



The ROYAL COLLEGE of
OPHTHALMOLOGISTS

Electronic Medical Records – Standards for UK Ophthalmology Services

The Royal College of Ophthalmologists champions excellence in eye care. In order to provide the best care for patients, and to generate improvements in care, it is important to be able to measure the quality of clinical and supporting services provided and ensure minimum quality standards are met. Electronic Medical records (EMRs)¹ are increasingly helping clinical teams to not only record clinical care in a legible and standardised manner but also to measure the quality of the services they provide (e.g. through more automated clinical audit) but their use is not without well documented risks.¹

This document, based on published evidence and consensus expert opinion, is designed to indicate how EMRs can be expected to best support the aims of the Royal College and its members in providing high quality ophthalmic care. They are standards which specifically address, or are considered particularly pertinent to, ophthalmic care and do not attempt to cover generic ground which has been comprehensively described or laid out in [separate standards elsewhere](#).² Instead they aim to focus on a small number of key areas. It is not expected that most EMR vendors will comply with all the standards but the minimum standards are indicated by a “must”.

We welcome feedback on the standards and how they might be improved and updated going forward.

Please send feedback on the standards and how you have used it to [Beth Barnes](#), Head of Professional Support beth.barnes@rcophth.ac.uk.

¹ An Electronic health record (EHR) as defined by the International Organization for Standardisation (ISO) is a “repository of information regarding the health of a subject of care, in computer processable form.” When you begin to read around the subject you will encounter both the terms electronic medical record (EMR) and electronic health record (EHR). These are often used synonymously however there are differences between what is meant by each term.¹¹ An EMR is an application which includes clinical data repository, clinical decision support, controlled medical vocabulary, order entry, computerized provider order entry, pharmacy, and clinical documentation applications which store the data about what happens to a patient during their encounter with a health care delivery organisation. An EHR on the other hand represents a summary of the information gathered in EMRs across multiple health care organisations which spans multiple episodes of care and is owned by the patient. An EHR can therefore only exist on the back of fully functioning EMRs which are developed to communicate with each other. For the majority of this report we are referring to EMRs for ophthalmology which may contribute data in future to more comprehensive EHRs.

When planning an Electronic Medical Record for ophthalmic patients, providers:

- Must have a plan for transitioning from historic paper notes. The bulk upload of paper records as PDFs in an unstructured manner has poor responsiveness and is hard to appraise quickly. Details of proposed interim / legacy document management system function should be fully explained
- Must ensure a realistic launch programme, with appropriate adjustment of clinical activity during implementation, and a back up records system for teething problems
- Must ensure there are robust data backup procedures in place to ensure no large-scale loss of data due to single server failure. If stored locally, there must be provision of remote access (full access) to facilitate satellite clinics
- Should be able to present specific, detailed examples in which the EMR has resulted in more sustainable healthcare as assessed by the triple bottom line of financial, social or environmental savings and demonstrate the EMR's effect on workflow and productivity³
- Should be able to exchange the full set of ophthalmic clinical data with EMRs from other vendors if a user decides to change EMR provider
- Should have a transparent portal or mechanism for feedback, change requests and suggested improvements to the EMR and provide comprehensive real-time support and education to users

A good Electronic Medical Record for use with ophthalmic patients:

- Should be easy to learn and use ("intuitive") and have documented proof of usability assessment.⁴ There should be minimisation of "clicks" and mandatory fields
- Must permit the capture of minimum structured data in line with agreed datasets (for examples see footnote)² but also permit the collection of unstructured, narrative data upon which much individual patient care depends
- Must conform or map to vendor-neutral standard terminologies (e.g., SNOMED CT, ICD, NHS Data dictionary, DICOM, HL7) to represent problem lists, diagnoses, procedures, allergies, clinical findings and handle messages / communication between systems

² Royal College of Ophthalmology - Diabetic Eye Disease, Cataract, Retinal Detachment, Corneal Cross-Linking
International centre for Health Outcomes Measurement: Cataract,¹² AMD,¹³ Facial Palsy
Royal College of Surgeons - Outcome Measures for Cosmetic Surgery
NHS Organ Donation and Transplantation - Standard national cornea transplant dataset

- Should have ophthalmic specific history, examination, investigation and surgical modules which contain accepted lists of ophthalmic symptoms, clinical parameters, investigations, and operative procedures *or* a suitably configurable multispecialty function adaptable to ophthalmic needs
- Must have the ability to allow data capture from networked devices (e.g. OCT and visual field machines) and should facilitate the capture of hand drawn notes / non networked images via personal devices (BYOD e.g. smartphone / digital ink devices) while complying with [normal information governance standards](#)
- Must allow visualisation of a summary of the patient’s ophthalmic history, diagnosis list and current management plan in a single, rapidly accessible (responsive) view
- Must allow data viewing and entry, including viewing data/entries and images changing over time (e.g. IOP, visual fields, OCTs etc.) easily in a realistic time frame for a patient consultation. (This may feature graphical representation of trends e.g. field of vision / IOP / VA data or permit access to more detailed historic episode data)
- Must comply with national requirements for record retention and access and historical record destruction ([Records Management Code of Practice for Health and Social Care 2016](#)).
- Should be able to accept data from, and provide feedback to, multiple care locations – particularly community optometry services but also potentially school screening, general practice and patients at home, in order to support shared care pathways
- Must produce correspondence which is customisable, automatically in an appropriate font for the patient⁵⁻⁷ and conforms to the National Outpatient Letter Standards.
- Should facilitate clinical audit:
 - Enable contribution to national audit programs
 - Enable collection of nationally and internationally agreed datasets²
 - Support automated “standard” audits on key quality and safety areas for ophthalmology recommended by NICE, The Royal College of Ophthalmologists etc. (e.g. outcomes of cataract surgery, treatment for wet AMD, adherence to NICE guidelines for Glaucoma: diagnosis and management, NICE guidelines for cataracts in adults: management etc.) against recognised benchmarks and published standards for individual clinicians and departments
 - Support custom user defined clinical audits
 - Support clinicians to provide evidence for revalidation
- Should facilitate reporting of performance:
 - Present real time data on patients who are lost to follow up⁸
 - Present real time data on patients who have a delayed follow up appointment⁹

