A national review of NHS policies and patient perspectives on surgical video: a prospective, mixed methods qualitative analysis

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Summary

Background Robust governance policy is a fundamental requirement for the adoption of routine surgical video recording at scale. The true extent of existing local National Health Service (NHS) policies relevant to the recording of surgical video is currently not known, as are patient attitudes to the use of these videos by healthcare providers.

Methods This was a prospective, mixed methods qualitative analysis. All 144 NHS trusts/boards in England and Wales were asked to provide policies relating to surgical video between 20th February and 20th March 2023. Policies were assessed in accordance with United Kingdom (UK) General Data Protection Regulation (GDPR) principles. A patient and public questionnaire was performed on 14th September 2024 to analyse public views on the role of surgical video within healthcare and to identify issues surrounding video recording of surgical procedures within the NHS.

Findings 143/144 (97.9%) NHS trusts/boards responded to the request. Relevant policies were provided by 43/144 (29.9%) trusts/boards. 35/43 (81.4%) addressed consent processes clearly, 21/43 (48.8%) provided clear statements regarding patient access, and 35/43 (81.4%) policies asserted the trust/board's copyright. 19/43 (44.2%) clearly stated data minimisation and data accuracy requirements. 11/43 (25.6%) stated storage duration and 20/43 (46.5%) specified storage location. 255 members of the public completed our surgical video questionnaire. Identified expected uses of video were education, record keeping, and research; benefits were its use as an educational tool, objective evidence of the procedure, and patient satisfaction; concerns were raised about data privacy, consent, and security. 80/255 (31.4%) of participants agreed that all surgical procedures should be recorded. 186/255 (72.9%) would be interested in their own procedure. Video use for surgical quality assurance (236/255, 92.5%), education (241/255, 94.5%), and research (242/255, 94.9%) was supported.

Interpretation The majority of NHS trusts/boards do not have policies governing surgical video recording, use, and/or storage. The supplied policies addressed UK GDPR principles variably, focusing mainly on consent. Patients strongly support the use of surgical video for quality assurance and education, but there is disagreement if this should be performed routinely. The discordance between patient expectation and current NHS practice for the routine recording of surgical video must be addressed when policy is revised.

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Keywords: Minimally invasive surgery; Surgical video; Operative recordings; Health policy; Data governance

Introduction

Surgical video has potential to improve surgical care through utilisation for medical record keeping, patient outcome assessment, quality assurance, education, and research into advanced artificial intelligence (AI) and data-driven tools.[1] As an objective record of

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Research in context

Evidence before this study

Previous data suggests current heterogeneity in data governance as a barrier to routine surgical video recording within the National Health Service (NHS). An assessment of the adoption of routine surgical video recording in England and Wales has demonstrated low routine surgical video recording practices and found that only a minority of NHS trusts/boards has policies governing surgical video recording, use, and/or storage. Examination of existing NHS policies relevant to surgical video is required to understand how governance may affect recording practices. Patient and public involvement in NHS policy is essential, as users and funders of the health service.

Added value of this study

This is the first study to review NHS policy relevant to surgical video in England and Wales. Our findings show the majority of NHS trusts/boards do not have policies governing surgical video. The NHS trusts/boards with policies relevant to surgical video address consent clearly, but require revision to better adhere to other United Kingdom (UK) General Data Protection Regulation (GDPR) principles. We have identified expected uses, benefits, and concerns from patients and the public regarding surgical video and demonstrated their support for surgical video use in quality assurance, education, and research.

Implications of all the available evidence

NHS surgical video governance policy requires revision to improve adherence to UK GDPR principles. This must account for key stakeholder opinions, including patients and the public. Improved governance may facilitate routine surgical video recording within the NHS.

intraoperative events, surgical video captures important data, such as instrument and equipment use, operative time, intraoperative decisions, and the impact of surgical manoeuvres and gestures on patient anatomy. This offers advantages over traditional operative record keeping, such as written operation notes, which have been demonstrated to have variable reliability.[2] Moreover, surgical video analysis is central to assessing surgical skill, and understanding its impact on patient outcomes,[3–8] in the context of digital surgery.[9] Nevertheless, a greater availability of surgical video data will have unforeseen consequences for patients and healthcare professionals, and risks harm in the absence of robust governance structures.[10–12]

A recent assessment of the adoption of routine surgical video recording in the National Health Service (NHS) in England and Wales found only 15.7% trusts/boards reported routine recording of surgical procedures.[13] Further investigation into barriers to the adoption of routine surgical video recording identified 'change', 'resource', and 'governance' as key themes preventing wider adoption.[14] These are reflected by only 46.4% NHS trusts/boards reporting access to surgical video recording technology and 42.1% NHS trusts/boards having governance policies concerning surgical video recording, use, and/or storage.[13]

Whilst many technological solutions to surgical video recording are available,[15–17] it is apparent that their availability alone is an insufficient driver for behavioural change in surgical video recording practices. An impediment to adoption is a lack of clarity among healthcare professionals about the collection, controlling, processing, use, and sharing of sensitive personal data from patients as part of surgical video recording. The lack of clarity has resulted in concern from healthcare professionals regarding potential legal challenges from patients resulting from the unauthorised use of the patient sensitive health data.[14,18] The need for governance policies that protect all stakeholders relevant to surgical video recording is, therefore, evident. Although the Department of Health and Social Care (DHSC) has recognised the importance of NHS data in the delivery of health services,[19–21] it is unclear whether local governance policies concerning surgical video recording and utilisation are appropriate for modern surgical practice.

The aim of this study is to review the available policies concerning the governance of surgical video recording from all acute NHS trusts in England and all NHS boards in Wales, and, informed by patient and public opinion, provide recommendations to inform modern Health Service policy that is applicable to modern surgical practice.

Methods

Policy acquisition

137 acute hospital NHS trusts in England were identified from Estates Returns Information Collection (ERIC) data, publicly available from NHS Digital.[22] Seven NHS boards in Wales were identified from Welsh NHS management information, publicly available from the Welsh Government.[23]

All 144 acute NHS trusts/boards in England and Wales were asked to provide copies of policies relating to the governance of surgical video recording, use, and/or storage between 20th February and 20th March 2023, in accordance with the Freedom of Information (FOI) Act 2000.[24]

Data extraction and analysis

All supplied policies were screened by one of three reviewers (AY, CS, KL) for statements concerning the

video recording of patients. Those not containing any such statements were excluded.

Included policies were reviewed by at least one of three reviewers (AY, CS, KL). Policies were reviewed in accordance with United Kingdom (UK) General Data Protection Regulation (GDPR) principles[25]: Lawfulness, fairness and transparency; Purpose limitation; Data minimisation; Accuracy; Storage limitation; Integrity and confidentiality (security); Accountability. This data was extracted and reviewed using Google Forms (Google, Mountain View, CA, USA) and Microsoft Excel (Microsoft, Redmond, WA, USA). The full review criteria are available in the Supplementary Data S1.

