Library Current Awareness Bulletin
Radiology – December 2021

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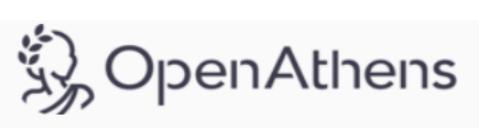
News

£250 million in NHS technology to modernise diagnostics
Department of Health and Social Care / The Rt Hon Sajid Javid MP
November 2021
[The NHS will receive £248 million to modernise diagnostics and help tackle patient waiting lists.]

Independent prescribing for diagnostic radiographers moves closer
The Society of Radiographers
November 2021
[The case for independent prescribing for diagnostic radiographers is to be reviewed by the Commission on Human Medicines at their December meeting.]

Integrating AI Into Radiology Practice to Enhance Lung Disease Prediction and Diagnosis
Diagnostic Imaging
November 2021
[Artificial intelligence has been shown to be beneficial in the discovery of prognostic biomarkers for lung cancer diagnosis, treatment, and response evaluation.]

[NHS sends X-rays abroad amid acute UK shortage of radiologists](#)
Financial Times
November 2021
[Health service is outsourcing analysis of scans as far afield as Australia as waiting lists lengthen]

Guidance

[Good infection prevention practice: using ultrasound gel](#)
UK Health Security Agency, Updated 10th November 2021

[Inclusive pregnancy status guidelines for ionising radiation: Diagnostic and therapeutic exposures](#)
The Society of Radiographers, Published November 2021

Statistics

[Diagnostic Imaging Dataset 2021-22 Data](#)
NHS England
November 2021
[The Diagnostic Imaging Dataset (DID) is a central collection of detailed information about diagnostic imaging tests carried out on NHS patients, extracted from local Radiology Information Systems (RISs) and submitted monthly.]

Artificial Intelligence

[Deep learning from MRI-derived labels enables automatic brain tissue classification on human brain CT](#).
Srikrishna M; Pereira JB; Heckemann RA; Volpe G; van Westen D; Zettergren A; Kern S; Wahlund LO; Westman E; Skoog I; Schöll M
NeuroImage, vol. 244
December 2021
[Automatic methods for feature extraction, volumetry, and morphometric analysis in clinical neuroscience typically operate on images obtained with magnetic resonance (MR) imaging equipment. Although CT scans are less expensive to acquire and more widely available than MR scans, their application is currently limited to the visual assessment of brain integrity and the exclusion of co-pathologies. CT has rarely been used for tissue classification because the contrast between grey matter and white matter was considered insufficient. In this study, we propose an automatic method for segmenting grey matter (GM), white matter (WM), cerebrospinal fluid (CSF), and intracranial volume (ICV) from head CT images. A U-Net deep learning model was trained and validated on CT images with MRI-derived segmentation labels. We used data from 744 participants of the Gothenburg H70 Birth Cohort Studies for whom CT and T1-weighted MR images had been acquired on the same day. Our proposed model predicted brain tissue classes accurately from unseen CT images (Dice coefficients of 0.79, 0.82, 0.75, 0.93 and 0.98 for GM, WM, CSF, brain volume and ICV, respectively). To contextualize these results, we generated benchmarks based on established MR-based methods and intentional image degradation. Our findings demonstrate that CT-derived segmentations can be used to delineate and quantify brain tissues, opening new possibilities for the use of CT in clinical practice and research.]

[Diagnostic Performance of Artificial Intelligence-Centred Systems in the Diagnosis and Postoperative Surveillance of Upper Gastrointestinal Malignancies Using Computed Tomography Imaging: A Systematic Review and Meta-Analysis of Diagnostic Accuracy](#).
Chidambaram S; Sounderajah V; Maynard N; Markar SR
Annals of Surgical Oncology
November 2021
[**Background**: Upper gastrointestinal cancers are aggressive malignancies with poor prognosis, even following multimodality therapy. As such, they require timely and accurate diagnostic and surveillance strategies; however, such radiological workflows necessitate considerable expertise and resource to maintain. In order to lessen the

