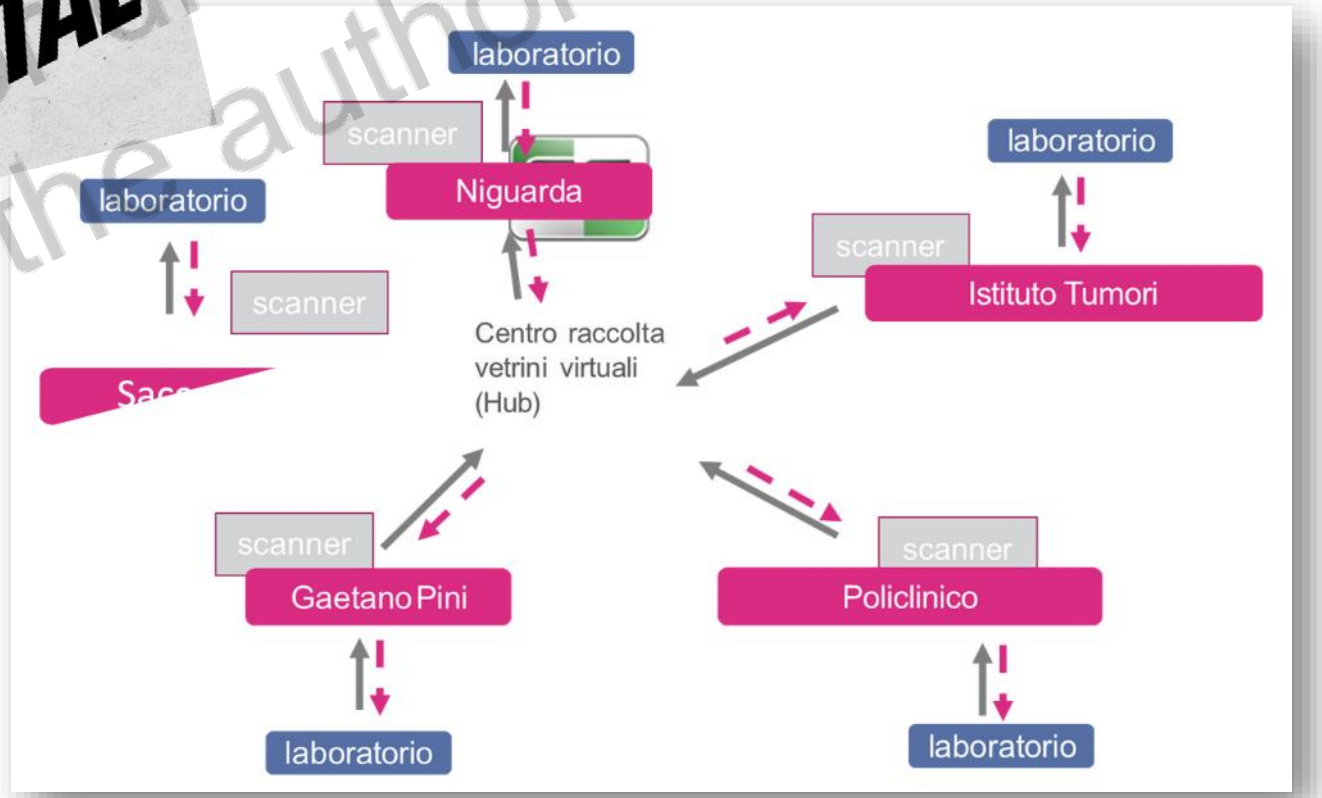
WHO: Pathology Departments from 5 Hospitals in Milan:

- Grande Ospedale Metropolitano Niguarda – E. Bonoldi
- IRCCS Istituto Nazionale Tumori – GC. Pruneri
- IRCCS Ospedale Maggiore Policlinico – S. Ferrero Bogetto
- ASST Fatebenefratelli-Sacco – M. Nebuloni
- ASST Gaetano Pini- CTO – A. Parafioriti

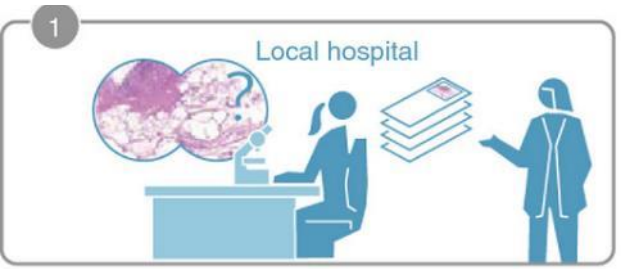
WORKLOAD: 1000 histological slides (corresponding to 180 cases)