Reviewers were blinded to each other's responses. To ensure inter-rater reliability (IRR), 10% of policies were independently reviewed by all three reviewers to account for single-reviewer biases and allow for disagreements to be discussed. Disagreements were resolved by consensus discussion and IRR was calculated through the Cohen's kappa statistic using R through RStudio version 3.6.3 (R Studio, Boston, MA, USA).

Patient and public involvement

Recommendations for health service policy were informed by a patient and public involvement event, hosted at the Imperial College London Open Day on 14th September 2024. This provided members of the public with an opportunity to consider the role of surgical video within healthcare and some of the issues surrounding the video recording of surgical procedures, and to complete a questionnaire on routine surgical video recording in the NHS. The questionnaire is available in the Supplementary Data S2.

Respondents provided free-text responses for their expected uses and perceived benefits of, and concerns with, routine surgical video recording within the NHS. These responses underwent an inductive 'open' coding process performed iteratively by two reviewers (AY, CS) to identify individual themes and subthemes. Where coded text could not be allocated to an existing theme, a new theme was created. Respondents were also asked to rate their agreement or disagreement with statements concerning surgical video recording, access, and utilisation, and to consider the appropriateness of surgical video ownership by various key stakeholders. Questionnaire responses were collated and analysed using Microsoft Excel.

Ethical approval and informed consent were not required for this study as the FOI Act entitles the public to request information from public authorities and respondents to public questionnaires are not considered research participants by the NHS Health Research Authority.

Role of the funding source

The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

Results

136/137 NHS trusts in England and all seven NHS boards in Wales responded to the FOI request, totalling 143/144 (97.9%) trusts/boards (Fig. 1). One trust in England was unable to provide responses at fifteen months following the request due to internal delays. Responding trusts/boards are listed in the Supplementary Data S3.

Policies were supplied by 48/136 NHS trusts in England and the 4/7 NHS boards in Wales, totalling policies from 52 trusts/boards for analysis. Trusts in England that supplied policies were "Teaching" (n = 15), "Large" (n = 12), "Specialist" (n = 5), "Small" (n = 5), or "Medium" (n = 11), as classified by the ERIC database.

At screening, policies provided by nine trusts/boards did not include any statements concerning the video recording of patients and were therefore excluded. Policies provided by the remaining 43 trusts/boards (Fig. 2) were reviewed against the UK GDPR principles.

Policies from 21/43 (48.8%) trusts/boards specifically considered surgical video, rather than visual and/or audio recording in general. The geographic distribution of the supplied polices and their consideration of surgical specifically is shown in Fig. 3.

Inter-rater reliability as calculated by Cohen's kappa was 0.515 (95% CI: 0.412–0.659).

Lawfulness, fairness and transparency

Consent

Video recording of surgery requires a valid patient consent. There are different types of patient consent that may apply, depending on how the recording is intended to be used. In addition to explicit informed consent, there may be implied consent, consent for anonymised recordings, and consent for incapacitated patients pursuant to the Mental Capacity Act 2005.[26] We have set out below our findings on the policies as relevant to the UK GDPR[25]—this is not a legal analysis.

35/43 (81.4%) policies stated when and how consent for video recording should be obtained, what should be covered in the consenting process, and how to proceed if it is not possible to gain consent. The remaining 8 policies stated how consent for video recording should be obtained but addressed the process in less detail.

The policies were consistent in the requirement for recording to stop if consent was withdrawn by the patient, or their representative, or if the act of recording was the cause of an adverse effect on the procedure.

Policies from different trusts/boards differed in the instances in which consent for recording is implicit in consent for the procedure, for example, one stated that consent was implicit for endoscopy and proctoscopy but not for other surgery, whereas another stated that consent was implicit for laparoscopic procedures. There was also variation in the type of consent required for

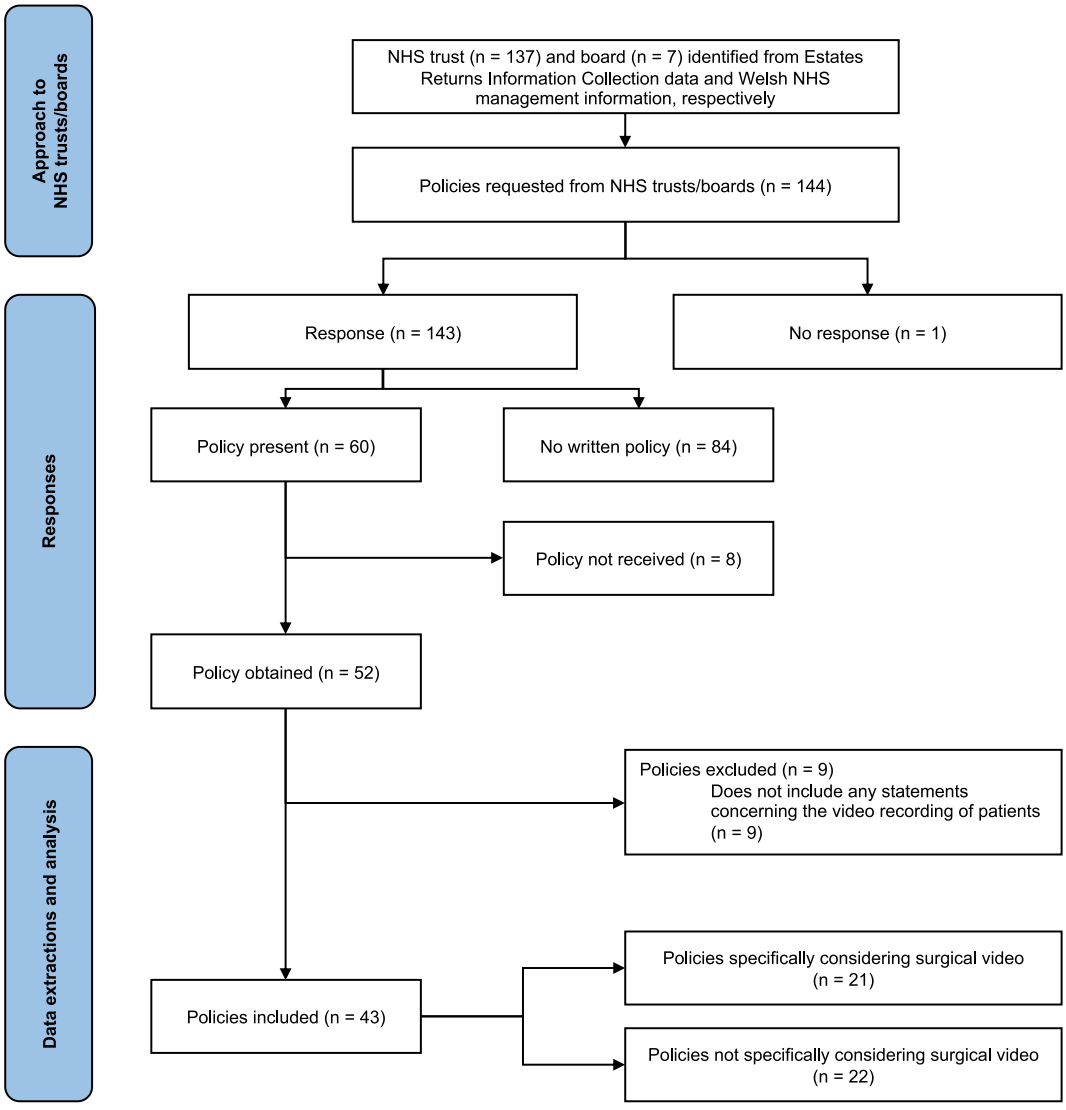


Fig. 1: Approach, responses, and policies supplied by National Health Service (NHS) trusts/boards.

similar purposes, with some trusts/boards acknowledging that their policies were *"stricter than national policy"*.