workload upon already stretched health systems, there has been increasing focus on the development and use of artificial intelligence (AI)-centred diagnostic systems. This systematic review summarizes the clinical applicability and diagnostic performance of AI-centred systems in the diagnosis and surveillance of esophagogastric cancers. **Methods**: A systematic review was performed using the MEDLINE, EMBASE, Cochrane Review, and Scopus databases. Articles on the use of AI and radiomics for the diagnosis and surveillance of patients with esophageal cancer were evaluated, and quality assessment of studies was performed using the QUADAS-2 tool. A meta-analysis was performed to assess the diagnostic accuracy of sequencing methodologies. **Results**: Thirty-six studies that described the use of AI were included in the qualitative synthesis and six studies involving 1352 patients were included in the quantitative analysis. Of these six studies, four studies assessed the utility of AI in gastric cancer diagnosis, one study assessed its utility for diagnosing esophageal cancer, and one study assessed its utility for surveillance. The pooled sensitivity and specificity were 73.4% (64.6-80.7) and 89.7% (82.7-94.1), respectively. **Conclusions**: AI systems have shown promise in diagnosing and monitoring esophageal and gastric cancer, particularly when combined with existing diagnostic methods. Further work is needed to further develop systems of greater accuracy and greater consideration of the clinical workflows that they aim to integrate within.]

COVID-19: Impact on Radiology Services

[COVID-19: Impact on radiology departments and implications for future service design, service delivery, and radiology education](#).
Taylor A; Williams C
The British Journal of Radiology, vol. 94(1127)
November 2021
[The pandemic caused by SARS-CoV-2 (severe adult respiratory distress syndrome Coronavirus-2) and its most severe clinical syndrome, COVID-19, has dramatically impacted service delivery in many radiology departments. Radiology (primarily chest radiography and CT) has played a pivotal role in managing the pandemic in countries with well-developed healthcare systems, enabling early diagnosis, triage of patients likely to require intensive care and detection of arterial and venous thrombosis complicating the disease. We review the lessons learned during the early response to the pandemic, placing these in the wider context of the responsibility radiology departments have to mitigate the impact of hospital-acquired infection on clinical care and staff wellbeing. The potential long-term implications for design and delivery of radiology services are considered. The need to achieve effective social distancing and ensure continuity of service during the pandemic has brought about a step change in the implementation of virtual clinical team working, off-site radiology reporting and postgraduate education in radiology. The potential consequences of these developments for the nature of radiological practice and the education of current and future radiologists are discussed.]

[What can we learn from the SARS-COV-2 pandemic about the value of specific radiological examinations?](#)
Hofmann, B; Andersen, E.R; and Kjelle, E.
BMC Health Services Research, vol. 21(1)
October 2021
[**Background**: The SARS-COV-2 pandemic provides a natural intervention to assess practical priority setting and internal evaluation of specific health services, such as radiological services. Norway makes an excellent case as it had a very low infection rate and very few cases of COVID-19. Accordingly, the objective of this study is to use the changes in performed outpatient radiological examinations during the first stages of the SARS-COV-2 pandemic to assess the practical evaluation of specific radiological examinations in Norway. **Methods**: Data was collected retrospectively from the Norwegian Health Economics Administration (HELFO) in the years 2015-2020. Data included the number of performed outpatient imaging examinations at public hospitals and private imaging centers in Norway and was divided in to three periods based on the level of restrictions on elective health services. Results were analyzed with descriptive statistics. **Results**: In the first period there was a 45% reduction in outpatient radiology compared to the same time period in 2015-2019 while in period 2 and 3 there was a 25 and 6% reduction respectively. The study identified a list of specific potential low-value radiological examinations. While some of these are covered by the Choosing Wisely campaign, others are not. **Conclusion**: By studying the priority setting practice during the initial phases of the pandemic this study identifies a set of potential low value radiological examinations during the initial phases of the SARS-COV-2 pandemic. These examinations are candidates for closer assessments for health services quality improvement.]

Diagnostic Radiology

[Cardiovascular CT and MRI in 2020: Review of Key Articles](#).
Gulsin GS; McVeigh N; Leipsic JA; Dodd JD
Radiology, vol. 301(2)
November 2021
[Despite the global coronavirus pandemic, cardiovascular imaging continued to evolve throughout 2020. It was an important year for cardiac CT and MRI, with increasing prominence in cardiovascular research, use in clinical decision making, and in guidelines. This review summarizes key publications in 2020 relevant to current and future clinical practice. In cardiac CT, these have again predominated in assessment of patients with chest pain and structural heart diseases, although more refined CT techniques, such as quantitative plaque analysis and CT perfusion, are also maturing. In cardiac MRI, the major developments have been in patients with cardiomyopathy and myocarditis, although coronary artery disease applications remain well represented. Deep learning applications in cardiovascular imaging have continued to advance in both CT and MRI, and these are now closer than ever to routine clinical adoption. Perhaps most important has been the rapid deployment of MRI in enhancing understanding of the impact of COVID-19 infection on the heart. Although this review focuses primarily on articles published in Radiology , attention is paid to other leading journals where published CT and MRI studies will have the most clinical and scientific value to the practicing cardiovascular imaging specialist.]