DURATION: 3 months with weekly telematic update meetings

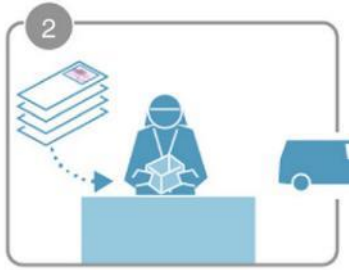




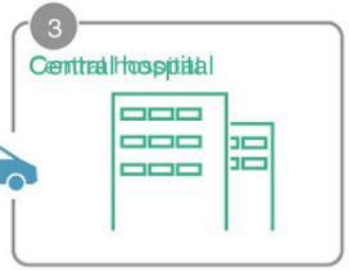
ANALOG WORKFLOW



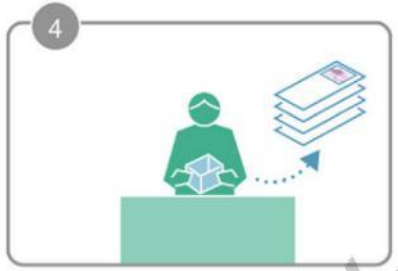
Case-owner studies a case and decides to ask for an expert opinion. Owner informs staff that the case must be prepared.



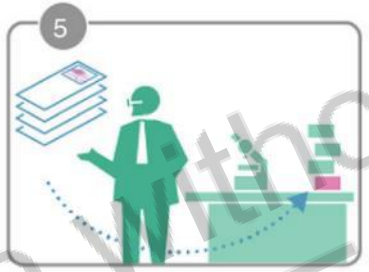
Supporting staff prepares slides for shipment.



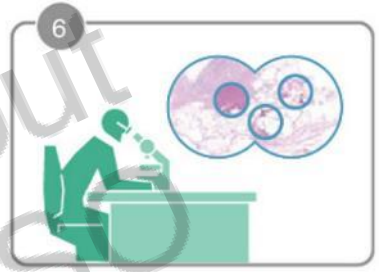
Parcel arrives at the central hospital



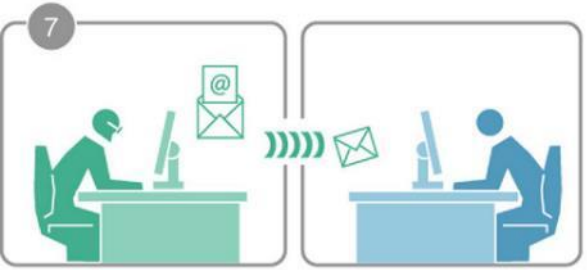
Parcel is processed



Expert pathologist receives the slides



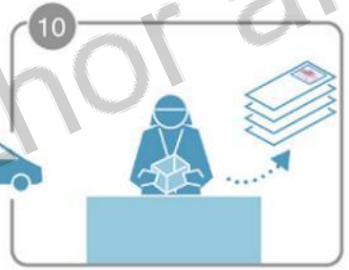
Expert pathologist views the slides and forms a conclusion.



Expert pathologist sends an e-mail with his conclusions to the case owner.

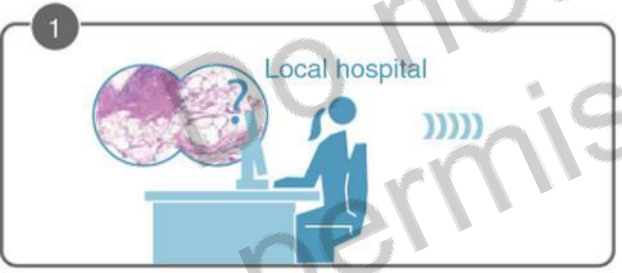
The case owner creates a report

Supporting staff prepares the slides for shipment



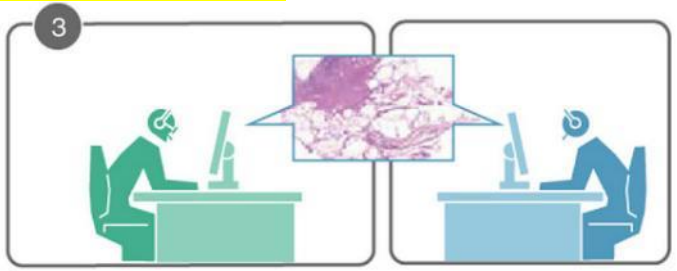
Supporting staff at the local hospital unpacks the slides

DIGITAL WORKFLOW

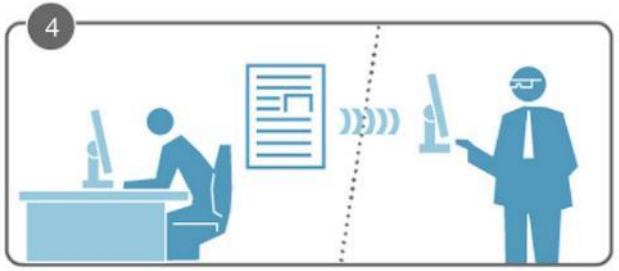


Case-owner studies a case and decides to ask for an expert opinion. Owner contacts sub-specialized pathologist for a consultation.

