Trending in: Digitizing Pathology with the Emerging Role of Artificial Intelligence (AI)

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The current day reality is being skewed towards a market-based economy where management processes have already geared up tremendously due to innovative and speedy data with information transfer has followed mathematical patterns or simply digitized as the terminology being termed now. What took the messenger months to convey information, data interpretation, and algorithmic interpretation has now been downsized to milliseconds. In technical terms the "digitization" of a process has transformed the ways for customers to self-discover, evaluate and make knowledge-based choices about buying, selecting, and upgrading their needs in any sector. From the fruit market to the defense industry to educate the process of digitization seems to stay a symbiotic if not an obligatory desideratum. "Digitization" in any industry implies the incorporation of robotic processes supplanted with needful artificial intelligence to enhance the efficiency, pace, and reproducibility of a process [1]. The whole process of digitization has been plausibly implementable due to the unparalleled and unprecedented revolutions and innovations in information technology wrapped with algorithmic intelligence which are all being viewed under the umbrella cover of "Artificial Intelligence (AI)". The health sector, though a biological domain dealing with varied and unpredictable human emotions and needing artistic skillful dealing with human behaviors is also being engulfed fast with this approaching AI tide [2].

"Digitization", is seemingly a new concept but it permeated and insidiously prevailed into laboratories and finally aimed for its prime position within the emerging innovative technologies, need as a linker for various online search engines to have compatible referencing and taking informatics to the next level in terms of managing increasing quantum, safeguarding quality and optimized record keeping [3]. The laboratory leadership, even without conventional mastery or comprehension remains sensitized in turnaround times (TAT), quality of their products *i.e.*, clinical reports, and desirability to actionable steps to address various clinics to laboratory pathways to overlapping managed care [4]. The current day "clinical laboratory leader" needs to be well aware of these core understandings to avoid derailing from the timely, accurate, and reproducible flow of data and ways leading physicians to translate them into "utility evidence" [5]. The change is in the coming.

The tangible, quality-focused, and clinically utilitarian reporting process in minimum TAT is the desirable new norm for clinical laboratories [6]. Wherever the laboratory leadership has the responsibility to teach and apply the core principles of pathology in various analytics, it has also to be paced with clinical side needs and productive data-driven evidence base for patient management in real-time. For example, the data from various scatter plots and cellular dimensions in hematological oncology and content-related information once calibrated and linked with AI-supported search engines allow precisely reproducible reporting thus reducing technical manhours and reducing reporting time [7]. Similar integration of various data units from chemical pathology can be funneled through algorithms to define the best possible IT-supported data interpretation to define the possible best therapeutics for the patients [8]. The inter-observer and even intraobserver variations in human-defined procedures like histopathological examination are well-documented where machine learning can prove a game changer that can reduce time delays, precision, and accuracy [9]. In summary, it seems that AI-driven laboratory solutions and digitization of process flow from investigation conception to evidence interpretation have made greater inroads towards reducing all-cause hospital mortality, aligning diagnostic and therapeutic lab decisions straightforward, right-sizing precision diagnostics by incorporating emerging cutting-edge technologies and all these at a dramatically lower expense.

Provided the next-generational medicine seems taking off superseding conventional medicine, one must acknowledge the imperfections and oddities with too much order and exuberance of choices and entrust the critical shift of clinical decisions to the digitization and artificial modes of information superintendence. While molecular "omics" are making entry into the laboratory arena, there remain gaps in perfect mergers between domains and technical computation to be vanquished before its plausible deployments for patient care [10]. The optimized and lab-friendly deployment of AIR models with digitized workflows is yet far from nearing the redefinitions of pathology HR needs, new validations

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models for safety and human oversight, and finally steps to be translated to address various downstream actions till data translation for trustworthy data translation in a much-evolved regulatory environment [11]. Furthermore, new data sciences dealing with volumes of varied platforms generating volumes of sequencing data need further validation protocols which still need ongoing human insight for better process controls, algorithmic management, and segregating new modes to isolate signal-to-noise data to be clinically employable mathematics for a systematic implementation on humans who have long been dependent upon empathetic medic attitudes and behaviors [12]. Patient privacy in this era of "big data" has also emerged as a much-needed dimension to be taken care of with requisite guards and filters to be in place for human data protection [13]. Future laboratory medicine leadership will be more burdened by improvising and updating HR mindset through clinical need assessments, being curious enough to address rapidly emerging technologies for cost-effective functions, and technically right-sized lab management and leadership [14].

The factual positions with growing volumes of data sciences remain indisputable that an early transition from conventional pathology data yields to evolving trends in the management of voluminous fabric of per-patient data needs statistical data trends by right-sized AI modes blended in a machine learning atmosphere for the clinical interpretable patient position. However, the take-off may be ongoing already but still, HR, appropriate training, regulatory compliance, bioinformatics efforts to right size delivery of patient data through artificially intelligent filters and meaningful patient use with appropriately developed regulatory compliance will remain obligatory from bench to clinic translation. Laboratory workers in different hierarchical positions must learn to remain progressive to the new paradigms in medical sciences and to be competitive and adaptive in the rapidly revolutionizing clinical environment. Regular and ongoing streams are developed to short size process flows, adding next-generational real-time quality assurance checks, developing and conformance to realistic country-wide regulatory compliance, bridging gaps between emerging technologies by tailor-made validated algorithms with desirable artificial intelligence and integrations, HR training updates, and finally a mechanism for regular updates in the process gaps and upgradations.

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