The use and safety of iodinated and gadolinium contrast media in Japan: Questionnaire-based survey

2015.7.21

English version 2015.7.21

The Contrast Media Safety Committee of the Japan Radiological Society

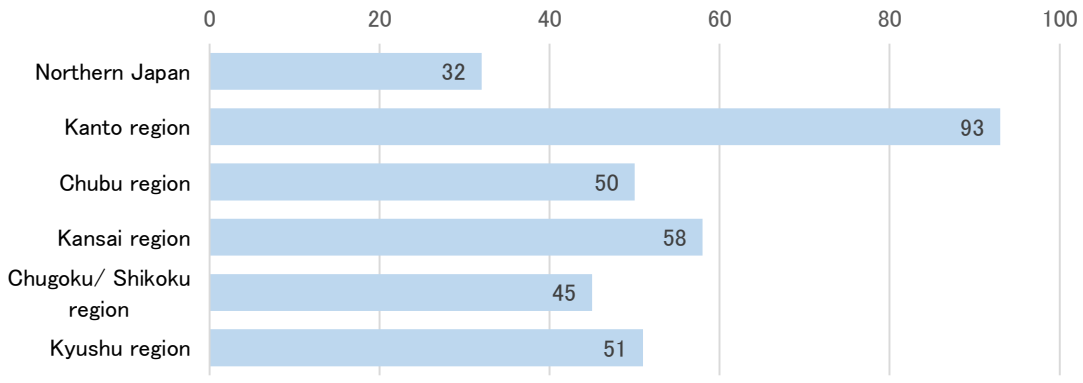
In February 2015, we sent questionnaires on iodinated contrast and gadolinium contrast media safety to a total of 724 institutions (191 general teaching hospitals, 521 training hospitals and 13 specialty training hospitals). We received replies from 329 (response rate: 45.4%) and we would like to report the results.

Currently, there are several guidelines on administration of iodinated contrast media and gadolinium contrast media to patients with renal dysfunction. The "Guidelines for Administering Iodinated Contrast Media to Patients with Renal Dysfunction 2012" JPN-I by the Japanese Society of Nephrology, Japan Radiological Society, and the Japanese Circulation Society and the "Guidelines for Administering Gadolinium Based Contrast Agents to Patients with Renal Dysfunction by the Joint Committee for NSF and Use of Gadolinium Based Contrast Agents" JPN-Gd by the Japan Radiological Society and the Japanese Society of Nephrology are widely used in Japan. From Europe, there are the "ESUR Guidelines on Contras Media v.9" ESUR by the European Society of Urogenital Radiology, and from the United States there is the "ACR Manual on Contrast Media v.9" ACR by the American College of Radiology.

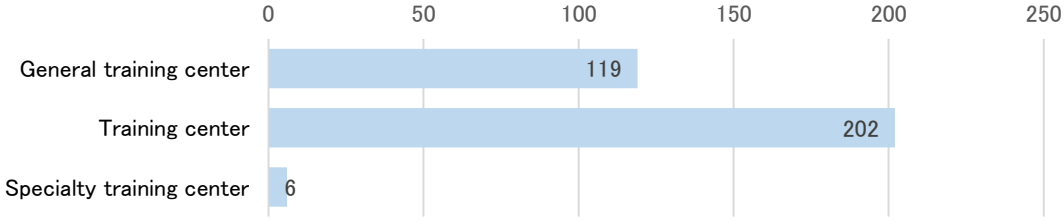
In this report, we will present the responses to our questionnaire, and compare them to the statements in the four guidelines/manual. Brief comments from the committee are added. There is no clear evidence for many aspects of contrast media use, but we hope this report will help readers in their clinical practice.