Sub-specialist pathologist receives a request and link to a shared viewing session



Expert and owner jointly view the slides while discussing them via phone.



The case owner creates an electronic report










SCANNER & HARDWARE

1. Istituto Nazionale Tumori, Milano: Aperio ScanScope XT Slide Scanner (120 slide capacity 1”x 3” slide)
2. IRCCS Ospedale Maggiore Policlinico, Milano: Aperio ScanScope XT Slide Scanner (120 slide capacity 1”x 3” slide)
3. ASST Fatebenefratelli Sacco, Milano: Digital Scanner HAMAMATSU PHOTONICS
4. ASST Grande Ospedale Metropolitano Niguarda, Milano: 3D HISTECH Pannoramic Scan II 250 slides
5. ASST Gaetano Pini-CTO: Digital Scanner HAMAMATSU PHOTONICS

Software & server Case Center have been offered by Epredia for the duration of this study

PRIMARY GOALS

Test the teleconsultation application as a valid routine alternative to the second opinion in Face to Face physical form

Set the rules (behavioral) among sending and receiving centers

Register all organizational changes involved in the process: for medical (diagnostic), technical (preparation of slides) and administrative (specimen, block, slides shipment preparation or collected by the patient) part.

ASSOCIATED GOALS

- Check the improvements related to diagnostic accuracy and timing of consultation and treatment for the patient admitted to referral center
- Monitor the biological specimen saving thanks to the joint evaluation of ancillary investigations
- Check the teaching efficacy of discussing virtual cases compared to the model of physical co-presence at the multi-head microscope
- Verify the congruity of new behavioral and procedural rules in virtually exchanged diagnostic opinions with respect to the need of sharing cases

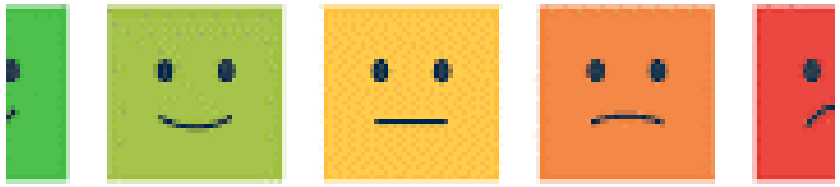
Expected Related Benefits

- decreasing of the diagnostic review time with advantages for the patient and earlier starting of the therapeutic phase
- reduction of duplication of tests already performed
- networked use of infrequent use of IHC antibodies not available in all the centers belonging to the network
- reduction in the costs of sending the case (blocks and slides) and setting up new blocks or slides
- Increasing habit of sharing cases with cultural gain

Qualitative-quantitative indicators

- TAT Average diagnostic time (number of days between the achievement and the outcome of digital collegial discussion)
- N of tests (immunohistochemical and molecular) repeated at the recipient center for the patient in mobility
- N days between accepting the moving patient and beginning of treatments in the recipient center

