Maximum Efficiency, Prioritized Patient Safety and Increased Revenue with Canon Medical's 4D CT Technology

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Real visionary innovation creates technology that improves efficiency, increases diagnostic and interventional revenue, expands radiology services and simultaneously delivers high-quality care while maximizing patient safety. Canon Medical's hybrid 4D CT system combines two powerful imaging modalities in the same room, allowing CT examinations and image-guided interventions without moving your patient to another department. This innovative solution may help you to support the expansion of complex interventional procedures, reduce treatment time, while improving throughput of other diagnostic imaging suites. Additionally, during an outbreak of communicable disease, having a hybrid 4D CT system reduces the need to transfer patients, thereby minimizing risk of exposure to both staff and patients.

Integrated Modalities Boost Efficiencies

Mixing CT guided interventions in shared CT rooms performing both diagnostic and interventional procedures can create inefficiencies associated with scheduling and patient transfers. In a 3-year study a reduction in interventional procedures from 5% to 2% in the shared CT rooms increased the CT throughput and resulted in **52% more diagnostic CT scans**, or an addition of 391 cases per month (Figure 1). Increased CT throughput increases imaging revenue, creates more flexibility in patient scheduling, and results in an overall better patient experience. As the 4D CT suite is fully capable of supporting all image-guided interventions, it may also help to ease staff scheduling and increases productivity by reducing the need to have the medical teams juggle their time between multiple rooms.

Improved Operational Efficiency

Comparing the first year case volume with the 4D CT system operational to the case volume 24-months prior, the number of interventional procedures grew to an average of 109 cases per month, equivalent to a **25% increase** in interventional volume, excluding the transition period (Figure 2).[1] As the 4DCT suite promotes more complex procedures, it also creates the opportunity for other conventional IR suites to optimize their efficiency.

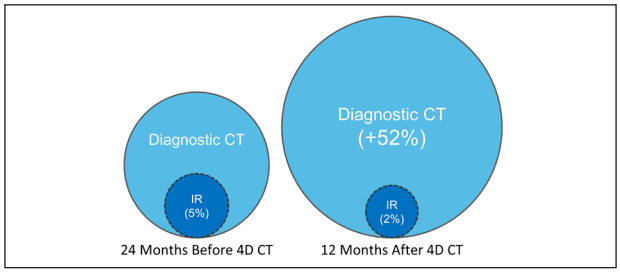


Figure 1 A significant increase in the number of diagnostic CT scans resulted when more interventional procedures were able to be allocated to a 4D CT system.