1. Location etc.

① Location

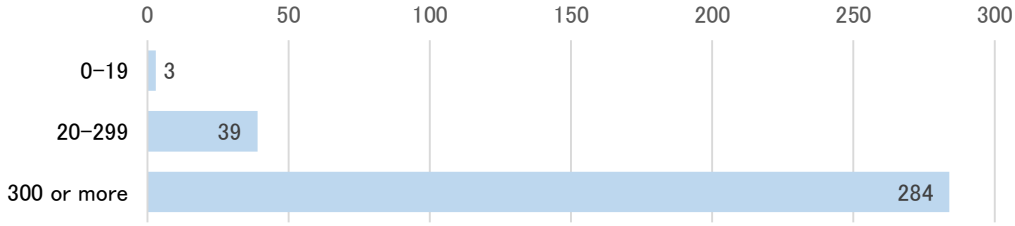


② Training certification



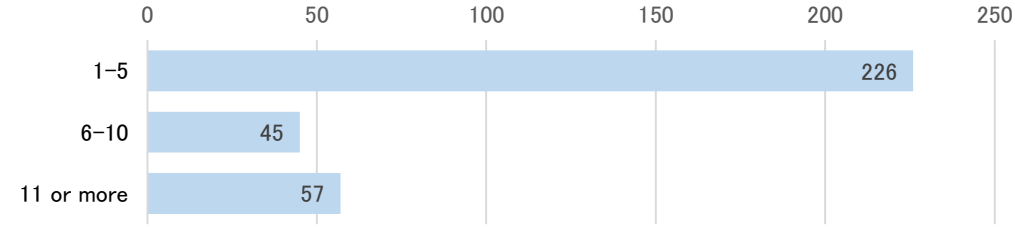
(No answer, n=2)

③ Number of beds



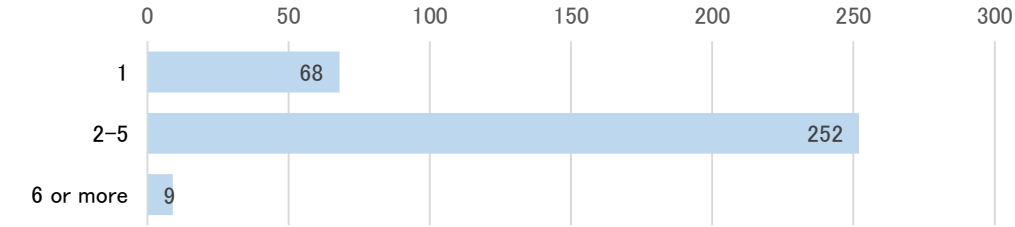
(No answer, n=3)

④ Number of board certified radiologists (including both diagnostic radiologists and radiation oncologists)

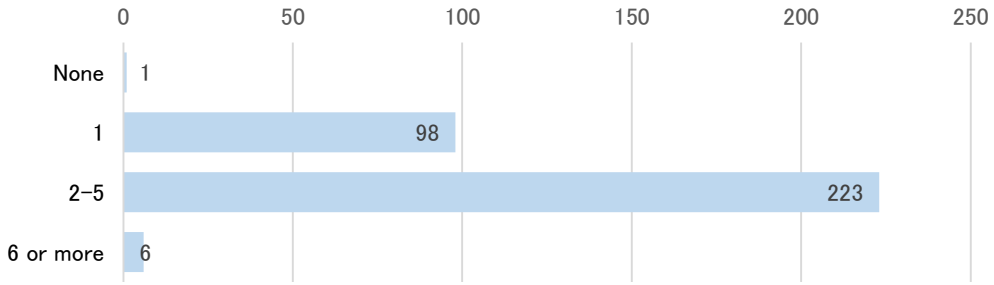


(No answer, n=1)

⑤ Number of CT units (not including radiation therapy planning CT units)

