BACKGROUND

According to World Health Organization (WHO) statistics, Noncommunicable diseases (NCDs) kill 41 million people each year, equivalent to 74% of all deaths globally. Cardiovascular disease (CVD) is the leading cause of death from NCDs accounting for 43%, followed by cancer with 27%, respiratory diseases with 10% and diabetes with 5%.

Each year, 15 million people die from NCDs between the ages of 30 and 69 years; and regrettably over 85% of these "premature" deaths occur in low- and middle-income countries (LMICs).

Cardiovascular disease, particularly heart attack and stroke, kills 17.9 million people a year, equivalent to 34% of global deaths, and it is anticipated to cross around 23 million by 2030. The second leading cause of death is cancer responsible for approximately 9 million deaths a year.

When distributing by regions, the Southeast Asia Region has the highest probability (25%) of dying young due to an NCD, followed by Africa with 22%. These are deaths which are largely preventable, through improving modifiable risk factors. If we look closely at mortality associated with ischemic heart disease (IHD), according to the Institute for Health Metrics and Evaluation, IHD was responsible for 16% of deaths worldwide in 2017, with the highest incidence, 24.5%, registered in the WHO's European Region. These are followed by the Eastern Mediterranean Region with 20.7%, the Americas with 16.1%, the Western Pacific Region with 15.9%, the South-East Asia Region with 14.9%, and finally Africa with only 5.5% of deaths associated with IHD. The country with the highest IHD-associated mortality is the Ukraine, with 44.9%, followed by countries in Central and Eastern Europe, Central Asia, North Africa, and the Middle East. In the Americas, the highest mortality is registered in Cuba with 20.94%; the USA is in fifth place with 18.7%, Canada in the eighth place with 17.3%. In South America the highest is Venezuela (seventh place) with 18.2%; Brazil is in 8th place with 13% after Colombia, Argentina and Mexico and followed by Chile, Peru, and Ecuador with close to 10% each.
One of the strategies to respond to the challenges to population health and wellbeing due to the global epidemic of heart attack and stroke is to provide actionable information for development and implementation of appropriate policies.

Despite several efforts to improve primary prevention, reducing well known risk factors associated to CVs, such as smoking habit, obesity and diabetes, substantial numbers of deaths are still occurring and require improved diagnostic tools to improve secondary prevention. To properly diagnose and stratify the risk of patients with coronary artery disease (CAD), medical imaging tests such SPECT myocardial perfusion imaging (MPI) and coronary CT angiography (CCTA) have been widely implemented, significantly improving patient outcomes. Unfortunately, the downside is the exposure to ionizing radiation, which could be reduced by improving clinical protocols and adopting recommended best practices.

Nuclear MPI is a non-invasive diagnostic test widely used to diagnose CAD, stratify risk, predict outcomes, guide patient management, and control costs. Reflecting these benefits, MPI volume has grown rapidly worldwide over the past two decades, to 15-20 million procedures annually and diffusion of technology and expertise has led to its continued adoption across the developing world. In recent years, cardiac CT has gained considerable popularity as well in assessing CAD and guiding patient management; for example, CCTA is now the first-line test for coronary artery disease imaging in United Kingdom national (NEXT) guidelines.

However, significant concerns have been raised over quality and variability in clinical practices for CAD assessment. A variety of protocols can be used to perform MPI on SPECT and PET cameras, and a variety of protocols can be used to perform CCTA and coronary artery calcium (CAC) scoring scanning. For each test, a variety of approaches and “best practices” have been developed to ensure image quality while lowering radiation exposures to patients. The IAEA Nuclear Cardiology Protocols Study 1 (INCAPS 1) was conducted in 2013 to evaluate the use of such best practices in SPECT and PET MPI, and their impact on quality of clinical practice and radiation dose to patients. INCAPS 1 was an observational, cross-sectional study of worldwide nuclear cardiology practice. Data were collected on protocols, technology, and best practices on Myocardial Perfusion Imaging (MPI) SPECT studies in 308 nuclear medicine laboratories in 65 countries during a single week in March-April 2013. INCAPS 1 found wide variation in practice of MPI worldwide and identified numerous areas for potential improvement. Numerous publications emanating from INCAPS 1 have addressed, region by region, challenges particularly relevant to low- and middle-income countries, adoption of best practices, and gender and age disparities.