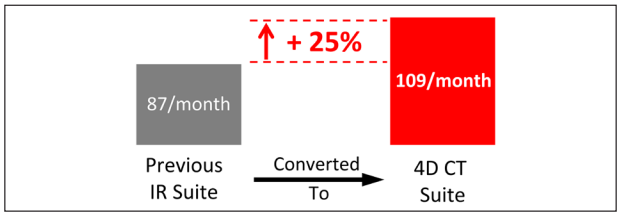
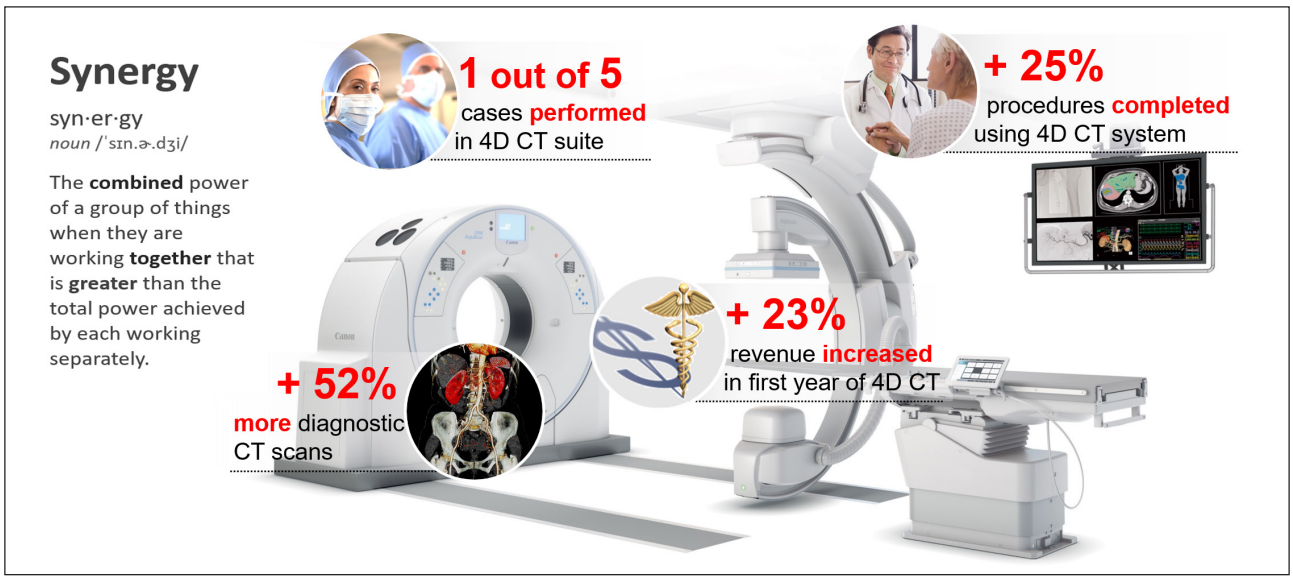


Figure 2 The 4D CT system reliably supported 25% more cases and consistently exceeded the average case volumes of the previous IR suite.



Patient procedures were compared before and after the 4D CT installation over the study periods from March 2016 to February 2018 and March 2018 to February 2019, respectively. Several benefits were observed with implementation of a 4D CT, including increases in efficiencies and revenue.

Increased Radiology Revenues

Increased procedure volumes can also translate into increased revenue. Evaluating five payor types (Medicare, Medicaid, commercial insurance, managed care programs and out-of-pocket), the total annual revenue **increased 23%** over the first year after implementation of the 4D CT (Figure 3) *(See Appendix for analysis)*. The 4D CT suite expanded many new, diverse and/or high revenue interventional procedures supported by its innovative imaging technology.

Including the increase in case volume in both diagnostic CT (+ 4692 cases/year) and 4D CT (+ 264 cases/year) suites and using the national average Medicare rates, the additional annual payments can be estimated. For example, at the low end, an additional 4692 diagnostic chest CT scans (CPT 71250) and 264 lung biopsies (CPT 32405) would add an additional annual payment of approximately $900,000. At the high end, assuming all CT scans were abdomen pelvis with contrast and all interventional procedures were transcatheter radioembolizations (CPT C 2616) would add approximately $5.1M in annual revenue. Actual increases in revenue likely fall somewhere in between the minimum and maximum estimates.

Diversification of Services

Implementing 4D CT technology provided innovative capabilities and new synergies to tackle the most complex interventions (Figure 4). In addition to increasing complexity and diversity of procedures, there was an observable expansion in the number of cases and services provided.

