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Original Article

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Does Printed CT Films Serve A Purpose in Urological Decision Making? A Practice Wasting Taxpayers' Money

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Abstract

Introduction: Abdominal computed tomography (CT) is a widespread imaging modality used in most of the surgical specialties including urology. Although console and CD based reporting has become the gold standard film printing with a high financial burden is still widely practiced. Present study analyses the current need of CT films compared to the radiologist report with a few representative frames.

Methodology: Abdominal CT images of 80 consecutive patients at a tertiary centre were analysed. The final reports issued by the radiologists and the hard film copies were assessed to find the incremental benefit ofthe films and their influence on decision making.

Results: Out of 80 reports 23% (n=18) were contrast studies and 20% (n=16) were for malignant conditions. A median of 4 CT films with 20 panels in each were printed. Additional axial and reconstructed cuts provided in 66% (n=53) of the population. A median of 2 (n=65) films with 4 small panels provided the information given in the report. Additional visual information was gathered only in 13% (n=11) which were useful for treatment decisions during surgical interventions such as percutaneous renal access and partial nephrectomy.

Conclusion: The practice of printing large number of films in abdominal CT reporting is obsolete in developed countries. Present study highlights the gross overutilization of films and their ill found place in decision making. Compared to console reporting the study affirms that hardly any additional information is obtained by printed films. Printed films may have a limited place in urological interventional procedures. This study concludes that a large-scale financial burden can be avoided by judicious printing of films and practising computer base reporting with a hard copy in an electronic medium.

Keywords: Computed Tomography, PACS (Picture archiving and communication systems), Urology, Radiology, Filmless reporting, DICOM (digital imaging and communications in medicine)

Introduction

Computed tomography (CT) has become an indispensable imaging modality across surgical specialties, providing crucial information for diagnosis, staging, and treatment planning. In urology, CT imaging plays a vital role in the management of both benign and malignant conditions, influencing key clinical decisions such as surgical planning, oncological staging, and postoperative evaluation (1,2).

Traditionally, CT images were reviewed as printed films, which formed the standard method of reporting. However, with rapid advancements in imaging technology and the widespread adoption of Picture Archiving and Communication Systems (PACS), digital reporting has emerged as the preferred and more efficient approach (3). Digital platforms offer superior image quality, reproducibility, and ease of access, enabling multi disciplinary discussions and remote consultations (4).

Despite these global advances, many imaging centres in Sri Lanka continue to provide printed CT films alongside textual reports. These films often add little value to clinical decision-making while significantly increasing costs to both healthcare institutions and patients. In a resource-limited, middle-income setting, such practices may represent an unnecessary financial burden.

This study aims to evaluate whether printed CT films serve a meaningful purpose in urological decision-making and to assess the potential economic implications of this outdated practice.

Methodology

This prospective observational analytical study was conducted at one of the urology wards of the National Hospital of Sri Lanka from April to July 2020. A consecutive cohort of patients who underwent urological interventions based on CT imaging over a four-month period was included. Data were collected using a structured, interviewer-administered proforma designed for this study. Information regarding the indication for imaging, details of the CT scan, radiologist's report, and the influence of both the report and printed CT films on clinical decision-making were recorded.

For each case, the findings documented in the radiologist's text report were compared with the information obtained by the treating clinician from the printed CT films. The additional or incremental contribution of the printed films to clinical management decisions was analysed. Cost analysis was performed to compare the expenses associated with console-based digital reporting alone versus combined digital reporting with provision of printed films. Ethical approval for the study was obtained from the institutional ethics review committee. All patient data were anonymised to maintain confidentiality.

Results

A total of 80 patients were included in the study, and 326 printed CT films were analysed. Each film contained 24 small panels of axial and coronal CT slices. Additional axial and reconstructed cuts were provided in 66% (n=53) of patients. Of the 80 patients, 23% (n=18) underwent contrast-enhanced studies. Indications included both benign and malignant urological conditions: 20% (n=16) were evaluated for malignancy of the genitourinary system, while the remaining patients were assessed for benign conditions, including urolithiasis (n=59), cystic kidney disease (n=2), and infectious diseases (n=3).

Printed CT film distribution

Nearly all patients (99%) received more than one CT film. The median number of films per patient was 4, representing approximately two-thirds of the study population (66%). Eighteen percent of patients were issued more than 4 films (Figure: 1).