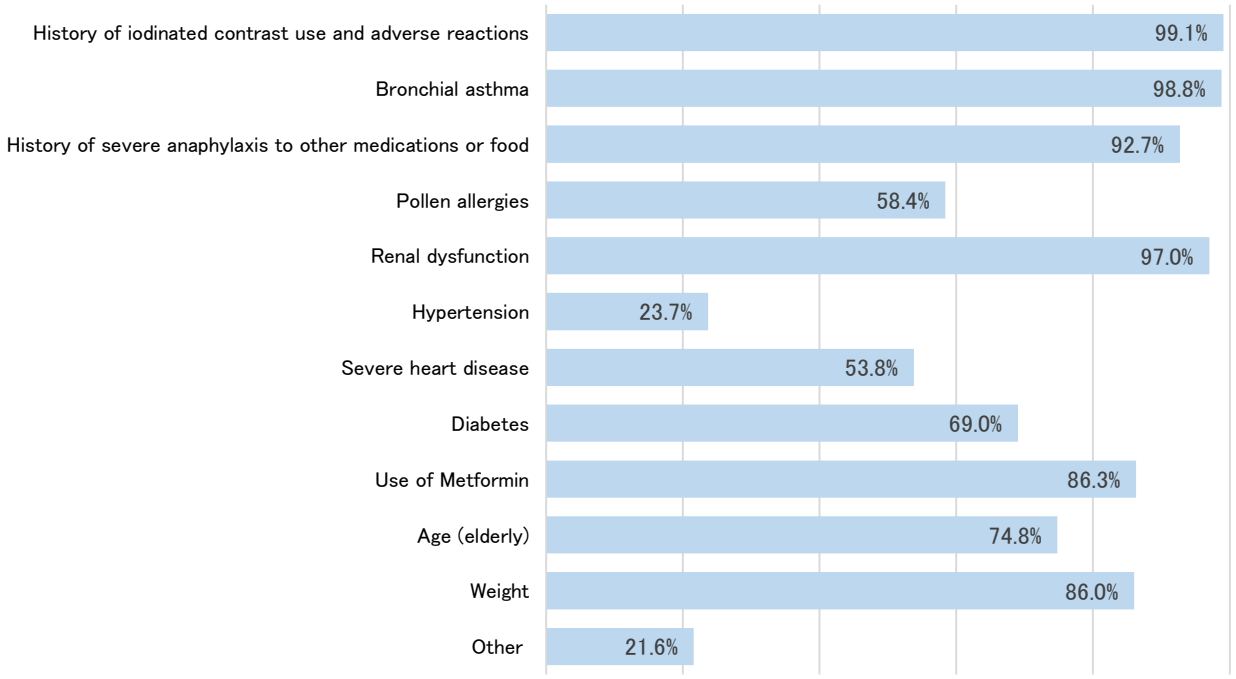


⑥ Number of MRI units



2. Iodinated contrast media: Patient interviews

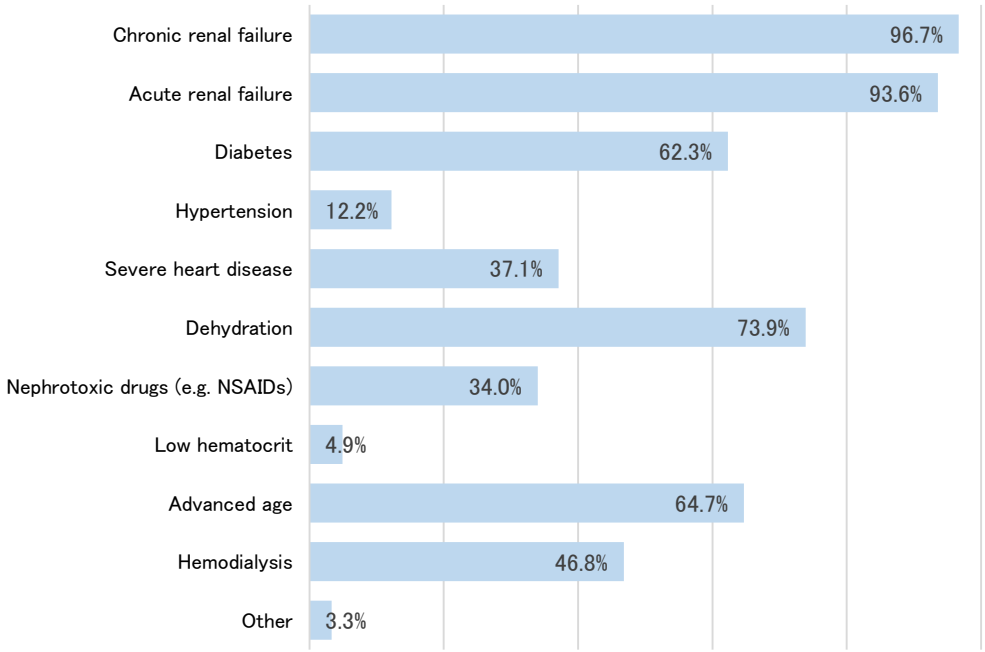
Which of the following do you confirm in the patient interview prior to administering iodinated contrast media? (Select all that apply)



＊ Other includes “thyroid disease” (n=27), etc.