INCAPS 1 led to 12 papers, and characterized worldwide variability, identifying e.g. particularly high radiation doses in many laboratories in Latin America and East Asia, and disparities in the use of MPI between men and women. Worldwide findings were published in European Heart Journal (available open access at https://academic.oup.com/eurheartj/article/36/26/1689/2293344) and demonstrated considerable worldwide variability in MPI practice. This paper was followed by 6 regional papers, focusing on nuclear cardiology practice in (alphabetically) Africa, Asia, Europe, Latin America, Oceania, and the US. In addition, five thematic papers were published, focusing on gender differences, the impact of age, stress-only MPI, diagnostic reference levels for SPECT MPI, and imaging protocols and technology. This IAEA-led effort has resulted in considerable worldwide discussion regarding the conduct of CAD imaging and approaches to improve this imaging. While many nuclear cardiology laboratories may have improved their practices since INCAPS I, worldwide practices in the 2020s remain uncertain. Moreover, worldwide practices relating to CCTA and CAC scoring have never been systematically studied. Thus, a new survey of worldwide practices for CAD imaging is needed.

With the dissemination of knowledge learned in INCAPS 1, and potential improvements attributable to these efforts, as well as to the availability of new developments in hardware, software and clinical protocols, the time has come to reexamine worldwide cardiac imaging practice.
More recently, two new non-invasive technologies for cardiac imaging, namely coronary computed tomography angiography (CCTA) and coronary artery calcium scoring (CACS), have grown worldwide and these emerging technologies should also be examined.

A better understanding of current practices would offer opportunities to identify areas to improve quality of care and to reduce disparities, which in turn would improve the quality of and decrease the global radiation burden from CAD imaging.

**STUDY PURPOSE AND RATIONALE**

The International Atomic Energy Agency (IAEA)'s division of Human Health, the Nuclear Medicine and Diagnostic Imaging section focuses on fostering the use of and improving the quality of medical imaging procedures. With their collaboration, INCAPS 1 was initiated in 2012 as an observational, retrospective worldwide nuclear cardiology practice study. INCAPS 4 will serve to follow up INCAPS 1. Due to the global increase in cardiac CT usage, the scope of the study has been expanded to encompass cardiac CT, as well as nuclear cardiology as studied previously. The primary objective will be to examine imaging practice variations from other institutions that include protocols, technology, best practices and will identify areas of improvement for future intervention.

The IAEA will be collecting introductory data and primary data. The introductory data will consist of a questionnaire comprising of a few survey questions to outline the typical practices and procedure volumes from the participating institutions. The primary data will consist of data collected retrospectively from the week chosen by the laboratory that includes height, weight, activity, scan parameters, and technical components of the equipment that the patient was imaged with to assess the usage of the camera and to observe the activity standards of other institutions to then assess if there is room for improvement.

The survey instrument will not record any protected health information/individually identifiable health information, in accordance with 45 CFR §164.514(b). For example, for any patient aged >89 years, "90 or above" will be collected rather than the patient’s exact age. Dates of procedures will not be collected, just days of the week which could reflect one of several days. The survey asks investigators interested in collaborating to respond to the questionnaire provided by IAEA through the secure online system at the IAEA called IRIS, regarding the patient volume for different imaging modalities at their institution.

We aim to study non-invasive cardiac imaging practice across the globe, obtaining consecutive data from all patients imaged over a one-week period in at least 1000 participating laboratories worldwide, between the weeks beginning 15 October and 10 December 2023, inclusive. Participating sites will have the opportunity to contribute data on their lab’s practices in CCTA and coronary artery calcium scoring, as well as in myocardial perfusion imaging performed with Single Photon Emission Computed Tomography (SPECT) or Positron Emission Tomography (PET). With this data we will better understand practice variation in contemporary practice, including use of protocols and technology in each modality, adherence to best practices, and radiation doses. We thereby will identify potential targets for improvement, and design and test interventions to improve non-invasive cardiac imaging practices.

This study focusses on identifying and understanding current applications of nuclear cardiology and cardiac CT worldwide and it will offer opportunities to recognize areas for improving clinical practice.
STUDY DESIGN

The IAEA Noninvasive Cardiology Protocols Study (INCAPS) Group has for the past decade conducted numerous studies addressing the use of cardiac imaging, best practices, and worldwide practice variation in cardiovascular disease diagnosis. The steering committee, comprising experts in clinical cardiology and cardiac imaging from around the world, devised a survey questionnaire including for each site. The INCAPS 4 form – preview is included below.