[Establishment of a multi-parameters MRI model for predicting small lymph nodes metastases (< 10 mm) in patients with resected pancreatic ductal adenocarcinoma.](#)
Shi, Y.J., Liu, B.N., Li, X.T., Zhu, H.T., Wei, Y.Y., Zhao, B., Sun, S.S., Sun, Y.S. and Hao, C.Y., 2021.
Abdominal Radiology
November 2021
[**Purpose**: To evaluate the potential role of MR findings and DWI parameters in predicting small regional lymph nodes metastases (with short-axis diameter < 10 mm) in pancreatic ductal adenocarcinomas (PDACs). **Methods:** A total of 127 patients, 82 in training group and 45 in testing group, with histopathologically diagnosed PDACs who underwent pancreatectomy were retrospectively analyzed. PDACs were divided into two groups of positive and negative lymph node metastases (LNM) based on the pathological results. Pancreatic cancer characteristics, short axis of largest lymph node, and DWI parameters of PDACs were evaluated. **Results**: Univariate and multivariate analyses showed that extrapancreatic distance of tumor invasion, short-axis diameter of the largest lymph node, and mean diffusivity of tumor were independently associated with small LNM in patients with PDACs. The combining MRI diagnostic model yielded AUCs of 0.836 and 0.873, and accuracies of 81.7% and 80% in the training and testing groups. The AUC of the MRI model for predicting LNM was higher than that of subjective MRI diagnosis in the training group (rater 1, P = 0.01; rater 2, 0.008) and in a testing group (rater 1, P = 0.036; rater 2, 0.024). Comparing the subjective diagnosis, the error rate of the MRI model was decreased. The defined LNM-positive group by the MRI model showed significantly inferior overall survival compared to the negative group (P = 0.006). **Conclusions**: The MRI model showed excellent performance for individualized and noninvasive prediction of small regional LNM in PDACs. It may be used to identify PDACs with small LNM and contribute to determining an appropriate treatment strategy for PDACs.]

[Radiation dose reduction with deep-learning image reconstruction for coronary computed tomography angiography](#)
Benz, D.C., Ersözlü, S., Mojon, F.L., Messerli, M., Mitulla, A.K., Ciancone, D., Kenkel, D., Schaab, J.A. et al.
European Radiology
November 2021
[**Objectives**: Deep-learning image reconstruction (DLIR) offers unique opportunities for reducing image noise without degrading image quality or diagnostic accuracy in coronary CT angiography (CCTA). The present study aimed at exploiting the capabilities of DLIR to reduce radiation dose and assess its impact on stenosis severity, plaque composition analysis, and plaque volume quantification. **Methods**: This prospective study includes 50 patients who underwent two sequential CCTA scans at normal-dose (ND) and lower-dose (LD). ND scans were reconstructed with Adaptive Statistical Iterative Reconstruction-Veo (ASiR-V) 100%, and LD scans with DLIR. Image noise (in Hounsfield units, HU) and quantitative plaque volumes (in mm3) were assessed quantitatively. Stenosis severity was visually categorized into no stenosis (0%), stenosis (< 20%, 20–50%, 51–70%, 71–90%, 91–99%), and occlusion (100%). Plaque composition was classified as calcified, non-calcified, or mixed. **Results**: Reduction of radiation dose from ND scans with ASiR-V 100% to LD scans with DLIR at the highest level (DLIR-H; 1.4 mSv vs. 0.8 mSv, p < 0.001) had no

impact on image noise (28 vs. 27 HU, p = 0.598). Reliability of stenosis severity and plaque composition was excellent between ND scans with ASiR-V 100% and LD scans with DLIR-H (intraclass correlation coefficients of 0.995 and 0.974, respectively). Comparison of plaque volumes using Bland–Altman analysis revealed a mean difference of − 0.8 mm3 (± 2.5 mm3) and limits of agreement between − 5.8 and + 4.1 mm3. **Conclusion:** DLIR enables a reduction in radiation dose from CCTA by 43% without significant impact on image noise, stenosis severity, plaque composition, and quantitative plaque volume.]