Levels of consent were discussed or acknowledged by a number of policies, including for patient records, education, publication, and other specific uses, however, the nomenclature and utilisation of these levels was inconsistent (Table 1).

Access

21/43 (48.8%) policies stated how patients could access surgical video recordings of their own procedures clearly. 8/43 (18.6%) policies stated that patients could access this video, but did not state how.

Many policies stated a patient's right to submit a subject access request (SAR) to obtain this video, citing the UK GDPR, Data Protection Act (DPA) 2018,[27] and/or Access to Health Records Act 1990[28] as the legal basis for this. The policies varied in their requirement for clinician consent and the charging of fees to provide patients with this video. Some policies commented that it would be good practice to show patients recordings in which they are the subject at the time of or after recording.

Copyright

Outside privacy law, in the UK copyright law protects original works and is automatically granted on creation. It protects the creator's exclusive rights to copy, adapt, communicate, and distribute their work. Generally, the creator is the first owner of the copyright, but there are

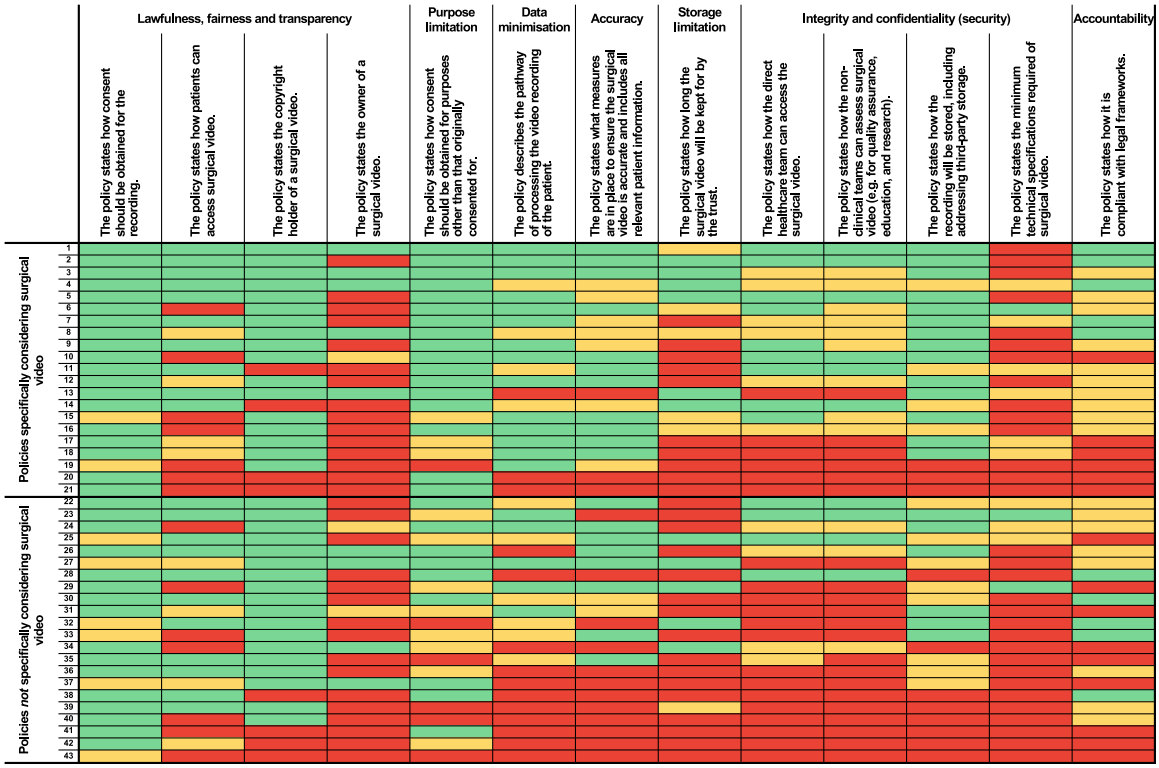


Fig. 2: Assessment of supplied policies according to United Kingdom (UK) General Data Protection Regulation (GDPR) principles. Key issues related to each principle were rated as being addressed clearly (green), somewhat (yellow), or not at all (red).

exceptions such as when a work is created by an employee within the scope of their employment. Access can be impacted by copyright, though this is not addressed by the GDPR.

35/43 (81.4%) policies clearly stated the holder of the copyright for surgical video recorded within the trust/board. These were unanimous in asserting that copyright is retained by the trust/board in which the video was recorded, and many policies stated that where video is used in publication, copyright must not be transferred to the publisher. One trust/board specified the duration for which it would hold copyright, stating this would *"usually stand for 70 years from that date* [of recording]*"*.

Ownership

9/43 (20.9%) policies clearly stated the owner of a surgical video, and 3/43 (7.0%) implied the owner but did not state it clearly.

The majority of policies did not discuss the ownership status of surgical video, or other patient imaging data. Most policies that did address ownership status asserted the trust/board in which a video is recorded is the owner of that video, however, one policy stated that the patient was the owner of a video in which they are the subject. Whilst access can be impacted by claims of ownership, this is not addressed by the GDPR.

Some policies referred to ownership in the context of physical objects, such as CD-ROMs and videotapes.

Purpose limitation

26/43 (60.5%) policies clearly stated when and how to obtain consent for use of surgical video outside the purpose consent was originally provided for. 11/43 (25.6%) policies referenced the need for further consent for purposes outside of the original consent, but did not specifically state how this should be done.

Many policies stated the need for explicit consent for a specific purpose for surgical video recording, with a number of policies giving the example that 'blanket' consent for publication *"just in case"* would be unacceptable.

Some policies stated that, if the necessary consent is unobtainable at the time of recording, consent may be provided retrospectively and required that the recording be destroyed without this.

Data minimisation

19/43 (44.2%) policies clearly stated how surgical video should be captured, transferred, stored, and removed from recording devices, whilst 10/43 (23.3%) policies stated how the recording should be captured or stored.