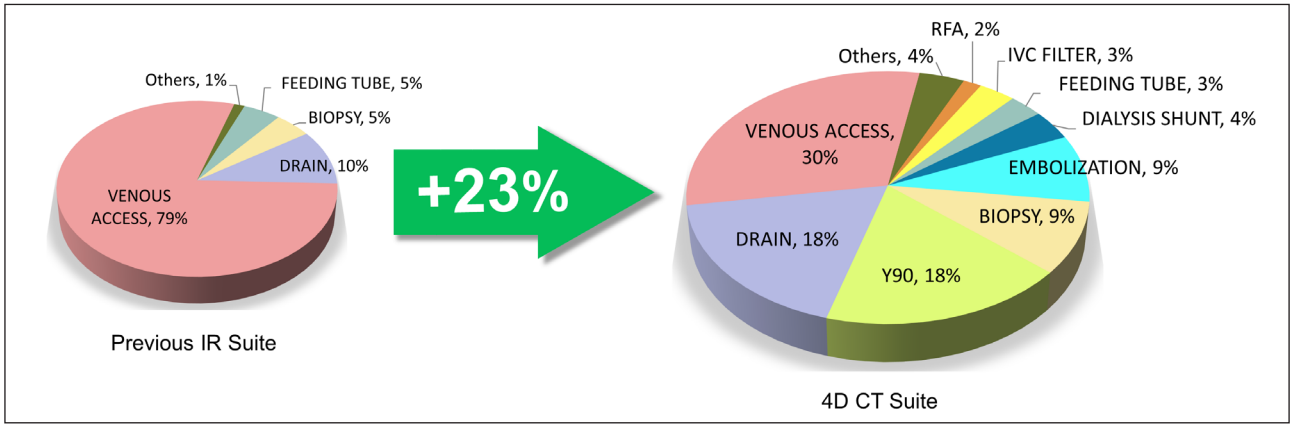


Figure 3 Modeling of revenue between the previous IR suite and the 4D CT IR suite during the study period estimated at least 23% increase in revenue was gained after installing the 4D CT system.

Prioritized Safety

Without the need to transfer a patient between diagnostic CT and interventional suites, the risk of transmission of or exposure to infectious diseases is minimized. Reducing patient transfer may also lessen transport accidents, diminish nonproductive time between cases, and reduce the disinfection costs of treatment in multiple locations. Utilizing a negative pressure 4D CT suite also maintains an appropriate level of preparedness during acute outbreak of respiratory pandemic events.

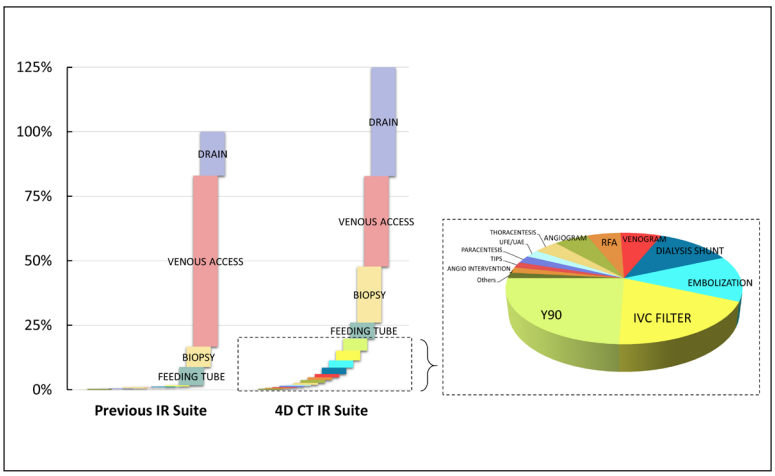


Figure 4 There was a significant increase in case volumes after installation of the 4D CT system in addition to an expanded variety of complex IR services performed in the 4D CT suite benefiting a larger patient population.

Enhanced Procedural Outcomes and Optimized Radiation Dose

An integrated CT and angiography system has been shown to not only increase sensitivity and specificity of hepatic and colorectal cancer diagnosis[2], but also supports low recurrence rate[3] and significantly higher survival rate in liver cancer patients[4]. The 4D CT system was found to significantly decrease patient radiation dose during trans-arterial chemoembolization (TACE) procedures as compared to angiography systems that rely upon Cone-Beam CT (Figure 5)[5], leading to a reduction in the risk of radiation injury to both patients and medical teams.