Interventional Radiology

[Current trends and perspectives in interventional radiology for gastrointestinal cancers](#)
Reitano E, de'Angelis N, Bianchi G, Laera L, Spiliopoulos S, Calbi R, Memeo R, Inchingolo R
World Journal of Radiology, vol. 13(10)
October 2021
[Gastrointestinal (GI) cancers often require a multidisciplinary approach involving surgeons, endoscopists, oncologists, and interventional radiologists to diagnose and treat primitive cancers, metastases, and related complications. In this context, interventional radiology (IR) represents a useful minimally-invasive tool allowing to reach lesions that are not easily approachable with other techniques. In the last years, through the development of new devices, IR has become increasingly relevant in the context of a more comprehensive management of the oncologic patient. Arterial embolization, ablative techniques, and gene therapy represent useful and innovative IR tools in GI cancer treatment. Moreover, IR can be useful for the management of GI cancer-related complications, such as bleeding, abscesses, GI obstructions, and neurological pain. The aim of this study is to show the principal IR techniques for the diagnosis and treatment of GI cancers and related complications, as well as to describe the future perspectives of IR in this oncologic field.]

[Feasibility of diffusion-weighted magnetic resonance imaging in evaluation of early therapeutic response after CT-guided microwave ablation of inoperable lung neoplasms](#)
Vogl, T.J., Emara, E.H., Elhawash, E., Naguib, N.N., Aboelezz, M.O., Abdelrahman, H.M., Saber, S. et al
European Radiology
November 2021
[**Objective**: To determine the early treatment response after microwave ablation (MWA) of inoperable lung neoplasms using the apparent diffusion coefficient (ADC) value calculated 24 h after the ablation. **Materials and methods**: This retrospective study included 47 patients with 68 lung lesions, who underwent percutaneous MWA from January 2008 to December 2017. Evaluation of the lesions was done using MRI including DWI sequence with ADC value calculation pre-ablation and 24 h post-ablation. DWI-MR was performed with b values (50, 400, 800 mm2/s). The post-ablation follow-up was performed using chest CT and/or MRI within 24 h following the procedure; after 3, 6, 9, and 12 months; and every 6 months onwards to determine the local tumor response. The post-ablation ADC value changes were compared to the end response of the lesions. **Results**: Forty-seven patients (mean age: 63.8 ± 14.2 years, 25 women) with 68 lesions having a mean tumor size of 1.5 ± 0.9 cm (range: 0.7–5 cm) were evaluated. Sixty-one lesions (89.7%) showed a complete treatment response, and the remaining 7 lesions (10.3%) showed a local progression (residual activity). There was a statistically significant difference regarding the ADC value measured 24 h after the ablation between the responding (1.7 ± 0.3 × 10−3 mm2/s) and non-responding groups (1.4 ± 0.3 × 10−3 mm2/s) with significantly higher values in the responding group (p = 0.001). A suggested ADC cut-off value of 1.42 could be used as a reference point for the post-ablation response prediction (sensitivity: 66.67%, specificity: 84.21%, PPV: 66.7%, and NPV: 84.2%). No significant difference was reported regarding the ADC value performed before the ablation as a factor for the prognosis of treatment response (p = 0.86). **Conclusion**: ADC value assessment following ablation may allow the early prediction of treatment efficacy after MWA of inoperable lung neoplasms.]

[Gastrointestinal Bleeding in Patients with SARS-CoV-2 Infection Managed by Interventional Radiology](#).
Ierardi, A.M.; Coppola, A.; Tortora, S.; Valconi, E.; Piacentino, F.; Fontana, F.; Stellato, E.; Cogliati, C.B. et al
Journal of Clinical Medicine, vol. 10(20)
October 2021
[**Background**: This study was conducted to evaluate the technical and clinical success of trans-arterial embolization (TAE) as a treatment of gastrointestinal bleeding (GIB) in Coronavirus Disease 2019 (COVID-19) patients and to describe its safety; moreover, we describe the characteristics of these patients. **Methods**: Thirty-four COVID-19

hospitalized patients presented with GIB. Risk factors, drugs administered for COVID-19 infection, and clinical and biological parameters were evaluated. Furthermore, intraprocedural data and outcomes of embolization were analyzed. **Results**: GIB was more frequent in male. Overweight, hypertension, diabetes, previous cardiac disease, and anticoagulation preadmission (48.5%) were frequently found in our population. Previous or actual COVID Acute respiratory distress syndrome (ARDS) and a high level of D-dimer were encountered in most cases. Upper GIB was more frequent than lower GIB. Technical and clinical success rates of embolization were 88.2% and 94.1%, respectively. The complication rate was 5.9%. **Conclusions**: Our study highlights the most frequent characteristics of COVID-19 patients with GIB. Embolization is feasible, effective, and safe.]