Policies accepted the use of trust/board approved recording devices but varied on the use of personal

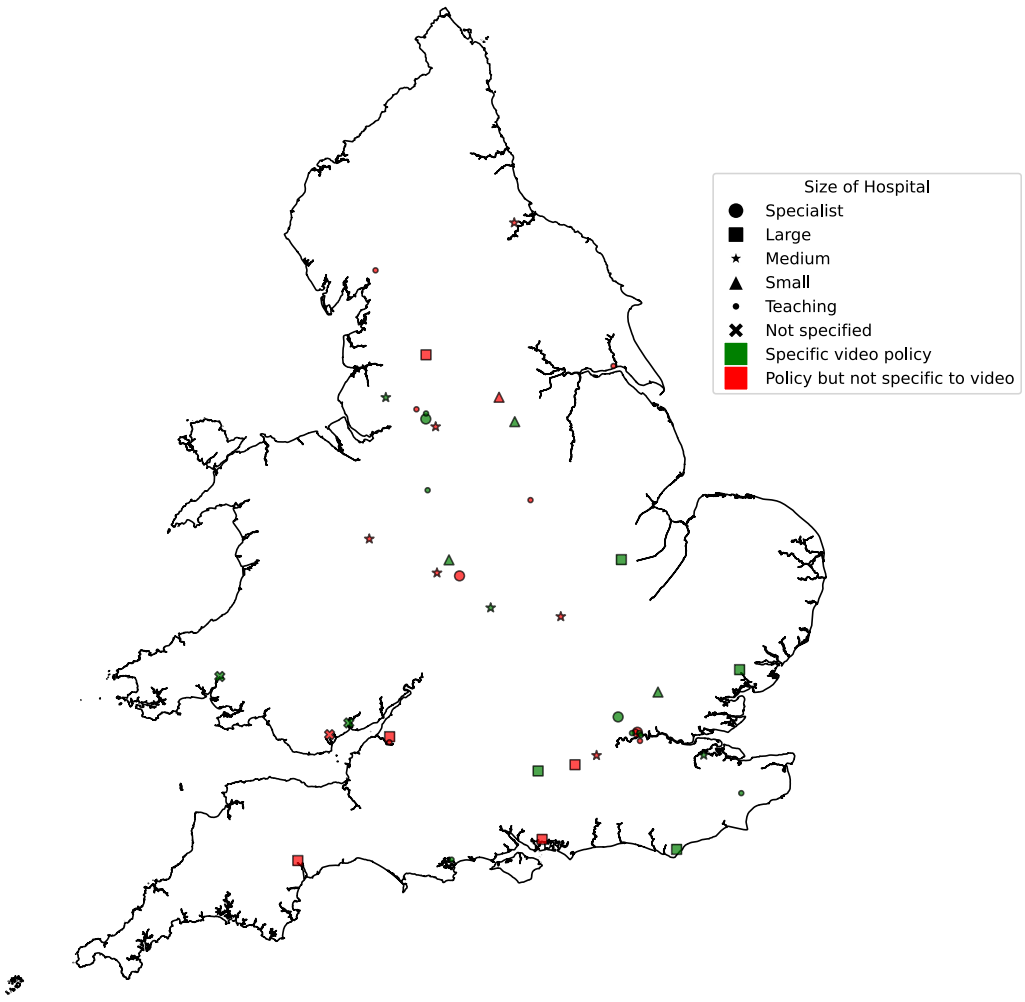


Fig. 3: Geographic distribution of the supplied polices concerning surgical video recording.

devices to capture surgical video—some accepted to use of trust/board approved applications, for example, Pando, Haiku, Medxnote, on personal devices. Three policies prohibited the use of USB and external hard drives.

Policies highlighted the importance of urgently transferring videos to encrypted, trust/board owned systems and promptly erasing unnecessary files. Some policies referenced specific staff who can assist with this, such as Medical/Clinical Photography/Illustration departments.

Accuracy

19/43 (44.2%) policies stated the labels and parameters required to ensure a surgical video is accurate and includes all relevant patient information. 9/43 (20.9%) policies stated how the video will be linked to the patient but addressed the requirements in less detail.

Information such as patient name, hospital number, date of recording, was required by many policies to assist with video storage organisation and retrieval—some trusts/boards utilised an image reference number system or had a standard operating procedure for the naming of files. Some policies required the reason for recording, documentation of consent, and/or diagnosis to also be stored with the media.

Multiple policies required the storage of first generation, unaltered media, in addition to video that has undergone additional editing (e.g. brightness adjustment), with one trust/board specifying digital media must be saved in its original format and explicitly prohibiting compression. Some policies commented on the need to duplicate analogue recordings such that an original can be preserved for archiving.

To minimise the risk of error, one trust/board required the use of an empty memory card for each

Institution A	Institution B	Institution C	Institution D	Institution E
Level One—is for medical record use only	Level 1: Medical record use only–images stored and viewable on the clinical image database. Can be referred onwards for second opinion. Not to be used for education or published in journals or public display.	Level 1—Patient record only consent given for images to be taken.	Level 1–Registered Healthcare Professional authorises photographs/recordings to be taken in the patient's best interest for MEDICAL RECORD ONLY.	Level A: for Medical Record use only The clinical images may only be used for direct patient care
Level Two—is for medical record and teaching	Level 2: Education and medical record—images stored and viewable on the clinical image database, but also can be used by clinicians and staff in presentations within the Trust to educate others such as case presentation during Grand Round	Level 2—Educate patients who are considering Similar Treatment to show to patients considering similar course of treatment, (anonymous images only used).	Level 2–Consent for photographs/recordings in MEDICAL RECORD ONLY	Level B: for Medical Record and Teaching The clinical images may be downloaded for use in, for example, lectures (with appropriate permissions)
	Level 3: Publication—whether in a journal, medical conference or internet site or public display. Specific written permission from the patient will be required for each instance of use in a journal article. Many journals will have a pro-forma for the patient to complete. For other public display and website use the Trust Image Release form	Level 3—Restricted Educational use consent gained for use in teaching (anonymous images only used).	Level 3–Consent for TEACHING and TRAINING NHS Staff and Partners in Health Organisations.	Level C: Medical Record, Teaching and Publication The clinical images may be used for teaching in the healthcare context and publication; this explicit consent does not extend to any further publication(s) or uses
		Level 4—Consent for Open Public Display and/or Publication in books, journals or on websites.	Level 4–Consent for Teaching and Training of non-NHS staff, RESEARCH, PRESENTATIONS at CONFERENCES, OR MADE AVAILABLE ON WEBSITES AND IN PUBLICATIONS.	Level D: Medical Record, NHS Funding

Table 1: **Verbatim examples of differing "levels" of consent for surgical video recording from select policies.**

patient being recorded, whilst another trust/board required media to be bookended by patient information stickers.

Storage limitation

11/43 (25.6%) policies stated the storage duration and subsequent management for a surgical video recorded within the trust/board, and 6/43 (14.0%) policies stated the storage duration alone.

Polices often referred to medical record retention policies and/or imaging and photography policies when establishing a storage duration for a surgical video. Notably, stated storage durations of recordings of patients of similar demographics and undergoing similar procedures differed considerably between trusts/boards, ranging from eight to 30 years for adult patients. One policy stated media should be deleted monthly, unless long term storage was specifically requested.

Integrity and confidentiality (security)

Healthcare access

13/43 (30.2%) policies state how the direct healthcare team can access a relevant surgical video, whilst 10/43 (23.3%) policies mention direct healthcare team access but do not describe practically how this should take place.

Where stated, policies viewing surgical video as part of the medical record permitted access by the direct healthcare team on that basis and within the terms of consent. Some policies provided access to tertiary centres in cases where there is a need for specialist input or advice.