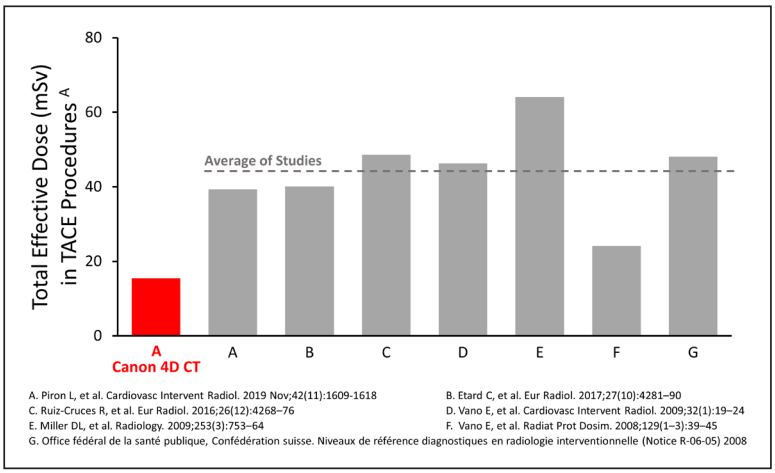


Figure 5 When compared to published literature, Canon's 4D CT delivers lowest total effective dose in TACE procedure.[5]

Collaborate For Better Patient Care

Canon offers a multidimensional knowledge base, dynamic customer interaction, and a robust support system of training and education to help medical teams transition and prosper within the today's healthcare environment. Canon's onsite accredited training program, conducted by experienced Application Specialists, provides in-depth information and experience in multi-phases of high quality training, empowering the medical team to use the system to its fullest potential.

Conclusion

The seamless integration of Canon Medical's industry leading interventional system with best-in-class CT technology offers one versatile solution for all possible interventional needs. This innovative 4D CT system may help you to boost efficiencies, improve throughput and increase revenue of both diagnostic and interventional suites. In addition, it may also help you to maintain an appropriate level of preparedness during acute outbreak of respiratory pandemic events through minimizing risk of disease transmission and disturbances in workforce. Easily switching between CT and angiography systems in a single room setting eliminates the need to transfer the patient and medical teams between rooms, which may lessen transport accidents resulted from patient transfer, diminish nonproductive time between cases, and reduce the disinfection costs of treatment in multiple locations.

In summary, Canon Medical's 4D CT enables you to improve your efficiency, increase diagnostic and interventional revenue, expand radiology services and simultaneously deliver high-quality care while maximizing patient safety.

Appendix

An evaluation of the total annual payments for the 4D CT suite and the previous IR suite over a study period of 36-months was performed looking at five payor types: Medicare, Medicaid, commercial insurance, managed care programs and out-of-pocket. The total annual revenue was estimated by multiplying the total payment from each payor to the national health expenditure payor mix ratio (20% Medicare, 17% Medicaid, 34% commercial insurance, 10% out-of-pocket and 19% managed care programs). Payor payments were calculated using national average Medicare rates, the Illinois Medicaid-to-Medicare fee ratio of 0.79[6], and the commercial payments-to-Medicare fee ratio of 2.16.[7] Out-of-pocket and managed care payments were considered equivalent to commercial insurance and Medicare rates, respectively.

References:

1. Feinberg N, et al. J Vasc Interv Radiol. 2020 Oct 8;S1051-0443(20)30574-1.
2. Inaba Y, et al. AJR Am J Roentgenol. 2000 Apr;174(4):955-61
3. Takayasu K, et al. AJR Am J Roentgenol. 2001 Mar;176(3):681-8
4. Toyoda H, et al. AJR 2009; 192:766–774
5. Piron L, et al. Cardiovasc Intervent Radiol. 2019 Nov;42(11):1609-1618
6. Kaiser Family Foundation Medicaid-to-Medicare Fee Index (https://www.kff.org/medicaid/state-indicator/medicaid-to-medicare-fee-index/) Accessed June 12, 2020.
7. Chernew ME, Hicks AL, Shah SA. Health Aff (Millwood). 2020;39(5):791-799.

The clinical results, performance and views described in this white paper are the experience of the author. Results may vary due to clinical setting, patient presentation and other factors. Many factors could cause the actual results and performance of Canon's product to be materially different from any of the aforementioned.

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