Data from MPI and from CT need not be provided from the same week from all centers, but for each modality, laboratories will be expected to provide consecutive data from all patients imaged over a one-week period, between the weeks beginning 15 October to 10 December 2023.

Participating sites will have the opportunity to contribute data on their laboratory practices in CT and MPI. Data from all patients imaged over a one-week period should be submitted, with the possibility to choose one of the weeks below:

- 15 to 21 October
- 22 to 28 October
- 29 October to 4 November
- 5 to 11 November
- 12 to 18 November
- 19 to 25 November
- 26 November to 2 December
- 3 to 9 December
- 10 to 16 December

All data will be entered using IRIS, a secure, online system at the IAEA. We anticipate that data collection will take less than an hour to complete in total for most laboratories. The form can be completed by a physician, radiographer/technician, or physicist and can be completed in more than one session.

Data from one week retrospectively chosen for review, for which data regarding all nuclear myocardial perfusion imaging studies and/or coronary CT procedures performed for clinical purposes will be provided. This will include the day of the week (not the date), the type of procedure, patient’s age (or "90 or above"), gender, weight (kg/lbs), height (cm/in), type of camera (PET/SPECT/CT etc), and scan parameters (e.g., x-ray tube current and voltage, or radiopharmaceutical and activity (mCi/MBq)).

STATISTICAL PROCEDURES

Mean, standard deviation, and other descriptive statistics will be performed to characterize procedures done at different sites. If data is normally distributed, then parametric tests such as Student’s t-test and chi-squared test will be used to compare between groups, and for nonnormally distributed data nonparametric tests such as the Wilcoxon rank sum test will be used. It is expected that over 1000 sites from all over the world will contribute data to the INCAPS 4 study. Comparisons will be made between world regions, and between types of practice sites including hospital and outpatient facilities. Hierarchical linear regression models will be developed to evaluate the relationship between laboratory adherence to best practices and with patient radiation dose, adjusting for patient clustering by laboratory and country.

OBJECTIVE

The overall objective of the study is to characterize worldwide CAD imaging practice and identify disparities and areas for improvement.
SPECIFIC OBJECTIVES

1) Describe best practice use and radiation doses from SPECT and PET MPI in 2023, and compare with worldwide practice as observed from the previous study in 2013.

2) Describe best practice use and radiation doses from CCTA and CACS and compare with those from MPI.

3) Identify disparities between world regions, countries, lower-and middle income vs. upper income countries, and genders, and identify targets for focused interventions to improve the quality of CAD imaging.

OUTCOMES

1. Improve knowledge of current practice of nuclear cardiology (SPET and PET)
2. Improve knowledge of current practice of cardiac CT (CCTA and CACS)
3. Identification of interventions to improve the safety and quality of clinical nuclear cardiology and cardiac CT.

OUTPUTS

1. INCAPS 4 results presented at scientific meeting.
2. INCAPS 4 results published in a peer reviewed scientific journal as open access articles for dissemination across the scientific community.
3. Identification of interventions to improve the safety and quality of clinical nuclear cardiology and CCTA practice to be implemented by means of technical cooperation projects and other initiatives.

ETHICS APPROVAL

The Columbia University Institutional Review Board has determined that INCAPS 4 is “exempt” and that informed consent is not required (under US law in 45 CFR 46). For UK sites, following the national Health Research Authority standardised assessment process, INCAPS is deemed to not be research, and not in need of formal HRA or REC review. For Swiss sites, the Bern Kantonale Ethikkommission für die Forschung has determined INCAPS 4 to be “Nicht zuständig, d.h. das Vorhaben ist nicht bewilligungspflichtig.” Documentation of any of these is available upon request. For many institutions, this implies that additional ethics approval is not necessary. It is important to highlight that all sites should adhere to local laws and regulations. If any participating centre has questions or concerns, please contact the IAEA – INCAPS 4 team here.

RELATED PUBLICATIONS

INCAPS 1 PAPER REFERENCES


INCAPS COVID 1 PAPER REFERENCES


This is not the data collection form; rather, it serves as a preview of the data that centers will submit on-line through the IAEA IRIS platform.

**Modalities**

* For which modality/modalities are you reporting patient-level data for this institution? Please select one or both.

- [ ] Nuclear Cardiology
- [ ] Cardiac CT

* How many patients would you like to register?