Additional access

10/43 (23.3%) policies state how non-clinical teams can access surgical video and 12/43 (27.9%) policies mention access by non-clinical teams but do not describe this in detail.

Policies were clear that additional access to surgical video should be within the terms of consent that had been provided for recording. Some trusts/boards use a clinical image database in which access is provided to users with appropriate permissions according to the consent given—for example, healthcare professionals are able to access media from patients under their care, other users are able to access media for which consent for use in teaching and education has been provided. Some policies specified that only Medical/Clinical Photography/Illustration departments have permission to produce copies of trust/board owned media.

Storage

20/43 (46.5%) policies specified where a surgical video should be stored (e.g. electronic health record, named software) and 12/43 (27/9%) policies provided a general location for surgical video storage (e.g. NHS computer system, unnamed software). Policies from different trusts/boards differed in their consideration of surgical video as part of the medical record. Some policies mandated media storage on a trust/board server, rather

than third-party servers or un-networked hard drives, in order to maintain accessibility to the healthcare team and for disclosure, if required (e.g. in response to a SAR). Many policies emphasised the need for the secure transfer of media, such as via encrypted memory stick or nhs.net email. Some policies required surgical videos to be logged in patient notes so that it was traceable to the medical record.

One policy stated that staff making their own clinical patient recordings were responsible for the management, storage, retention, and destruction of their own clinical files.

Technical specifications

3/43 (7.0%) policies stated the minimum technical specifications required of a surgical video and 9/43 (20.9%) policies mentioned such specifications but do not provide specific requirements.

Policies addressing surgical video technical specifications often discussed the need for quality of resolution, focus, and colour depth or volume to be *"adequate for purpose"*—such that media has clinical value. Some policies preferred optical zoom to digital zoom, where possible. Screenshots of media were deemed unsuitable for diagnostic use by some policies.

Accountability

10/43 (23.3%) policies discussed their alignment with specific legislation, whilst 18/43 (41.9%) policies briefly stated compliance with legal requirements.

Most policies stated 'carrying out a public task' and/or 'medical purposes', under Articles 6 and 9 of the UK GDPR, as the legal basis for media processing by the trust/board. Some policies also referenced the Institute of Medical Illustrator's Code of Professional Conduct for Professional Members (2014),[29] DPA 2018, Caldicott Principles,[30] Human Rights Act (1998),[31] and General Medical Council (GMC) Guidance on Making and Using Visual and Audio Recordings of Patients (2013).[32]

Patient and public involvement

Members of the public were invited to complete our questionnaire on routine surgical video recording in the NHS at our patient and public involvement event. 255 complete responses were obtained. Respondent demographics are summarised in Table 2.

Themes, subthemes, and quotations from respondents expected uses of, perceived benefits of, and concerns regarding, routine surgical video recording within the NHS are shown in Table 3. Three themes (education, record keeping, research) were identified from free-text responses regarding respondents' expected uses of surgical video. Three themes (educational tool, objective evidence, patient satisfaction) were identified from respondents' perceived benefits of routine surgical video recording. Three themes (privacy, consent, security) were identified from respondents' concerns with routine surgical video recording.

	Total (N = 255)	%
Gender		
Male	107	42.0%
Female	129	50.6%
Other	0	0.0%
Prefer not to say	19	7.5%
Age		
18–30	92	36.1%
31–40	6	2.4%
41–50	82	32.2%
51–60	64	25.1%
61–70	6	2.4%
>70	0	0.0%
Prefer not to say	5	2.0%
Ethnicity		
White	129	50.6%
Asian	76	29.8%
Black	11	4.3%
Mixed	12	4.7%
Other	18	7.1%
Prefer not to say	9	3.5%

Table 2: **Public and patient involvement questionnaire respondent demographics.**

Respondents' agreement or disagreement with statements concerning surgical video recording, access, and utilisation are shown in Fig. 4A.

80/255 (31.4%) respondents agreed with, and 79/255 (31.0%) respondents were neutral to, the statement that all surgical procedures should be recorded. 70/255 (27.5%) respondents agreed with, and 93/255 (36.5%) were neutral to, the hospital holding the copyright to a surgical video.

183/255 (71.8%) respondents strongly agreed or agreed that the recording of their surgical procedure should be stored on an NHS computer/server. 125/255 (49.0%) respondents strongly disagreed or disagreed that the recording of their surgical procedure should be stored on a third-party computer/server engaged in a contract with the NHS; 91/255 (35.7%) respondents were neutral to this.

186/255 (72.9%) respondents strongly agreed or agreed that they would be interested in accessing their own surgical procedure videos. 164/255 (64.3%) respondents strongly agreed or agreed that surgical procedure videos should only be viewed by patients in the presence of an expert to explain what is happening in the video.

Respondents strongly agreed or agreed that they would be happy for videos of their surgical procedure to be used for surgical quality assurance purposes (236/255, 92.5%), educational purposes (241/255, 94.5%), and research purposes (242/255, 94.9%).

Theme	Subtheme	Quote
Expected uses of surgical video		
Education	Patient	"Explain to the patient about surgery and for educational purpose."
		"To show patients what a procedure may look like."
		"To show a patient at how it all went."
		"Important as we are able to get a better understanding of how a surgical procedure works."
		"Opportunities for patient debrief if requested by patient."
	Trainee	"Allowing medical students and practicing doctors to learn about a new type of surgery."
		"Educational for students."
		"For training purposes for the junior doctors."
		"Prepares the students for different outcomes and scenarios."
		"To support training of real situations and responses to these."
	Surgeon	"Rewatching footage to make observations to improve technique or surgical practices."
		"Analysing footage for improvements or mistakes."
		"Anticipate to be used for reflection and improvements in surgery."
		"People can learn from other surgeons' techniques and could potentially improve on their methods."
Record keeping	Evidence for litigation	"Could be used as evidence if something went wrong or to prove a case during litigation."
		"If things go wrong there is video evidence that can be used to see what happened."
		"Evidence to protect against negligence claims."
		"Physical evidence–don't have to rely on testimony."
	Quality Assurance	"To see where surgeries have gone wrong so that improvements can be made."
		"Quality of the surgery and hospital practice, ongoing learning or learn from best practice."
		"Recognises mistakes so they can be improved on later procedures."
		"To ensure procedures are done correctly and spot mistakes/improvements."
		"Quality assurance for institutions and patients, training."
	Documentation	"Have the record in case anything goes wrong."
		"Provides a record of activities."
		"A record of procedure. I think an efficient way to see clear records in detail very important."
		"To have a record of surgeries for future reference."
Research	Novel techniques	"They can be studied and analysed to find out more effective techniques."
		"Development of techniques/guidance."
		"To share practical techniques."
		"Research if the patient has a rare condition."
	Artificial intelligence	"Review of more data through AI, linking past outcomes to procedures."
		"Can be used an AI/ML model."
		"Enable AI visual intelligence/visual learning."
		"Development specialist knowledge/developing AI."
Benefits of routine surgical video recording		
Educational tool	Increased accessibility	"Allows teaching and reflection to be done without having to be present in the surgery."
		"A realistic video to show what happens in surgery in teaching."
		"Can see routine practices rather than trying to describe them."
		"Enhanced teaching opportunities and abilities as a result of using real examples."
		"Every day is different, students and even experts will get opportunity to explore and learn more."
		"Helping people and particularly students understand surgeries taking place and giving them a strong insight into surgery."
	Reflective practice	"Allowing surgeons to reflect and understand more about the benefits and complications involved in surgery."
		"Be able to review the surgical procedure."
		"Being able to capture details of the operation and analyse it later for learning, research or sometimes legal purposes."
		"Review of the actual process of the Surgical team for future improvement."
		"Primarily to enable a review of the procedure if required, training, research."
	Quality Improvement	"Generally improved professional practices in all areas."
		"Help to improve techniques, prevent problems that occur often."
		"Helps the standardise and level of care/outcomes."
		"Higher quality surgery outcomes and more accountability."
		"Improves knowledge through 'in situ' examples."
		"Allow biomedical engineers to design better equipment based on surgery footage."
		"Identifying opportunities to improve patient safety, processes within theatre."
		"People can learn from other surgeons' techniques and could potentially improve on their methods."
		"Recognises mistakes so they can be improved on later procedures."
		"Techniques were improved by spreading best practice."
Objective evidence	Complications/Malpractice	"Could also be used to check if any mistakes were made if something happens to the patient after the procedure."
		"Protect against negligence."
		"Can be useful for finding mistakes preventing malpractice."
		"For use in the event of any reported incidents or 'never events' for evidence gathering and supporting statements."
		"Proof of how the surgery has been done in case of any problem."
		"Teaching as well as resolving possible disputes after surgery between patient and medical staff."
	Quality control	"Checking standards are maintained and best practice are implemented."
		"Ensures that correct practice is conducted by providing evidence."
		"More in-depth analysis available for training/diagnostics."

