ASNC Image Guide Registry: Leading the way toward improving quality and patient care in nuclear cardiology

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BACKGROUND

The Agency for Health Care Quality and Research defines a ''registry'' as an organized system that uses observational study methods to collect uniform data (clinical and other) to evaluate specified outcomes for a population defined by a particular disease, condition, or exposure, and that serves one or more predetermined scientific, clinical, or policy purposes.[1] One of the big advantages of registries is that they reflect ''real world practice'' and help to identify gaps in care which may not otherwise be feasible in high-quality randomized control trials which by their rigorous trial designs don't fully reflect the practice trends in daily life.

In their excellent review of imaging registries and single center series, Hachamovitch et al lay out the key advantages and disadvantages of imaging registries when compared to rigorously conducted randomized controlled trials.[2] These include lower cost, generalizability, mapping temporal trends, evaluate appropriate use by physicians, and use of data for outcomes research. Limitations of imaging registries outlined include lack of randomization, inherent confounders, and biases including patient heterogeneity, variations in reading practices, referral patterns.

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A great example of the value of such a registry in clinical practice was the Advanced Cardiovascular Imaging Consortium (ACIC) for coronary CT which this author and his institution participated in.[3] This was a Michigan hospitals' based registry which looked at real world utilization of Coronary CT and studied the temporal trends of various aspects related to testing and practice patterns of CT. One of the important initial successes of ACIC was that it highlighted the marked variability of radiation dosing in CT (from very low to very high) across institutions doing the same test in the early stages of ACIC data collection. This then led to standardized proactive implementation by participating institutions of best practice measures to reduced radiation. Upon reassessment ACIC demonstrated significant reduction of radiation in cardiac CT across institutions with more standardized practice, which was a testament to the value of such a registry.[4]

The medical imaging community has come under strong scrutiny over the past decade due to skyrocketing costs of medical imaging and the concept of ''value'' over ''volume'' is more pertinent now than ever. The American Heart Association convened a writing group which put together a valuable must read document led by Shaw et al to discuss the landscape of quality in cardiovascular imaging. It highlighted the challenges faced by imaging and how we should be positioned to deliver high-quality value based imaging.[5] By now most if not all in the imaging community know of regulations such as meaningful use guidelines, merit-based incentive payments system (MIPS) and physician quality reporting system(PQRS) which have changed the way radiologic imaging based practice works. The current MIPS program uses a combination of PQRS, payment modifiers and electronic health records into a single system to evaluate healthcare providers.

Although some research registries have shed valuable insight into the practice and economics of nuclear cardiology such as SPARC,[6] the nuclear cardiology

community as whole has so far lacked in an ongoing large scale registry aimed at collecting patient and myocardial perfusion imaging (SPECT) data with the goal of raising the bar to deliver quality imaging in nuclear cardiology. This type of registry could provide unique opportunities for voluntary participation of nuclear cardiology practices either free standing or hospital based, get feedback on institutional level, reflect on their practice and make proactive changes. The American Society of Nuclear Cardiology's Image Guide Registry (IGR) created and launched in 2015 appears poised to fill that void.

THE ASNC IMAGE GUIDE REGISTRY (IGR)

The Image Guide registry (IGR) is a joint collaboration between ASNC and the American Society of Echocardiography and was launched by ASNC in 2015. The 2 separate modules ImageguideNuclear and ImageguideEcho allow data entry by labs for nuclear cardiology and echocardiography. This registry is the nation's first non-invasive imaging registry and the primary goal of the registry is aimed at tracking and improving nuclear cardiology and echocardiography quality for the benefit of patient care. Centers for Medicare Services (CMS) has recognized IGR as a Qualified Clinical Data Registry (QCDR) since 2015 and most recently this has been also approved for the year 2020 (CMS approved 16 QCDR measures within IGR) which enables physicians to develop performance measures with the data captured for MIPS with greater granularity. Successful participation in MIPS will allow physicians to avoid an automatic negative payment adjustment on Medicare receivables. Participants will also be able to attest to Improvement Activities and Advancing Care Information (imageguideregistry.org, accessed April 13, 2020).