**Institutional Characteristics**

Number of beds (if hospital)

**Institution’s Procedure Numbers During Selected Week**

In this section, please provide counts of all imaging studies in the specified categories performed for clinical purposes and completed during one specific week of your choice (Monday-Sunday) between 15 October 2023 and 15 December 2023. The same week should be used for this section, for Nuclear Cardiology studies, and for Cardiac CT studies in the following sections - this will be referred to as the selected week.

- All data entered should be recorded retrospectively for the selected week.
- Only include studies completed during the selected week.
  - For example, if a two-day stress-rest SPECT myocardial perfusion imaging study is begun on Friday of the previous week and completed on Monday of the selected week, then it should be included, however if it is begun on Friday of the selected week but completed on Monday of the week following the selected week, then it should not be included.
- Only include studies in which patients were imaged at your facility. Exclude studies read at your facility but performed elsewhere. However, include studies performed at your facility but read elsewhere.
- Exclude studies performed exclusively for research.
- If both stress echocardiography and a baseline (rest) echocardiogram are performed, count these as separate studies; similarly for cardiac magnetic resonance.

<table>
<thead>
<tr>
<th>Procedure Type</th>
<th>Is test performed at this site?</th>
<th>Number of procedures performed during selected week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Echocardiography without Stress Testing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stress Echocardiography</td>
<td>[ ] Yes [ ] No</td>
<td></td>
</tr>
<tr>
<td>Cardiac Magnetic Resonance without Stress Testing</td>
<td>[ ] Yes [ ] No</td>
<td></td>
</tr>
<tr>
<td>Stress Cardiac Magnetic Resonance</td>
<td>[ ] Yes [ ] No</td>
<td></td>
</tr>
<tr>
<td>Stress SPECT Myocardial Perfusion Imaging</td>
<td>[ ] Yes [ ] No</td>
<td></td>
</tr>
<tr>
<td>SPECT Myocardial Perfusion Imaging for Viability</td>
<td>[ ] Yes [ ] No</td>
<td></td>
</tr>
<tr>
<td>SPECT Myocardial Blood Flow Reserve (with CZT camera)</td>
<td>[ ] Yes [ ] No</td>
<td></td>
</tr>
<tr>
<td>Stress PET Myocardial Perfusion Imaging</td>
<td>[ ] Yes [ ] No</td>
<td></td>
</tr>
<tr>
<td>PET Myocardial Perfusion Imaging for Viability</td>
<td>[ ] Yes [ ] No</td>
<td></td>
</tr>
<tr>
<td>PET Myocardial Blood Flow Reserve</td>
<td>[ ] Yes [ ] No</td>
<td></td>
</tr>
<tr>
<td>Nuclear Ventriculography (MUGA, RVG, etc.)</td>
<td>[ ] Yes [ ] No</td>
<td></td>
</tr>
</tbody>
</table>
- Amyloidosis (PYP, DPD, HMDP, etc.)
- Exercise ECG (Treadmill, no imaging)
- Exercise ECG (Bicycle, no imaging)
- CT Coronary Artery Calcium Scoring Alone
- CT Coronary Angiography without Calcium Scoring
- CT Coronary Angiography with Calcium Scoring
- CT Fractional Flow Reserve
- CT Quantitative Plaque Analysis
- CT Perfusion
- CT Structural (for valve repair/replacement, left atrial appendage, ablation, or other intervention)
- Invasive Coronary Angiography (in cath lab)
- Invasive Physiology (in cath lab, e.g., FFR, iFR)
- Invasive Imaging (in cath lab, e.g., IVUS, OCT)

<table>
<thead>
<tr>
<th>Procedure Number</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCAPS 4 FORM - PREVIEW</td>
<td></td>
</tr>
</tbody>
</table>

This is not the data collection form; rather, it serves as a preview of the data that centers will submit on-line through the IAEA IRIS platform.
Patient Data: Nuclear Cardiology

(Information to be collected for each patient scanned during the selected week)

Unit Selection

Please select units of data input for the form below.

| * Weight | ☐ kg ☐ lb |
| * Height | ☐ cm ☐ inches |
| * Activity | ☐ MBq ☐ mCi |

Activity Measurement

☐ Calibrated activity in syringe prior to injection
☐ Calibrated activity prior to injection minus residual activity in syringe after injection

Patient Data

In this section please include all nuclear (SPECT, PET, or planar) myocardial perfusion imaging studies performed for clinical purposes completed during the selected week (Monday-Sunday) between 15 October and 15 December 2023.