(Table 3 continues on next page)

Theme	Subtheme	Quote
(Continued from previous page)		
Patient satisfaction		"Gives confidence to the patient to avoid medical negligence." "Patients are aware of what to expect." "Patients can request video to see what happened to them." "Reduces stigma of surgery, helps people to see how to practice surgery with real situations." "You could use as evidence, if the patient questioned about the surgery."
Concerns regarding routine surgical video recording		
Privacy	Video access	"Who has access to the surgical videos." "Should be kept within the NHS and can be accessible by patient." "Yes, who has access to recordings afterwards." "I would be concerned about insurance companies gaining access." "[I] would have concerns about the secure storage of it and access to it."
	Data protection	"Information must be protected at all times." "Must be in line with data protection information." "Needs to be treated as personal information may be covered by GDPR or similar." "Protection so much uploaded to social media sites and as a surgeon myself, I would worry about having control of it."
	Anonymity	"Ensuring the patient is anonymous/unidentifiable." "Consent if it becomes personal e.g. face, i.e. identify patients without consent." "Only that it remains anonymous and patient privacy is retained." "Where would the recordings be stored, will the patient's identity be in the video (privacy concerns)."
Consent	For recording and use	"Asking consent to the patient to see whether or not he/she would like to be recorded." "Patient being identified from the video, surgeon not getting consent for other purposes of the video." "Patient confidentiality and complications surrounding consent especially for more intimate procedures." "Checking standards are maintained and best practice are implemented."
	Capacity	"Importance of consent for patients lacking mental capacity." "Patients could not be in a condition to give consent."
Security	Data breach	"Data breaches, leaked videos online." "If they are leaked and affect people's security and privacy." "If they are not protected well, they can be leaked to public which might cause discomfort to patient." "Where it's going to be stored/is it secure i.e. encrypted"
	Misuse	"Can be shared as disturbing content or exploited." "Privacy issues possible other uses not intended." "Misuse of the footage."

Table 3: **Themes, subthemes, and quotations from respondents regarding the expected uses of, perceived benefits of, and concerns regarding, routine surgical video recording within the National Health Service (NHS).**

188/255 (73.7%) respondents strongly agreed or agreed that they would be happy for videos of their surgical procedure to be used to train NHS artificial intelligence (AI) tools. 119/255 (46.7%) respondents strongly agreed or agreed that they would be happy for videos of their surgical procedure to be used to train third-party AI tools with an agreement/contract with the NHS, whilst 80/255 (31.4%) respondents strongly disagreed or disagreed with this statement.

When asked to rank the appropriateness of surgical video ownership by different key stakeholders (1, most appropriate, to 5, least appropriate), respondents ranked the hospital (mean rank 1.83) and the patient (mean rank 1.89) as the most appropriate (Fig. 4B).

Discussion

This work builds on our previous nationwide assessment of the adoption of routine surgical video recording in England and Wales.[13] Since this study, we received responses from a further three NHS trusts in England, for a total of 143/144 (97.9%) responses from NHS trusts/boards in England/Wales. Only 43/143 (30.1%) trusts/boards provided policies relevant to surgical video recording, with just under half of these considering surgical video specifically, indicating an important gap in local governance concerning an increasingly common practice.[33]

There was broadly even distribution of the trusts/boards providing policies relevant to surgical video across England and Wales. In England, over twice as many "Teaching", "Large", and "Medium" trusts supplied policies relevant to surgical video recording compared to "Specialist" or "Small" trusts. As current recording practices appear to be decided at local or individual surgeon level, the distribution of policies may not currently reflect the accessibility of surgical video recording to NHS patients. Nationwide adoption of a modernised surgical video recording policy, nevertheless, will be fundamental to ensuring the future generation of diverse surgical video datasets that are representative of the UK population—this is particularly important for use in education, research, and AI tool development.

Consent is a legal requirement for surgery, and was identified as an important issue in our analysis of patient and public concerns regarding routine surgical video recording. Surgical video recording is routinely discussed as part of the procedural consent process in