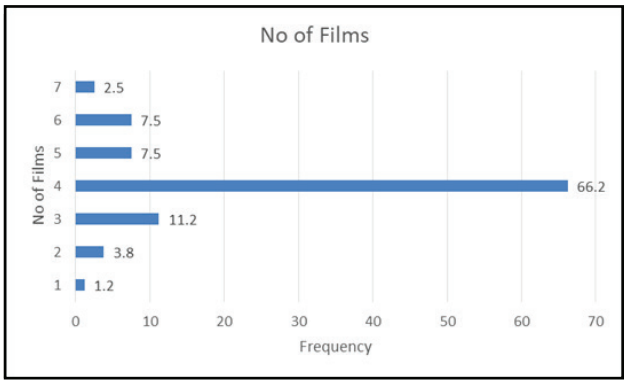

Figure 1. *Distribution of the number of printed CT films per patient.*

Clinical impact of printed CT films versus radiologist's report

In patients with benign conditions, only 2 small panels per film were sufficient to provide information equivalent to that in the radiologist's report. In malignant conditions, 2-4 panels were informative. Despite this, 99% of patients were provided with multiple films containing all 24 panels, most of which did not contribute to patient management.

Analysis showed that only 17% of patients (n=14) obtained additional information from the printed films beyond the radiologist's report – 16% in benign and 21% in malignant cases. The clinical impact of this extra information was negligible for benign conditions and limited to 14% in malignant cases (Figure 2 and 3).

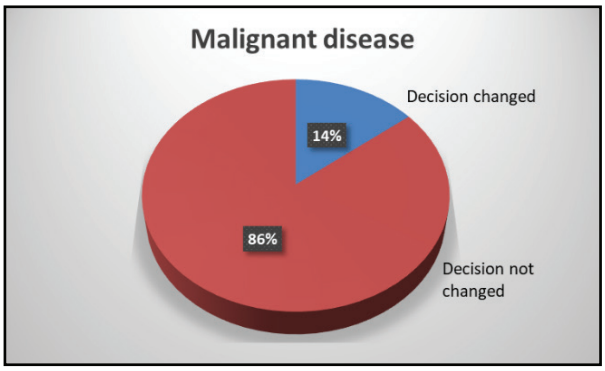

Figure 2. *Proportion of patients in whom printed CT films provided additional information beyond the radiologist's report.*

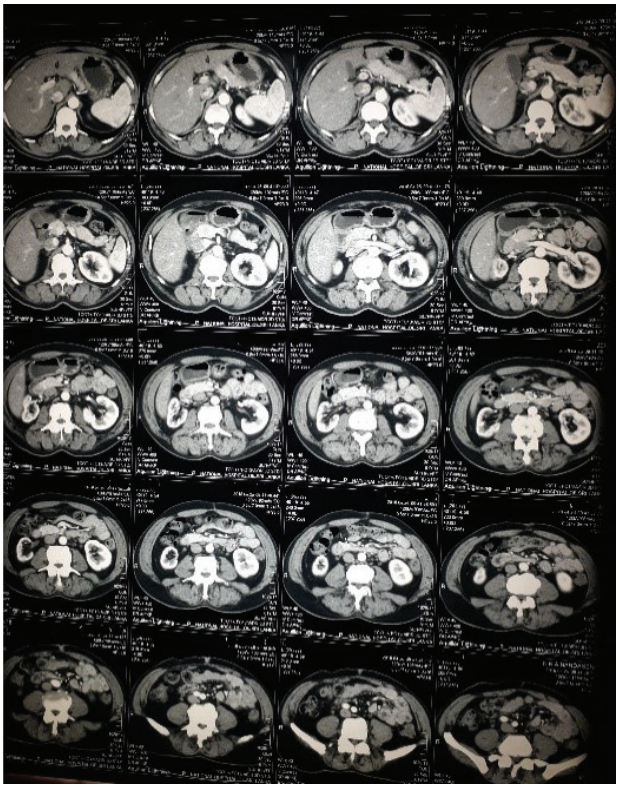

Figure 3. *Printed CT image containing additional panels which are not relevant to the pathology (reported as bladder tumour causing bilateral hydronephrosis).*

Discussion

The evolution of computed tomography (CT) since its invention in 1972 by Allan Cormack and Godfrey Hounsfield has revolutionized medical imaging, particularly in urology (5). Initially, CT images were reported using printed films, a method that has become increasingly obsolete with advancements in digital imaging technologies. The transition to digital systems, notably Picture Archiving and Communication Systems (PACS), has significantly enhanced the efficiency and quality of radiological services in developed countries (3). PACS facilitates the storage, retrieval, and sharing of medical images, allowing for rapid access and manipulation of images, which is crucial for timely and accurate clinical decision-making (4). Benefits include rapid image processing, reproducibility, improved reporting quality, and streamlined data transfer between centres, ultimately enhancing patient management and institutional efficiency (6).