- Include nuclear stress tests, viability studies, and rest myocardial perfusion imaging.
- Do not include radionuclide ventriculography (MUGA) studies, or amyloid (PYP, DPD, HMDP) studies.
- All data entered should be recorded retrospectively for the selected week.
- Only include studies completed during the selected week; for example, if a two-day stress-rest SPECT myocardial perfusion imaging study is begun on Friday of the previous week and completed on Monday of the selected week, then it should be included, however if it is begun on Friday of the selected week but completed on Monday of the week following the selected week, then it should not be included.
- Only include studies in which patients were imaged at your facility, excluding studies read at your facility but performed elsewhere. However, include studies performed at your facility but read elsewhere. For studies read at your facility but performed at a different facility, we encourage completing a separate document for the other facility.
- For patients aged 90+, please specify age as 90, in accordance with the HIPAA privacy law standard.

Patient Characteristics

| * Age |  |
| * Sex | ☐ Male ☐ Female ☐ Other |
| * Weight |  |
| * Height |  |
| * Known coronary artery disease (CAD) | ☐ Yes ☐ No ☐ Do not know (please, ask colleague if you’re not sure) |
| * Prior myocardial infarction | ☐ Yes ☐ No ☐ Do not know (please, ask colleague if you’re not sure) |
| * History of percutaneous coronary interventio (PCI) | ☐ Yes ☐ No ☐ Do not know (please, ask colleague if you’re not sure) |
| * Prior coronary artery bypass surgery (CABG) | ☐ Yes ☐ No ☐ Do not know (please, ask colleague if you’re not sure) |
| * Main reason patient underwent nuclear cardiology scan | ☐ Acute symptoms; ☐ Stable/chronic symptoms; ☐ Asymptomatic; ☐ Other/unknown |
| * Patient location | ☐ Inpatient; ☐ Outpatient; ☐ Emergency department; ☐ Observation unit; |

Scanning and Camera Details

| * Camera | ☐ 2-Head SPECT Gamma Camera; ☐ Single-Head SPECT Gamma Camera; ☐ 3-Head SPECT Gamma Camera; ☐ Dedicated Cardiac CZT Camera (e.g. D-SPECT, 530c); ☐ All-purpose CZT SPECT/CT Camera (e.g., Veriton, StarGuide); ☐ Planar Imaging Only (No SPECT performed); ☐ PET |
### Patient Position
- □ Supine; □ Prone; □ Upright; □ Semi-Upright; □ Supine+Prone; □ Supine+Upright; □ Upright+Semi-Upright; □ Supine+Semi-Upright

### Attenuation correction
- □ None; □ CT (Single Slice); □ CT (Multislice, free breathing); □ CT (Multiscale, breath-hold); □ Transmission; □ MRI; □ Artificial Intelligence Based

### DLP for CT Attenuation Correction (mGy*cm)

### Software
- □ Siemens IQ SPECT; □ Philips Astonish; □ GE Evolution; □ Siemens Flash3D/CardioFlash; □ UltraSpect WBR Wide Beam Recon; □ Other (please specify):

### First Injection
#### Day of injection
- □ Monday; □ Tuesday; □ Wednesday; □ Thursday; □ Friday; □ Saturday;
- □ Sunday; □ Monday (Previous Week); □ Tuesday (Previous Week);
- □ Wednesday (Previous Week); □ Thursday (Previous Week);
- □ Friday (Previous Week); □ Saturday (Previous Week);
- □ Sunday (Previous Week); □ Prior to Previous Week

### Activity

### Radiopharmaceutical
- □ Tc-99m sestamibi (Cardiolite); □ Tc-99m tetrofosmin (Myoview); □ TI-201;
- □ Rb-82; □ N-13 ammonia; □ O-15 water; □ F-18 FDG

### Rest or Stress for 1st injection
- □ Rest; □ Stress

### Second Injection
#### Day of injection
- □ Monday; □ Tuesday; □ Wednesday; □ Thursday; □ Friday; □ Saturday; □ Sunday; □ Monday (Previous Week); □ Tuesday (Previous Week);
- □ Wednesday (Previous Week); □ Thursday (Previous Week);
- □ Friday (Previous Week); □ Saturday (Previous Week);
- □ Sunday (Previous Week); □ Prior to Previous Week