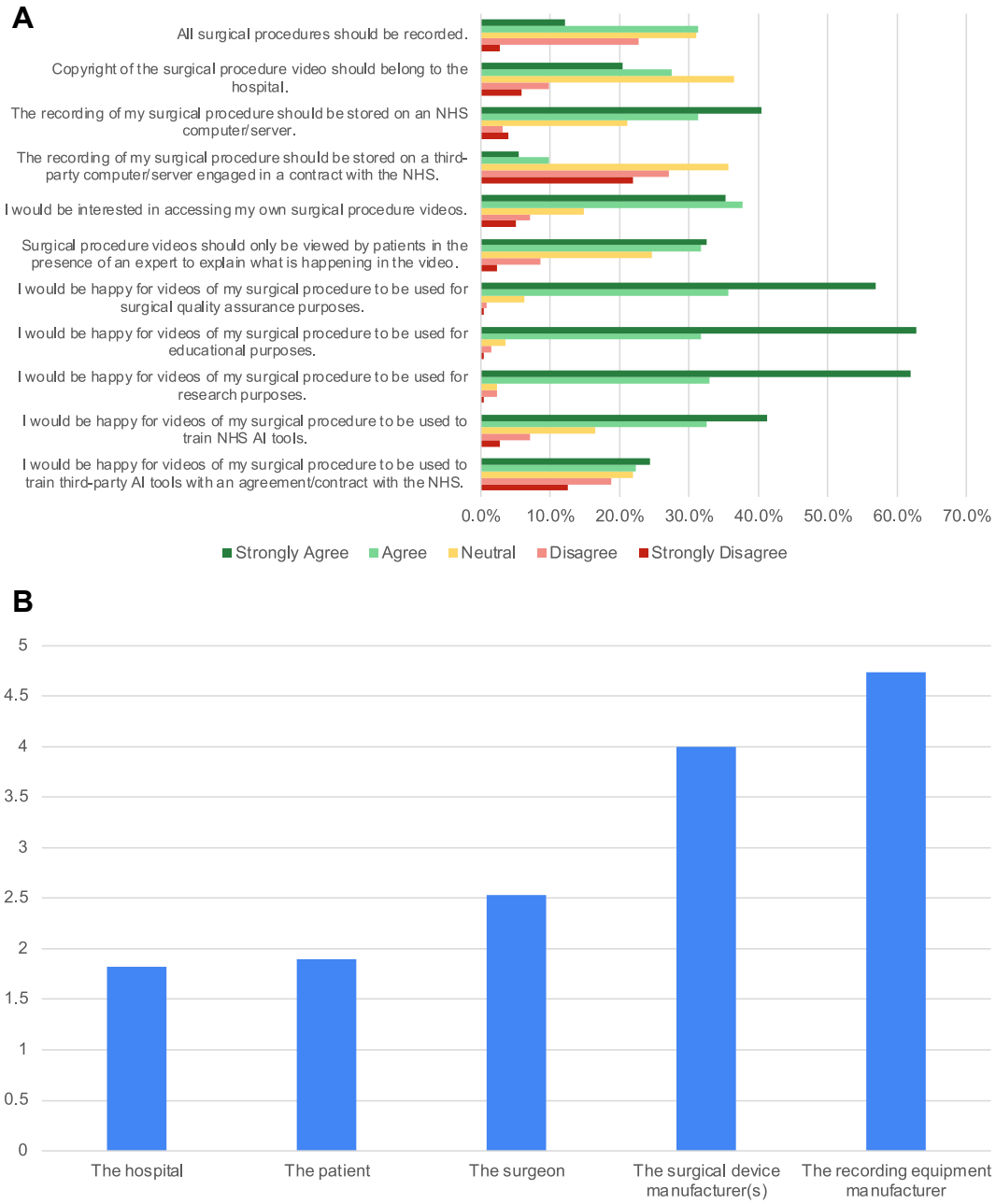


Fig. 4: A) Extent of agreement/disagreement with the statements about surgical video. B) Ranking appropriateness of surgical video ownership by key stakeholders (1, most appropriate; 5, least appropriate).

almost half of NHS trusts/boards in England/Wales,[13] and our questionnaire demonstrated support for routine surgical video recording in almost a third of respondents and indifference to this in almost a further third of respondents. We might, therefore, expect an increase in the discussion of surgical video recording to give rise to a corresponding increase in the number of recorded procedural videos. All the supplied policies addressed the consent process required for surgical video recording; the majority discussing when and how consent should be obtained, what should be discussed with the patient, and how to proceed in situations where it is not possible to gain consent. Patient autonomy and safety were also prioritised by the requirement to stop recording if consent was withdrawn or if recording adversely affected the procedure.

The GMC considers consent to record internal organs or structures and laparoscopic and endoscopic images implicit in the consent given for the procedure, but advises that further consent is required should the patient be identifiable from these recordings.[32,34] Indeed, privacy was another theme identified in our public and patient involvement. The risk of identification may account for the heterogeneity between trusts/boards on the situations in which consent to record is implicit in consent for the procedure and the perceived need for local policy to be stricter than national policy in some trusts/boards. Variation in practice might be reduced, and informed patient decision-making ensured, by a national mandate for written consent to record surgical video.

Furthermore, differences in the nomenclature and use of "levels" of consent by trusts/boards has potential to confuse interactions between institutions, possibly hindering education and research—two of the themes identified as expected uses of surgical video by patients and the public. It would, therefore, be useful to standardise the use of levels of consent for recording within the NHS.

The majority of our questionnaire respondents showed interest in accessing videos of their own surgical procedures, with most supporting a requirement for the presence of appropriate expertise to explain the video. This was also discussed in free-text responses to perceived benefits of surgical video recording, in which respondents commented on the use of video to set expectations and instil confidence in patients. Two-thirds of the supplied policies stated that patients could request videos of their procedures, where they exist, usually via a SAR. Notably, however, there was no description of how this access would be provided or whether it would be accompanied by relevant expertise. Some policies also suggested patients could be shown recordings as or after they are recorded—whilst this may be convenient for photographs and radiological images, review of surgical video during or shortly after the procedure might be impractical.

Most trusts/boards asserted their copyright for surgical video recorded within their premises, but were less clear regarding the owner of the video—with disagreement between policies over whether this should be the trust/board or patient. This was consistent with our questionnaire respondents ranking of the hospital and the patient as the most appropriate surgical video owners. Further work is needed to evaluate current copyright and ownership practices, and to consider the relevance of other surgical video stakeholders—especially as the latent value of this data may be realised in the near future.[11]

Other themes identified in our patient and public involvement were privacy and security, with further subthemes of concerns over the accessibility and possible misuse of surgical video once it has been recorded. This is particularly relevant in the context of recent cyberattacks that have attempted to ransom NHS patient data.[35] Purpose limitation was addressed by most of the supplied policies, which required consent to be specific for a given use and did not accept 'blanket' consent practices. These are examples of policies which promote patient autonomy and justice, two of the principles of biomedical ethics,[36] by ensuring patients are able to make informed and specific choices about the use of data generated within their care.

Processes which avoid the need to duplicate video files, such as the use of bespoke software/applications over portable local storage as stated by multiple policies, reduce the risk of inappropriate access and misuse. However, given the variation in local recording practices,[13] some polices pragmatically address this potential risk by necessitating the use of encrypted hardware and requiring prompt erasure of unnecessary files. It may be helpful for institutions to adopt regional, or even national, standard operating procedures for surgical video recording in order to reduce variation and share best practices. These should seek to benefit from modern storage technologies and solutions to increase efficiency and reduce the administrative burden on healthcare professionals.

Accurate storage of surgical video is essential to a number of the expected uses (e.g. record keeping, research) and benefits (e.g. objective evidence) identified by respondents to our questionnaire. This was addressed by almost two-thirds of the supplied policies, some of which detailed specific systems and/or software used to catalogue videos and other media on NHS servers or bespoke systems. There was notable variation in the metadata that was required to be stored with the video, suggesting a need for consensus to be reached over which of this information is essential in order to comply with the data minimisation principle. Moreover, whilst the requirement by some policies to store first generation, unaltered media ensures compliance with the accuracy principle, if surgical video were to be recorded at scale, this would pose a significant data storage and compute capacity challenge to current NHS information technology infrastructure.