Unfortunately, public health sector in Sri Lanka is yet to this technology widely and console based reporting occurs only in the radiology department which is not accessible to the treating clinicians most of the time (7). The information to the clinician is received, almost always as printed films of the large number of CT image slices with or without vertical and 3D reconstruction, which are mostly selected by the radiographers with minimal supervision. Hence printed films have a high chance of missing important data.

In the present study we found that almost everybody was issued with more than 1 film each containing 25 small panels whereas the important information mentioned in the radiologist's report were demonstrable just in 2 small panels rendering the rest over 75% of the films non informative and a waste of resources. It would have quite been sufficient for the clinician, if the relevant data which is already mentioned in the radiologist's report, were highlighted and printed one single film. Moreover, it would have been more informative if the clinician gets direct access to the electronic image display.

Provision of additional information from printed CT films was also not significant as demonstrated in this study as in benign diseases it didn't have any impact on patient management and in malignant conditions only 14% had beneficial impact. This makes over 75% of the printed films has no positive impact on patient management only causing an unnecessary cumulative financial burden on the health system. In Sri Lanka, according 2020 data from medical supplies division of Ministry of Health, the cost expenditure for each film varies from Rs 168.63 to Rs 281.94 (Table 1).

Table 1. Expenditure per film for 2020 from 4 different brands according to the CT machine model

Brand	cost/film (SLR)
No of films purchased	
Brand A 250000	281.94
Brand B 75000	168.63
Brand C 65000	168.63
Brand D – Data not available for 2020.	

According to this data, the projected expenditure for the films to print the CT report is more than 94 million rupees/year for national hospital alone. As demonstrated above if 75% of films are non-productive in-patient management apply this concept to other similar specialities and regional hospitals it would lead to saving millions of rupees for the national health budget.

Financial analyses from other countries provide insight into the potential cost savings associated with transitioning to digital imaging systems. For instance, a study conducted in Finland found that the implementation of PACS resulted in a net saving of approximately USD 485,000 over an eight-year period, with a payback period of four years (3). According to a study performed in India, the cost of establishing PACS system in a single unit was 20 million Indian rupees and they found that they were able to save 0.7 million rupees/month for a particular ICU just from avoiding printed X ray films (8). Further, Langer et al found that the productivity of the radiologists also increased by 10-30% in a filmless environment (9).

In the context of urology, the integration of advanced imaging technologies, such as three-dimensional (3D) reconstructions, has been shown to enhance surgical planning and outcomes. A study examining the impact of 3D reconstruction on surgical planning in kidney cancer cases found that exposure to 3D reconstructions significantly influenced the decision-making process, with changes in surgical approach in 57% of cases (10). This underscores the importance of having access to high-quality, digital imaging for complex urological procedures.

Despite the clear advantages of digital imaging systems, the transition from traditional methods poses several challenges. The initial cost of implementing PACS, the need for training healthcare professionals, and the integration with existing hospital information systems require careful planning and investment. However, as demonstrated by the experiences of other countries, the long-term benefits, including cost savings and improved patient care, justify the investment (8,9).

In Sri Lanka, while the full implementation of PACS may be currently unfeasible due to financial and infrastructural constraints, interim measures can be adopted. Providing clinicians with access to digital images through compact discs (CDs), digital versatile discs (DVDs), or universal serial bus (USB) drives can facilitate better clinical decision-making without the immediate need for a comprehensive PACS. These measures can serve as a bridge, allowing time for the gradual integration of digital imaging systems into the healthcare infrastructure (7).

Conclusion

The practice of printing large number of films in abdominal CT reporting is obsolete in developed countries. Present study highlights the gross overutilization of films and their ill-found effect of it in decision making. Present study affirms there is hardly any additional information obtained by printed films over a comprehensive console reporting by an experienced radiologist supported by few reprehensive clinically relevant frames Obvious wastage of resources and a large-scale unnecessary financial burden could be avoided by judicious printing of films (preferably economical versions such as paper printing) with comprehensive computer-based reporting and provision of the soft copy in an electronic medium.

Author Contributions

TV: Conceptualization, Data collection, Manuscript writing; All others: Data collection, Critical revision, Literature review, Manuscript editing.

Conflicts of Interest

The authors declare no conflicts of interest.

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