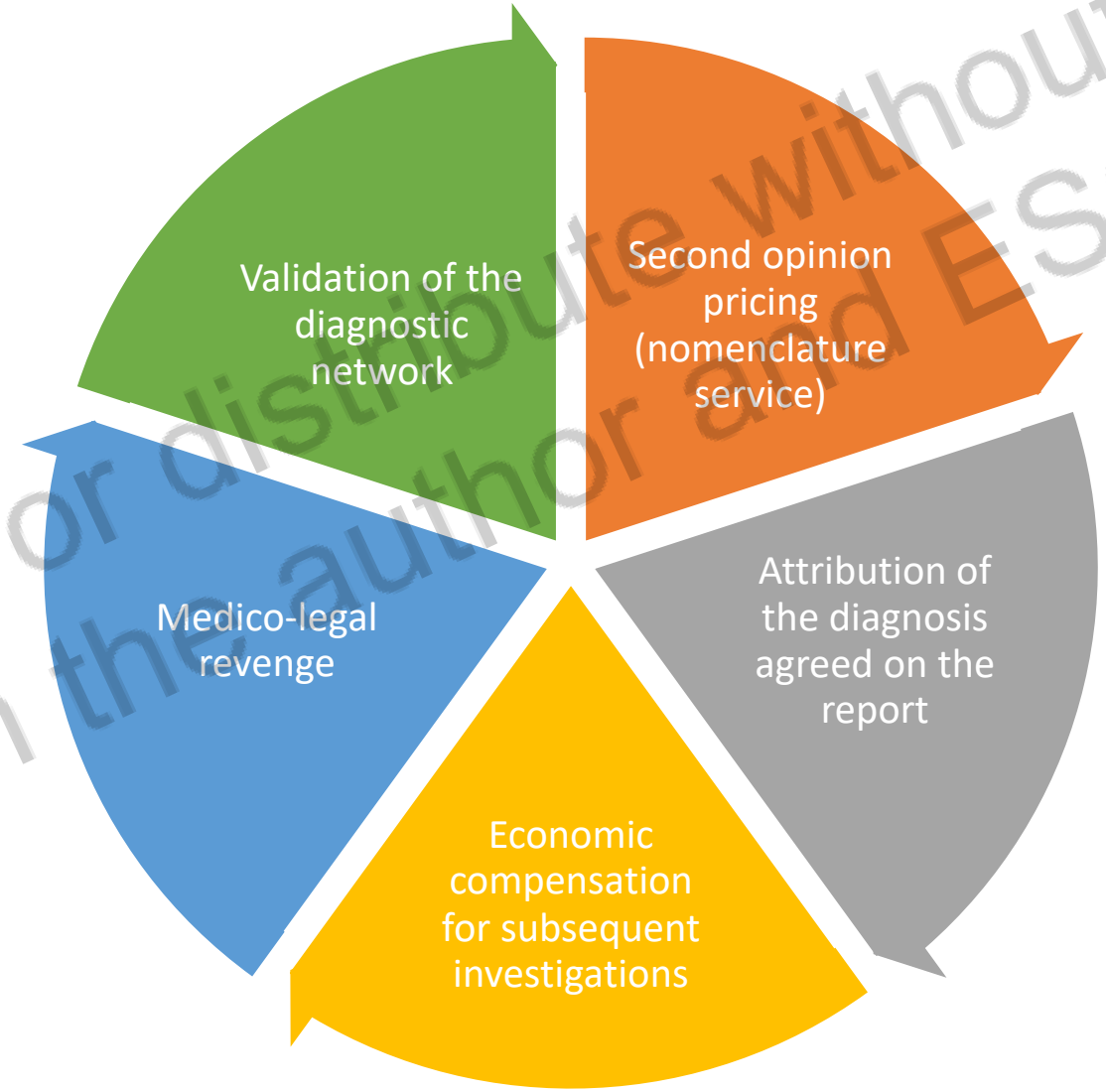
compared with the average flow time during the 3 months prior to the study



Ethical considerations

- cases will be totally anonymized and made unrecognizable
- Patient’s consensus to treat his own specimen will be obtained
- contribution from the network components will not be named on the report

Open Problems



studies carried out so far showed the telepathology reliability when considering “safety” if a virtual slide is used instead of the physical slide

- *Thorstenson, S., Molin, J. & Lundström, C. Implementation of large-scale routine diagnostics using whole slide imaging in Sweden: Digital pathology experiences 2006-2013. J. Pathol. Inform. **5**, 14 (2014).*
- *Fraggetta, F., Garozzo, S., Zannoni, G. F., Pantanowitz, L. & Rossi, E. D. Routine Digital Pathology Workflow: The Catania Experience. J. Pathol. Inform. **8**, 51 (2017).*
- *Cima, L. et al. Validation of Remote Digital Frozen Sections for Cancer and Transplant Intraoperative Services. J. Pathol. Inform. **9**, 34 (2018).*
- *Griffin, J., Kitsanta, P., Perunovic, B., Suvarna, S. K. & Bury, J. Digital pathology for intraoperative frozen section diagnosis of thoracic specimens: an evaluation of a system using remote sampling and whole slide imaging diagnosis. J. Clin. Pathol. **73**, 503–506 (2020).*
- *Pantanowitz, L. et al. American Telemedicine Association clinical guidelines for telepathology. J. Pathol. Inform. **5**, 39 (2014).*
- *Hanna, M. G. et al. Validation of a digital pathology system including remote review during the COVID-19 pandemic. Mod. Pathol. **33**, 2115–2127 (2020).*