Storage limitation and processes were addressed variably in the supplied policies. Less than half of the policies stated a storage duration, and, in those that did, there was significant variation in the length of storage duration. Some of this heterogeneity may be accounted for by differing perceptions of surgical video as part of a patient's medical record, which, if included, would subject it to medical record retention policies. There is currently no consensus within the surgical community on the status of surgical video as related to the medical record[37]; the DHSC requires adult health records to be retained for eight years, with possible further extension up to 20 years, before review for archiving.[38] Furthermore, clarification is required for storage limitation and

processes for surgical video which has been recorded for additional purposes, such as education and research—particularly when considering the use of large video datasets for the training of AI tools.

Our patient and public involvement identified a majority support the storage of surgical video on NHS systems, whilst almost half of respondents opposed the use of third-party storage providers. Some of the supplied polices supported practices consistent with this view, by mandating the use of trust/board servers, however, a number of third-party storage providers are also currently in use within the NHS[13] and offer storage capacity, annotation, telemedicine, integrated holistic data acquisition, and, sometimes, sophisticated AI or extended reality tools.[15] Delegation of the responsibility for video management, storage, retention, and destruction to the recording healthcare professionals, as in one of the supplied policies, risks variation in practice within the same institution and may not provide sufficient support to clinical staff seeking to ensure best practice.

Access to surgical video by members of the direct healthcare team and others were addressed in half of the supplied policies. Access by the direct healthcare team is, perhaps, a self-evident use of surgical video, and use of video for surgical quality assurance was overwhelmingly supported by respondents to our questionnaire. Polices stated clearly that additional access to surgical video should be within the terms of consent, with some institutions utilising databases with settings that maximised access to, and therefore the potential benefits of, videos. Such practices are well supported by patients and the public, with education perceived as an expected use and benefit of recording surgical video and the vast majority of respondents to our questionnaire agreeing with the use of surgical video in education and research.

Notably, research into AI tools was a subtheme identified from the free-text responses to the benefits of surgical video recording. Almost three-quarters of respondents supported the use of surgical video to train NHS AI tools, with just under half of respondents supporting their use to develop third-party AI tools—mirroring opinions on the video storage.

Technical requirements for surgical video were generally poorly defined, with most policies requiring the video to be *"adequate"* to provide clinical value. This contrasts with practice in Radiology, where minimum acceptable technical requirements are used to ensure full-fidelity, diagnostic-quality images.[39] The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) have previously compared the video quality, services, analytics, and metadata provided by 13 video recording platforms[15]—many of which are in use within the NHS. Technology that protects anonymity outside the surgical field, such as automated blurring of extracorporeal images,[40] was also not discussed. Furthermore, the referencing of legacy technology such as CD-ROMs and videotapes is clear evidence that many policies need to be modernised to be relevant to current and future technologies, such as increasingly present digital surgery ecosystems.[11]

Almost two-thirds of supplied policies asserted an express legal basis for their processing of personal data, which may be present in surgical video, within their remit to deliver public tasks and for medical purposes within the publicly-funded healthcare system. GMC guidance requires the maintenance of patients' privacy, dignity, and autonomy,[41] however, as previously discussed, some trusts/boards deemed it more appropriate to utilise stricter policies.

Our recommendations to address the discordance between patient and public expectations and current surgical video governance in England and Wales relate to the NHS, however the findings of this work have global relevance (Table 4). In the United States and European contexts, adherence to legislation such as the Health Insurance Portability and Accountability Act (HIPAA) and the California Consumer Privacy Act (CCPA), and the European Union GDPR, respectively, are required. The issue of health provider control over the surgical data is poised to become a preeminent issue given the rapid and poorly coordinated

1.	When consent is the legal basis for processing personal data under (e.g. surgical video) the GDPR, it should be explicit, written, and freely given; nevertheless, in all cases, patients should be provided with a clear description of the purposes of video use and access rights.
2.	Levels of consent by patients as data subjects for recording and use (e.g. medical record, education, research, publication) should be standardised.
3.	Patients should have the right to access to surgical video recordings in which they are the subject (identifiable or unidentifiable) with appropriate clinical support available to interpret the content.
4.	Copyright should be held by the institution in which the video was recorded.
5.	Technical guidance for surgical video recording must be relevant to digital surgery ecosystems (e.g. applications, internet-connected laparoscopic and endoscopic stacks) and storage solutions (e.g. cloud storage).
6.	Only necessary metadata (e.g. hospital, procedural information, operating surgeon, patient outcome, etc.) should be recorded and stored with surgical video to provide context.
7.	Surgical video should be stored for a defined and justified period of time on systems that are controlled by the institution in which the video was recorded, and remain accessible to healthcare professionals within the scope of provided consent.
8.	The legal basis of surgical video recording, use, and storage should be stated clearly in local policy.

Table 4: **Health service policy recommendations for the governance of surgical video.**

digitisation of surgery, and the ensuing development of multinational, healthcare professional- and patient-facing services by industry. The need for the involvement of key stakeholders, such as patients and the public, healthcare professionals, and health system leaders, to revise relevant policy is, therefore, urgent.

Our study has a number of limitations. Whilst all 144 NHS trusts/boards in England and Wales provided acknowledgement of our FOI request, one trust in England did not provide a response. From the 143 trusts/boards that did respond, 52 supplied policies for review, of which 43 were relevant to surgical video. Our patient and public involvement was held at a central London university open day, potentially biasing the results of our questionnaire towards results from demographics more likely to engage with higher education and within certain age ranges.

In conclusion, this nationwide review of local NHS governance polices relevant to surgical video demonstrates the majority of trusts/boards in England and Wales are deficient in their governance of surgical video recording practice. Of the trusts/boards supplying policies relevant to surgical video recording, only half had policies that considered surgical video recording specifically, and all of the supplied policies addressed UK GDPR principles variably. There is, therefore, significant scope for national coordination and revision of policy to address outstanding issues of best consent and accessibility practices, copyright and ownership issues, storage procedures, and minimum technical requirements. Our patient and public involvement identified expected uses of surgical video to be education, record keeping, and research; benefits of routine surgical video recording to be an educational tool, objective evidence, and patient satisfaction; and concerns with routine surgical video recording to be privacy, consent, and security. It also provided important insights into patient and public opinion on routine surgical video recording practices, and demonstrated their support for surgical video use in quality assurance, education, and research. From this, we recommend a series of actions to address the discordance between patient expectation and the current governance of surgical video recording.

Contributors

AY–literature search, study design, data collection, data access and verification, data analysis, data interpretation, writing, figures, decision to submit.

KL–literature search, study design, data access and verification, data analysis, data interpretation, writing, figures, decision to submit.

CS–study design, data collection, data analysis, data interpretation, writing, decision to submit.

AS–data collection, data interpretation, writing, decision to submit.

CH–data collection, data interpretation, writing, decision to submit.

MV–data interpretation, writing, decision to submit.

JK–study design, data analysis, data interpretation, writing, decision to submit.

All authors read and approved the final version of the manuscript.

Data sharing statement

The datasets generated during the current study are available from the corresponding author on reasonable request.

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Declaration of interests

JK is a share holder in Surgease Ltd and Medical iSight Ltd. The authors have no other conflicts of interest to declare that are relevant to the content of this article.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.eclinm.2025.103490.

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