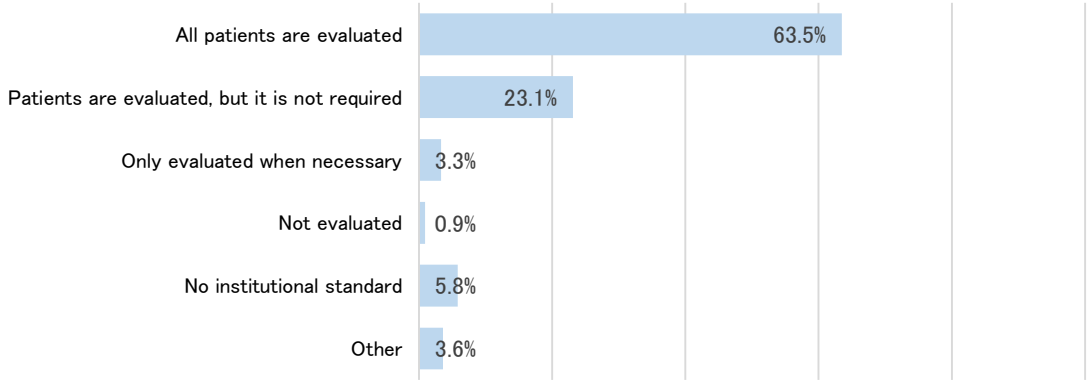
3. Iodinated contrast media: Contrast induced nephropathy

① Which of the following do you consider risk factors for contrast induced nephropathy? (Select all that apply)



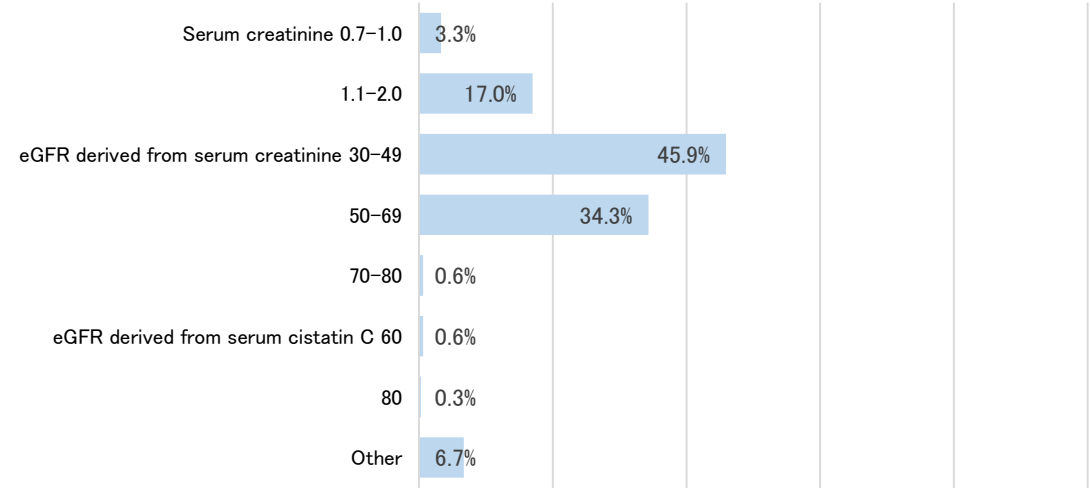
Comment: Renal failure is an obvious risk factor for contrast induced nephropathy, but JPN-1, ESUR and ACR all state diabetes, nephrotoxic drug use, and advanced age as additional risk factors. ESUR and ACR state the presence of heart disease should also be noted. ESUR lists low hematocrit as a risk factor.

② Do you evaluate renal function (by obtaining a serum creatinine level or similar method) prior to administering iodinated contrast media?



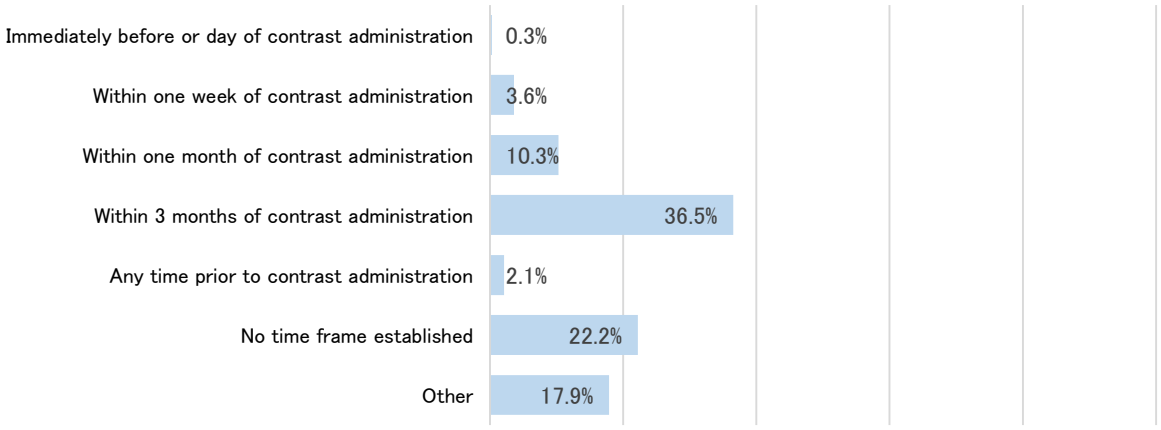
Comment: There is no clear consensus on whether renal function should be evaluated in all patients receiving iodinated contrast media. Ideally, all patients should undergo evaluation of renal function because of the possibility of occult renal dysfunction. ACR states that high-risk patients should be evaluated.