The main benefits of participation in IGR include

- Enhance patient care and improve lab efficiency
- Successfully participate in regulatory programs on Medicare Part B services
- Report on cardiovascular-imaging-specific performance measures, improvement activities, and advancing care information to satisfy requirements under MIPS
- Demonstrate appropriate use of cardiac imaging tests to payers utilize a user-friendly platform with a variety of data submission methods for both nuclear and echo modules
- Gain access to benchmark reports and standardized performance data

The process of data entry has 3 options in the IGR. It can be done using one of three vendors (INVIA, Cedars-Sinai or Syntermed) or manual entry into an IGR created and approved datasheet allows participating institutions or practices to directly enter their practice data into IGR. As a final alternative, one could potentially work with trying to extract data points from their electronic medical records system through FigMD if compatibility is established.

In this issue of JNC, Elder et al share the initial data of the ImageguideNuclear part of registry from 2015 to 2018 (15 quarters) of 100 plus data variables on close to 10,000 patients from 19 practices sampled from 12 states spread across the USA. Most practices were primarily single office facilities, for profit, all accredited with either ICANL or ACR. The population represented in this initial analysis was predominantly male and the primary mode of stress was pharmacologic (Regadenoson was used in the majority of pharmacologic stress studies, Bruce protocol most common for exercise SPECT and Technetium 99m based isotopes was the primary isotope used). Rest/stress SPECT was the predominant protocol used in most facilities. Dual isotope protocols were still done with 14% of rest studies using Thallium -201. Ninety-six percent of studies were rated as appropriate from the participating institutions. Eight-nine percent studies were of good quality and only a minority of studies (27%) used attenuation correction (AC). SPECT outnumbered PET studies by 4:1 ratio.

Overall, the IGR has set the stage for nuclear cardiology community to get insights on a national level of current state of SPECT practice. It provides a first of its kind early look into practice trends sampled across the USA. The data collected in an ongoing fashion can clearly can help practices take a closer look at their performance trends, radiation dosing, appropriate use compared to others and serve as an ongoing quality improvement tool for implementing positive changes in SPECT practice. The opportunities for QA QI projects and research which such a rich ongoing large databank is significant.

Some drawbacks are evident in this IGR dataset. Compared to the national annual volume of SPECT of approximately 8 million plus studies, the IGR which started in 2015 has captured only a fraction of studies presented here (9520 studies) with a predominance of male population. The racial mix and insurance type details are not available. There is a significant dearth of participation by academic and large volume medical centers across the USA in this registry. Although the authors say there was a planned choice of centers for the

initial data collection to reflect a good sample, this still skews the IGR data quite a bit. Hence at least in its early stages, IGR mostly reflect SPECT practice amongst independent office practices. This appears to be a multifactorial issue and likely reflects a combination of institutions not participating due to enrollment challenges, manpower, time commitments, and or funding. For example at this author's institution, which attempted to enroll in the IGR we were asked to upgrade our SPECT reading software just to be able to be vendor compliant for this registry which obviously incurs costs. The other option was we would have to hire or find personnel who can manually enter this data which were impractical given the current challenges in clinical environment. As the study authors have commented, enrollment will get better given the recognition by CMS of IGR as QCDR which certainly provides an impetus for most if not all to get on board eventually. Furthermore, the radiation doses used are not available from this data set.

Certain important insights are evident from IGR. As reflected in prior studies and the current trends over the past decade of declining ischemic burden on SPECT scans,[7] the IGR shows that most of scans were normal (62%). This again reflects multifactorial reasons including better patient risk factor management, more aggressive primary preventive medical therapy and likely also testing more lower risk patients apart from possibly directing angiographic referral for high risk patients bypassing testing. A whopping 96% of SPECT studies were deemed appropriate in IGR as determined by the practices submitting data. Although this appears impressive in this unselected cohort and is very encouraging, this likely is overestimated. The IGR team did do a random sample audit and had close to a 98% correlation of appropriateness as chosen by the institution, but one still wonders whether this level of appropriate used with extremely low inappropriate study ratings truly reflects current practice given higher rates of inappropriate studies in multiple prior independent studies.[8,9] A larger sample with more practices and institutions with ongoing audit by IGR over time will better clarify this.

On a sobering note, despite ASNC efforts to push for radiation reduction strategies initiatives (stress first or stress only imaging, using PET imaging, avoiding Tl-201 based imaging[10]) and advocate a goal to reduce SPECT radiation to < 9 msv in at least 50% of studies by 2014, this is far from being achieved based on the data from IGR. Practices continue to mainly do rest-stress and 14% still use Tl-201 as part of dual isotope SPECT. We need as an imaging community to move towards ''patient centered imaging'' and not ''one test fits all'' approach which is current practice in most instances. IGR-based data driven feedback will be valuable for practices to re-evaluate this as was done with the ACIC registry in cardiac CT discussed above.