#### Activity

#### Radiopharmaceutical
- □ Tc-99m sestamibi (Cardiolite); □ Tc-99m tetrofosmin (Myoview);
- □ TI-201; □ Rb-82; □ N-13 ammonia; □ O-15 water; □ F-18 FDG

### Rest or Stress for 2nd injection
- □ Rest; □ Stress

### Third Injection
#### Day of injection
- □ Monday; □ Tuesday; □ Wednesday; □ Thursday; □ Friday; □ Saturday; □ Sunday; □ Monday (Previous Week); □ Tuesday (Previous Week); □ Wednesday (Previous Week); □ Thursday (Previous Week); □ Friday (Previous Week); □ Saturday (Previous Week); □ Sunday (Previous Week);
- □ Prior to Previous Week

#### Activity

#### Radiopharmaceutical
- □ Tc-99m sestamibi (Cardiolite); □ Tc-99m tetrofosmin (Myoview);
- □ TI-201; □ Rb-82; □ N-13 ammonia; □ O-15 water; □ F-18 FDG
Rest or Stress for 3d injection
☐ Rest; ☐ Stress

Fourth Injection
Day of injection
☐ Monday; ☐ Tuesday; ☐ Wednesday; ☐ Thursday; ☐ Friday; ☐ Saturday; ☐ Sunday; ☐ Monday (Previous Week); ☐ Tuesday (Previous Week); ☐ Wednesday (Previous Week); ☐ Thursday (Previous Week); ☐ Friday (Previous Week); ☐ Saturday (Previous Week); ☐ Sunday (Previous Week);
☐ Prior to Previous Week

Activity
Radiopharmaceutical
☐ Tc-99m sestamibi (Cardiolite); ☐ Tc-99m tetrofosmin (Myoview);
☐ TI-201; ☐ Rb-82; ☐ N-13 ammonia; ☐ O-15 water; ☐ F-18 FDG

Rest or Stress for 4th injection
☐ Rest; ☐ Stress

INCAPS 4 FORM - PREVIEW
This is not the data collection form; rather, it serves as a preview of the data that centers.
will submit on-line through the IAEA IRIS platform.
Patient Data: Cardiac CT

(Information to be collected for each patient scanned during the selected week)

<table>
<thead>
<tr>
<th>Patient Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>In this section please include all Coronary Artery CT and Coronary Artery Calcium Scoring studies performed for clinical purposes performed during one selected week (Monday-Sunday) between 15 October 2023 and 15 December 2023 as specified.</td>
</tr>
<tr>
<td>• Include coronary artery bypass graft studies, coronary studies also imaging the thoracic aorta, and &quot;triple rule out&quot; studies.</td>
</tr>
<tr>
<td>• Do not include structural studies such as pre-TAVR evaluation, left atrial appendage, and pulmonary vein assessment.</td>
</tr>
<tr>
<td>• In general, do not include congenital heart disease studies, unless they are performed specifically for coronary evaluation, i.e. to assess known or suspected anomalous coronary arteries.</td>
</tr>
<tr>
<td>• For medications, please specify medications received including patient's own medications as well as those given specifically for heart rate control for the test.</td>
</tr>
<tr>
<td>• All data entered should be recorded retrospectively for the selected week.</td>
</tr>
<tr>
<td>• Only include studies in which patients were imaged at your facility, excluding studies read at your facility but performed elsewhere.</td>
</tr>
<tr>
<td>• However, include studies performed at your facility but read elsewhere. For studies read at your facility but performed at a different facility, we encourage completing a separate document for the other facility.</td>
</tr>
<tr>
<td>• For patients aged 90+, please specify age as 90, in accordance with the HIPAA privacy law standard.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Day</td>
</tr>
<tr>
<td>☐ Saturday; ☐ Sunday;</td>
</tr>
<tr>
<td>• Age</td>
</tr>
<tr>
<td>• Sex</td>
</tr>
<tr>
<td>• Weight</td>
</tr>
<tr>
<td>• Height</td>
</tr>
<tr>
<td>• Known coronary artery disease (CAD)</td>
</tr>
<tr>
<td>• Prior myocardial infarction</td>
</tr>
<tr>
<td>• History of percutaneous coronary intervention (PCI)</td>
</tr>
<tr>
<td>• Prior coronary artery bypass surgery (CABG)</td>
</tr>
<tr>
<td>• Main reason patient underwent coronary CT scan</td>
</tr>
<tr>
<td>☐ Other/unknown</td>
</tr>
<tr>
<td>• Patient location</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scan Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Beta Blocker – Oral</td>
</tr>
<tr>
<td>• Beta Blocker – Intravenous</td>
</tr>
</tbody>
</table>
* Other Heart Rate Control Agent
  ☐ Yes ☐ No ☐ Do not know (please, ask colleague if you’re not sure)
* Nitroglycerin
  ☐ Yes ☐ No ☐ Do not know (please, ask colleague if you’re not sure)
* Breast Shielding
  ☐ Yes ☐ No ☐ Do not know (please, ask colleague if you’re not sure)
* Breast Retraction
  ☐ Yes ☐ No ☐ Do not know (please, ask colleague if you’re not sure)
* Heart rate at time of scan (beats per minute)
* Atrial fibrillation at time of scan
* Scanner
  ☐ Yes ☐ No ☐ Do not know (please, ask colleague if you’re not sure)

