



Digital Healthcare Focus: European Hospitals on Fire (FHIR) EMH-onFHIR



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In this space I will explore monthly topics, from concepts to technologies, related to the necessary steps to build Digital Healthcare Systems. For this month, I have invited Mr Giorgio Cangili to co-author a brief article on Fast Healthcare Interoperability Resources (FHIR), as hospitals and their interconnections are a critical asset and next step for European health data interoperability.

As patients and citizens move, health data needs to move with them. While primary care is fundamental and other community based social and healthcare solutions are increasingly important in the provision of healthcare and prevention, hospitals remain, and are likely to remain, the largest health data holders. Their interconnectedness is key to the European Health Data Space. Not only for networks of care for people with rare conditions to support inter-hospital communication and ad-hoc research collaboration, but also as organised systematic networks – the prime example of which being the European Reference Networks.

Hospital management and healthcare personnel are concerned with internal interoperability within the hospital network. Hospitals may serve as the fine capillarity network of intra and inter regional and national health data exchange. In the EU, this complements efforts to create the [European Health Data Space](#), the regulation of which is currently under discussion. This creates a new or another way to think about the role of hospitals and large healthcare organisations in fostering cross-border exchange and interoperability standards.

Hospitals, and indeed large healthcare organisations in Europe have two fundamental responsibilities regarding the health data they collect and manage:

1. To share it amongst health institutions, including cross-border, to provide responsible, safe, and easy patient care.
2. To make health data available for regional national and European secondary use, within safe

and regulated means, fostering research, public policy and public health, adhering to the FAIR (Findable Accessible Interoperable Reusable) principles.

Additionally, hospitals are key to European health data interoperability because they retain, and are often the major source and driver of health IT assets production, human capacity building, innovation and hence, the home for a large, and much needed Digital Health Workforce.

The [KIWI \(Knowledgeable, Intelligent, Wise and Interoperable\) framework](#) for future hospitals proposes Interoperability as key component. When thinking of inter-hospital connectivity, we can consider direct peer-to-peer services as these most often follow the patients' referral pathways. The emergence of the European Electronic Health Record eXchange Format (EHRxF), namely services such as Laboratory and Radiology reports, or better still, Hospital Discharge Reports, is being detailed by the [X-eHealth project](#) and supports a multitude of these pathways, particularly for chronic and rare disease patients. This implies that soon enough, tested, refined, detailed and officially endorsed guiding instructions and specifications for how to exchange hospital borne health data will exist in the EU. These arrangements are likely to influence or even be adopted by non-EU countries in Europe as well, thus allowing cross-border exchange with non-EU countries. This permits data exchange with national level infrastructures, but also can be used for hospital-to-hospital connections.

Why is linking hospitals important?

Patient safety can be significantly improved when information is securely and adequately exchanged between healthcare-providing organisations in the cases where patients move from one organisation to the other during increasingly longer periods of acute care. In the case of oncology patients, for example, patients are often diagnosed or initially investigated for cancer in a hospital or smaller practice, and then move to a higher specialised hospital unit for final diagnosis or treatment. Along their clinical path, information often stays behind or follows in paper form, leaving a health data trail of emailed and scattered PDF files.

Even in countries with interconnected public hospital networks, the need to link and exchange data with non-public institutions may exist. In some situations, highly specialised clinical knowledge which is available in very few diagnostic or therapeutical facilities is key for quality patient care and survival. This often means patients must follow a complex path of care which includes public, private or university institutions, in order to secure the personalised state-of-the-art care required by their condition. In many such cases, critical information is still exchanged on paper or via emailing of scanned documents. Worst even, sometimes, it is based on health professional's memory recall, phone calls, or the continual re-questioning of tired, sick patients and their families.

COVID-19 has had an overall positive impact on health system digitisation. During the pandemic, patient data exchange between hospitals became more frequent, as the resilience of hospital care services became evidently related to their capacity to exchange staff, patients and data. As a result, collective learning and European hospital-sector intelligence can be said to have risen where data and information flows were more abundant.

Do CEOs and CIOs need to be concerned?

Interoperability, not just technical, but also organisational, is necessary for patient safety and better care. This is, however, not a matter reserved only for software vendors and eHealth solution providers. Hospital CIOs and indeed CEOs need to be worried. Building common groups with other "similar" or interdependent institutions is key for collaboration. The possibility of meaningful exchanges hospital to hospital, and from hospital in the country of affiliation of the patient (called country A in EU cross-border services jargon) to the hospital in the country of treatment (called country B), will increase as interdependency increases. Knowing which organisations are capable of seamlessly interconnecting their health information assets, may prove invaluable.

It is high time that a landscape map of FHIR interoperability capabilities is established. While pointing to supported technical FHIR resources, such a map can serve as a proxy for organisations where it is

easier to connect, with adequate security and privacy provisions that enforce the required and agreed policies.

The European Map of Hospitals on FHIR - EMH-onFHIR

The idea proposed is simple, not new, but still valuable. There are several sources on FHIR Servers, from the official [HL7 website](#) to more practical [“how-to” guides](#), which can prove to be a useful resource on their relevance for hospitals. Any hospital offering HL7 FHIR APIs through a FHIR Server will be able to “self-declare” their server to HL7 Europe, via an online submission form, wherein they can indicate where and how the FHIR server metadata information can be accessed, status (production, test, or demonstration), and what services are offered. This core information, alongside the geolocation and contact persons, will be displayed onto a map on the “EMH-OnFHIR” tab of HL7 Europe website.

In the first phase, if the FHIR server metadata information is made publicly accessible, e.g. not protected by the organisation firewall, HL7 Europe will test the reported server, by getting the published *CapabilityStatement* and summarising the capabilities of that server on the above-mentioned page. The [CapabilityStatement](#) is a FHIR resource documenting “a set of capabilities (behaviours) of a FHIR Server for a particular version of FHIR that may be used as a statement of actual server functionality or a statement of required or desired server implementation.” This map will provide a first overview of hospitals that are potentially open for collaboration and data exchange.

Future evolutions of this service might include: Enhanced automatic tests based on agreed testing scenarios, following an approach like that realised by Inferno for testing conformance to the [Standardised API for Patient and Population Services criterion § 170.315\(g\)\(10\)](#), or by the [FHIR ValueSet \\$expand Comparison Tool](#) offered by the ontoserver. This may include the verification of selected FHIR profiles and/or implementation guides (e.g. the European EHRxF or the IPS-International Patient Summary), testing on specific operations, authentication methods and so on. This enhanced report will provide more detailed insight on the actual capabilities, enabling a better evaluation of what each organisation can offer. The usage of this method will allow some quantification of the cross-hospital “connectivity” capabilities and eventually can also be used to give visibility to the number of transactions using FHIR standard, both internal and inter-hospital.

How and where to start

National hospital associations and networks need to be engaged. Direct participation of such National and European structures is key to disseminating the message, but can also be useful for top management to have the added advantage of progressively knowing which hospitals can be a source of data, or at least a source of meaningful technical expertise exchange and invaluable benchmarking.

- If you are a CEO or CIO and are wondering if you have a FHIR server in use in your hospital or healthcare facility, or if not, why you should, then exploring that question is a crucial first step.
- For those in health IT, hospital management and healthcare management more broadly, or are part of hospital groups or associations, and you are interested in knowing more about this important subject, feel free to [contact us](#) to learn more.

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