The IGR reaffirms the low use of AC correction methods of only about 27% across sampled practices which included combination of transmission sources, CT and supine/prone. One cannot but help wonder that this lack of AC adoption by the nuclear cardiology community is one of the main reasons why most practices just routinely do rest-stress as it is in their comfort zone. For one to effectively adopt a stress first or stress only strategy, either high-quality AC or routine prone imaging is needed to confidently call a stress study normal and obviate the rest study.[11] Whether AC adds value has been a source of ongoing debate spawned by numerous issues.[12] Similar to the echo community moving towards standardization of strain imaging across vendors and now poised to get reimbursed, standardization of AC methodology, interpretation training and then reimbursement efforts are needed to move this technology into mainstream.

It is now time for a concerted effort as nuclear cardiologists to enable our practices to join IGR and be part of a key initiative aimed at elevating quality and practice patterns in nuclear cardiology. This author congratulates the hard work and efforts of many in putting the IGR together and for ASNC to lead this effort. The collaboration with American Society of Echocardiography and availability of ImageguideEcho registry to enhance quality and satisfy QCDR for echo practices should be viewed as added incentive for administrators and practices to join IGR. I for one will renew my efforts at my institution.

Disclosure

No conflicts of interest.

References

1. Gliklich R, Dreyer N, Leavy M (eds.). Registries for Evaluating Patient Outcomes. A User's Guide. 3 edn. Agency for Healthcare Research and Quality. April 2014. http://www.effectivehealthcare.ahrq.gov/registries-guide-3.cfm. Accessed April 9, 2020.
2. Hachamovitch R, Pena JM, Xie J, Shaw LJ, Min JK. Imaging registries single center series. J Am Coll Cardiol Imaging 2017;10:276-85.
3. Chinnaiyan KM, Depetris A, Al-Mallah M, Abidov A, Ananthasubramaniam K, Gallagher MJ, et al. Rationale, design and goal of the Advanced Cardiovascular Imaging Consortium: a Blue Cross Blue Shield of Michigan quality improvement project. Am Heart J 2012;163:346-53.
4. Chinnaiyan KM, Boura JS, Depetris A, Gentry R, Abidov A, Share DA, et al. Progressive radiation dose reduction in a state wide collaborative quality improvement program; results of the

Advanced Cardiovascular Imaging Consortium. Cir Cardiovasc Imaging 2013;6:646-54.
5. Shaw LJ, Blankstein R, Jacobs JE, Leipsic JA, Kwong RY, Taqueti VA, et al. Defining quality in cardiovascular imaging: a scientific statement from the American Heart Association. Circ Cardiovasc Imaging 2017. https://doi.org/10.1161/HCI.0000000000000017.
6. Hachamovitch R, Johnson JR, Hlatky DA, Cantagallo L, Johnson BH, Coughlan M, et al. SPARC investigators. The study of myocardial perfusion and coronary anatomy imaging res in CAD (SPARC): design, rationale, and baseline patient characteristics of a prospective, multicenter observational registry comparing PET, SPECT, and CTA for resource utilization and clinical outcomes. J Nuc Cardiol 2012;16:935-48.
7. Jouni H, Askew JW, Crusan Miller TD, Gibbons RJ. Temporal trends of myocardial perfusion imaging in patients without coronary artery disease. A 22 year experience of a tertiary care medical center. Am Heart J 2016;26:127-33.
8. Gibbons RJ, Askew JW, Hodge D, Kaping B, Carryer DJ, Miller TD. Appropriate use criteria for single photon emission computed tomography sestamibi studies. A Quality Improvement Project. Circulation 2011;123:499-503.
9. Fonesca R, Negishi K, Otahal P, Marwick Th. Temporal changes in appropriateness of cardiac imaging. J Am Coll Cardiol 2015;63:763-73.
10. Cerqueira MD, Allman KC, Ficaro EP, Hanson CL, Nicols KJ, Thompson RJ, et al. Recommendations for reduction in radiation in myocardial perfusion imaging. J Nucl Cardiol 2010;17:709-18.
11. Ananthasubramaniam K, Bhatti S. Stress first myocardial perfusion imaging: is it time to put to rest the ''rest first ''strategy for most patients ? J Nucl Cardiol 2012;19:1106-9.
12. Cuculo A. Attenuation correction for myocardial perfusion imaging: still a controversial issue. Eu J Nuc Med and Mol Imaging 2011;38:1889-91.