---

* What scans were performed?
  ☐ Calcium Score; ☐ Repeat Calcium Score; ☐ Coronary CT Angiogram;
  ☐ Repeat Coronary CT Angiogram

The following 4 sections will become available to you based on your answer to “What scans were performed?”. Depending on the options, which have been checked, you will complete between 1-4 sections.

**Calcium Score**
- X-ray tube potential/voltage (kVp)
  ☐ 60; ☐ 70; ☐ 80; ☐ 90; ☐ 100; ☐ 110; ☐ 120; ☐ 130; ☐ 135; ☐ 140; ☐ 150
- X-ray tube current
- Anatomic current modulation
  ☐ Yes ☐ No ☐ Do not know
- Scan mode
  ☐ retrospective helical; ☐ retrospective helical with ECG tube current modulation; ☐ prospective helical; ☐ prospective axial with padding;
  ☐ prospective axial without padding; ☐ high-pitch prospective helical (Flash mode); ☐ stationary wide volume with padding;
  ☐ stationary wide volume without padding
  ☐ Yes ☐ No ☐ Do not know

**CTDivol (mGy)**
**DLP (mGy*cm)**

**Repeat Calcium Score**
- X-ray tube potential/voltage (kVp)
  ☐ 60; ☐ 70; ☐ 80; ☐ 90; ☐ 100; ☐ 110; ☐ 120; ☐ 130; ☐ 135; ☐ 140; ☐ 150
- X-ray tube current
- Anatomic current modulation
- Scan mode
  ☐ Yes ☐ No ☐ Do not know
  ☐ retrospective helical; ☐ retrospective helical with ECG tube current modulation; ☐ prospective helical; ☐ prospective axial with padding;
  ☐ prospective axial without padding; ☐ high-pitch prospective helical (Flash mode); ☐ stationary wide volume with padding;
<table>
<thead>
<tr>
<th><strong>Coronary CT Angiogram</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>X-ray tube potential/voltage (kVp)</td>
<td>☐ 60; ☐ 70; ☐ 80; ☐ 90; ☐ 100; ☐ 110; ☐ 120; ☐ 130; ☐ 135; ☐ 140; ☐ 150</td>
</tr>
<tr>
<td>X-ray tube current</td>
<td></td>
</tr>
<tr>
<td>Anatomic current modulation</td>
<td></td>
</tr>
<tr>
<td>Scan mode</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th><strong>Repeat Coronary CT Angiogram</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>X-ray tube potential/voltage (kVp)</td>
<td>☐ 60; ☐ 70; ☐ 80; ☐ 90; ☐ 100; ☐ 110; ☐ 120; ☐ 130; ☐ 135; ☐ 140; ☐ 150</td>
</tr>
<tr>
<td>X-ray tube current</td>
<td></td>
</tr>
<tr>
<td>Anatomic current modulation</td>
<td></td>
</tr>
<tr>
<td>Scan mode</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th><strong>Total Study Radiation Dose</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total study DLP (including all series such as scout imaging, timing bolus, calcium score, coronary CTA etc.)</td>
<td></td>
</tr>
</tbody>
</table>

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**INCAPS 4 FORM - PREVIEW**

This is not the data collection form; rather, it serves as a preview of the data that centers will submit on-line through the IAEA IRIS platform.