[What is the effectiveness of radiofrequency ablation in the management of patients with spinal metastases? A systematic review and meta-analysis.](#)
Murali N; Turmezei T; Bhatti S; Patel P; Marshall T; Smith T
Journal of Orthopaedic Surgery and Research, vol. 16(1)
November 2021
[**Purpose**: Spinal metastases are indicative of progressive cancer which can lead to vertebral body fractures and spinal cord compression. Radiofrequency ablation (RFA) treatment is infrequently used in patients with refractory pain. The aim of this systematic review is to determine the clinical efficacy of RFA, with the scope of using it as front-line management of spinal metastases. **Methods**: Electronic databases were searched (to July 2020) for studies evaluating RFA treatment for spinal metastases in adults. Measured outcomes were pain (primary), disability, health-related quality of life (HRQOL), complications, tumour control and mortality. Study inclusion, data extraction and risk of bias using the ROBIN-I tool were assessed. Meta-analysis was conducted for pooled results with homogeneity, and narrative synthesis was conducted otherwise. **Results**: 15 studies were included. RFA reduces pain scores at 3-5 weeks [standardised mean difference (SMD 2.24, 95% confidence intervals (CI) 1.55-2.93], 3-4 months (SMD 3.00, 95% CI 1.11-4.90) and 5-6 months (SMD 3.54, 95% CI 1.96-5.11). RFA is effective in reducing disability/improving HRQOL in the short-term but longer-term efficacy remains unclear. 13.2% cases reported local tumour control failure (2.5 months-5 year follow-up) whereas mortality was 23.6% (follow-up of up to 1 year). **Conclusion**: Low quality evidence has proven RFA to be safe and effective in reducing pain and disability, especially in the short-term. RFA may be routinely implemented in all cases involving refractory pain or radiotherapy-resistant tumours but controlled trials are required to compare the efficacy of RFA to current frontline treatments.]

Radiation Therapy

[Effects of preoperative radiotherapy on survival of patients with stage II and III esophageal squamous cell carcinoma: a population-based study](#)
Dong, J.; Shen, W.; Du, X.; and Zhu, S.
Medicine, vol. 100(41)
October 2021
[The impact of preoperative radiotherapy (PRT) on survival in patients with stage II and III esophageal squamous cell carcinoma (ESCC) remains controversial. The aim of this study was to explore the effect of PRT on survival of these patients. Patients with stage II and III ESCC who underwent chemotherapy ± PRT were identified and retrieved from the SEER database from 2010 to 2015. Cox regression analysis was used to identify independent prognostic factors in patients. Subgroup analysis stratified by T stage and N stage was performed. Kaplan–Meier survival analysis was performed to assess disease specific survival (DSS). A total of 1160 patients were retrieved, of whom 289 (24.9%) underwent PRT plus chemotherapy, and 871 (75.1%) did not receive PRT. In multivariate analysis, PRT plus chemotherapy was a favorable prognostic factor for patients with stage T2 (hazard ratio [HR], 0.364, 95% CI, 0.202–0.658; P < .001), T3 (HR, 0.536, 95% CI, 0.413–0.695; P < .001) and T4 (HR, 0.318, 95% CI, 0.125–0.805; P = .016), but PRT plus chemotherapy was not statistically significant on DSS in patients with T1 disease (HR, 0.556, 95% CI, 0.262–1.179; P = .126). All 3 different N stages (N0, N1, and N2 + N3) were statistically significant (P < .05) in chemotherapy with or without PRT. In conclusion, patients with stage II and III ESCC at the T2-T4 stage gained significant survival benefit from PRT plus chemotherapy.]