- Should facilitate research:
 - Enable the collection of enhanced datasets for research
 - Ability to flag patients who are likely to fit user specified inclusion criteria or who have a condition which is currently under British Ophthalmological Surveillance Unit (BOSU) surveillance (bosu@rcophth.ac.uk)

- Should support CVI registration:
 - Ability to flag patients who appear to be eligible for certification
 - Ability to collect the dataset required to complete and generate the Certificate of Vision Impairment form (CVI)

- Could facilitate patient involvement by:
 - Enabling efficient collection of validated patient reported outcome and experience measures e.g. revalidation suitable patient feedback questionnaires (see GMC link), PREMS and PROMs¹⁰
 - Enabling patient access to their records and feedback forms through a patient portal

Useful links and documents

- [Standards for the clinical structure and content of patient records](#)
- [Royal College of Surgeons Dataset of Clinical Quality Indicators for use by all independent providers of cosmetic surgical procedures](#)
- [General Medical Council - Colleague and patient feedback for revalidation](#)
- [Professional Record Standards Body for Health and Social care](#) – developing standards for outpatient letters
- [Records Management Code of Practice for Health and Social Care 2016](#)
- ISO Standards of relevance to these quality standards are as follows:
 - ISO/IEC 90003 – Software engineering
 - ISO/IEC 27000 family - Information security management systems
- British standards of relevance to these quality standards include:
 - BS 10008 Evidential Weight and Legal Admissibility of Electronic Information
- Royal College of Ophthalmologists Diabetic Eye Disease, Cataract, Retinal Detachment, Corneal Cross-Linking national datasets

Abbreviations

AMD – Age related macular degeneration

BYOD – Bring your own device

CVI – Certificate of vision impairment

DICOM - [Digital Imaging and Communications in Medicine](#)

EHR – Electronic Health Record

EMR – Electronic Medical Record

GMC – General Medical Council

[HL7 – Health Level Seven](#)

ICD10 - is the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD), a medical classification list by the World Health Organization (WHO)

IOP – Intraocular pressure

NICE – National Institute for Health and Care Excellence
PREM – Patient reported experience measure
PROM – Patient reported outcome measure
SNOMED CT - a structured clinical vocabulary for use in an electronic health record
VA – Visual Acuity

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Approved by Royal College of Ophthalmologists Quality and Safety Group and Professional Standards Committee

References

1. Kim MO, Coiera E, Magrabi F. Problems with health information technology and their effects on care delivery and patient outcomes: a systematic review. *J. Am. Med. Informatics Assoc.* 2016; ocw154.
2. Chiang MMF, Boland MVM, Brewer A, Epley KD, Horton MB, Lim MC, et al. Special requirements for electronic health record systems in ophthalmology. *Ophthalmology.* 2011; 118(8): 1681–7.
3. Turley M, Porter C, Garrido T, Gerwig K, Young S, Radler L, et al. Use Of Electronic Health Records Can Improve The Health Care Industry’s Environmental Footprint. *Health Aff.* 2011; 30(5): 938–946.
4. Ratwani RM, Zachary Hettinger A, Kosydar A, Fairbanks RJ, Hodgkins ML. A framework for evaluating electronic health record vendor user-centered design and usability testing processes. *J. Am. Med. Informatics Assoc.* 2016: ocw092.
5. Blackmore-Wright S, Georgeson MA, Anderson SJ. Enhanced Text Spacing Improves Reading Performance in Individuals with Macular Disease Pelli DG (ed). *PLoS One.* 2013; 8(11): e80325.
6. Drummond SR, Drummond RS, Dutton GN. Visual acuity and the ability of the visually impaired to read medication instructions. *Br. J. Ophthalmol.* 2004; 88(12): 1541–1542.
7. Menon GJ, Dutton GN. Writing to our patients. *Br. J. Ophthalmol.* 1999; 83(7): 765.
8. Davis A, Baldwin A, Hingorani M, Dwyer A, Flanagan D. A review of 145 234 ophthalmic patient episodes lost to follow-up. *Eye.* 2017; 31(3): 422–429.
9. Foot B, MacEwen C. Surveillance of sight loss due to delay in ophthalmic treatment or review: frequency, cause and outcome. *Eye.* 2017.
10. Dean S, Mathers JM, Calvert M, Kyte DG, Conroy D, Folkard A, et al. ‘The patient is speaking’: discovering the patient voice in ophthalmology. *Br. J. Ophthalmol.* 2017; 101(6): 700–708.
11. Garets D, Davis M. Electronic medical records vs. electronic health records: yes, there is a difference. *A HIMSS Anal. White Pap. HIMSS Anal.* 2005.
12. Mahmud I, Kelley T, Stowell C, Haripriya A, Boman A, Kossler I, et al. A Proposed Minimum Standard Set of Outcome Measures for Cataract Surgery. *JAMA Ophthalmol.* 2015; 133(11): 1247.
13. Rodrigues IA, Sprinkhuizen SM, Barthelmes D, Blumenkranz M, Cheung G, Haller J, et al. Defining a Minimum Set of Standardized Patient-centered Outcome Measures for Macular Degeneration. *Am. J. Ophthalmol.* 2016; 168: 1–12.

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