[Potential Role of Natural Products to Combat Radiotherapy and Their Future Perspectives](#)
Akter, R; Najda, A; Rahman, H; Shah M; Wesolowska, S; ul Hassan, SS; Mubin, S; Bibi, P; and Saeeda S.
Molecules, vol. 26(19)
October 2021
[Cancer is the second leading cause of death in the world. Chemotherapy and radiotherapy (RT) are the common cancer treatments. In addition to these limitations, the development of adverse effects from chemotherapy and RT reduces the quality of life for cancer patients. Cellular radiosensitivity, or the ability to resist and overcome cell damage caused by ionizing radiation (IR), is directly related to cancer cells' response to RT. Therefore, radiobiological research is emphasizing chemical compounds 'radiosensitization of cancer cells so that they are more reactive in the IR spectrum. Recent years researchers have seen an increase in interest in natural products that have antitumor effects with minimal side effects. Natural products, on the other hand, are easy to recover and therefore less expensive. There have been several scientific studies done based on these compounds that have tested their ability in vitro and in vivo to induce tumor radiosensitization. The role of natural products in RT, as well as their usefulness and potential applications, is the goal of this current review.]

[Translation Initiation Machinery as a Tumor Selective Target for Radiosensitization](#)
Lehman, S.L; Wilson, E.D; Camphausen, K; and Tofilon, P.J.
International Journal of Molecular Sciences, vol. 22(19)
October 2021
[Towards improving the efficacy of radiotherapy, one approach is to target the molecules and processes mediating cellular radioresponse. Along these lines, translational control of gene expression has been established as a fundamental component of cellular radioresponse, which suggests that the molecules participating in this process (i.e., the translational machinery) can serve as determinants of radiosensitivity. Moreover, the proteins comprising the translational machinery are often overexpressed in tumor cells suggesting the potential for tumor specific radiosensitization. Studies to date have shown that inhibiting proteins involved in translation initiation, the rate-limiting step in translation, specifically the three members of the eIF4F cap binding complex eIF4E, eIF4G, and eIF4A as well as the cap binding regulatory kinases mTOR and Mnk1/2, results in the radiosensitization of tumor cells. Because ribosomes are required for translation initiation, inhibiting ribosome biogenesis also appears to be a strategy for radiosensitization. In general, the radiosensitization induced by targeting the translation initiation machinery involves inhibition of DNA repair, which appears to be the consequence of a reduced expression of proteins critical to radioresponse. The availability of clinically relevant inhibitors of this component of the translational machinery suggests opportunities to extend this approach to radiosensitization to patient care.]

Radiology Departments & Quality Improvement

[Quality improvement project to decrease unnecessary investigations in infants with bronchiolitis in Cork University Hospital](#).
Jansen L; Meyer GP; Curtin G; Lynch B; O'Brien R
BMJ Open Quality, vol. 10(4)
[**Background**: Bronchiolitis is a common reason for infants to present to the emergency department (ED). Clear evidence-based guidelines exist that recommend against routine radiological and laboratory investigations in this cohort. Despite this, preintervention audit showed that children below 12 months of age with bronchiolitis in the ED during November 2018-January 2019 were receiving unnecessary investigations. Our aim was to improve patient care by decreasing unnecessary investigations in bronchiolitis infants. **Methods**: Baseline assessment comprised a preintervention audit of children less than 12 months of age with a diagnosis of bronchiolitis that presented to ED during November 2018-January 2019. The outcome measure was average weekly hospital length of stay (LOS), process measures were average weekly chest X-ray (CXR) and laboratory investigation rate. The balancing measure was the average weekly representation rate. **Intervention**: A multimodal intervention was implemented comprising a locally agreed flowchart enhanced by regular feedback on performance using run charts and in-person sessions. **Results**: A postintervention audit of November 2019-January 2020 was undertaken. There was a 57% reduction in the mean average weekly CXR rate (from 25% to 11%, p value 0.009974 significant at p<0.05); there was an improvement by 56% in the mean average weekly laboratory investigation rate (from 29% to 13%, p value 0.005475, significant at p<0.05) in the preintervention and postintervention periods, respectively. The mean average weekly representations remained at 4% preintervention and postintervention (p value 0.737). There was no significant

difference in hospital LOS (from 25.3 hours to 20.7 hours, p value 0.270549). **Conclusion**: An evidence-based protocol improved physicians' ability in diagnosing and managing infants with bronchiolitis. This led to a reduction in unnecessary and potential harmful investigations, thereby improving patient quality of care. This improvement will contribute to decreased healthcare cost and appropriate use of resources during the high-pressured winter period.]

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