③ How do you evaluate renal function? What are the cutoff values indicating high risk?



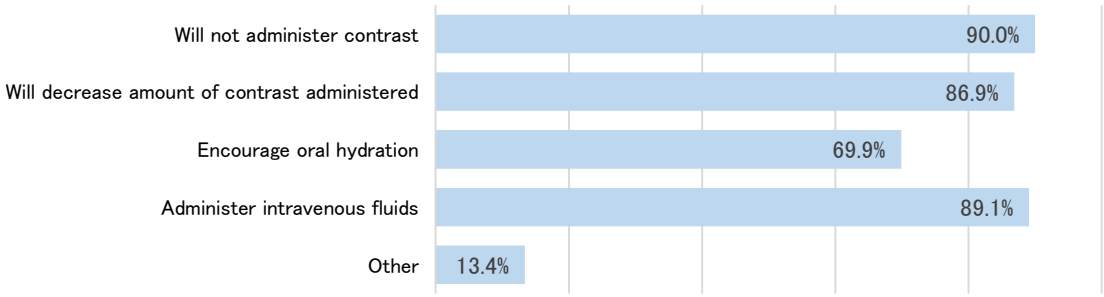
Comment: JPN-1 and ESUR state that eGFR is appropriate for evaluating renal function, but ACR states that it is not clear whether or not eGFR is superior to serum creatinine value. JPN-1 states that risk for contrast-induced nephropathy increases when eGFR<60 ml/min/1.73m^2, but ESUR states that risk for contrast induced nephropathy increases when eGFR<60 ml/min/1.73m^2 for intraarterial administration, but risk increases when eGFR<45 ml/min/1.73m^2 for intravenous administration. ACR states that risk for contrast-induced nephropathy is low when the serum creatinine value is less than 2.0 mg/dL.

④ How recent must the serum creatinine value be?



Comment: According to ESUR, renal function should be evaluated within 7 days of contrast administration.

⑤ What do you do when a patient has impaired renal function? (Select all that apply if your response varies by level of renal function)

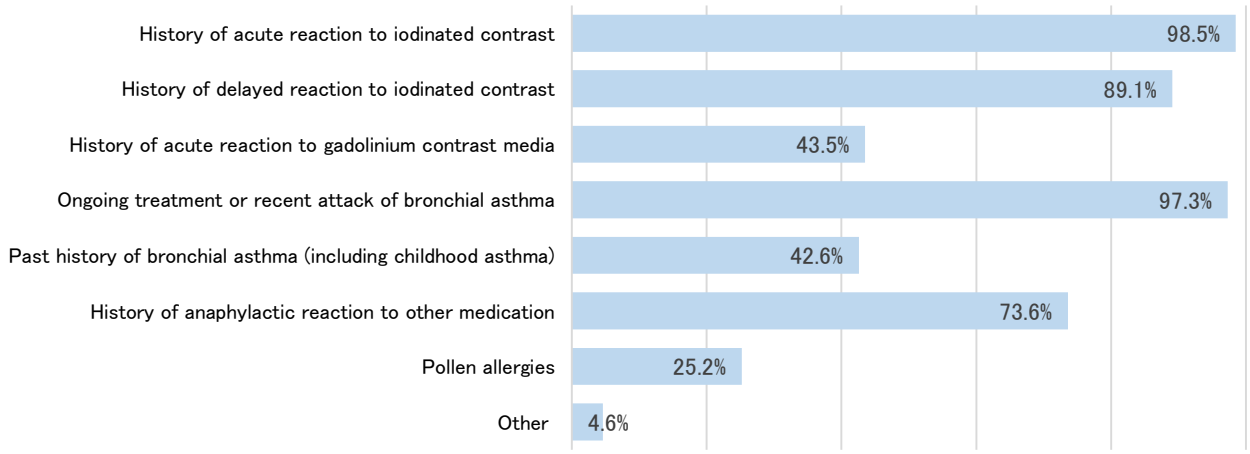


* Other includes “at discretion of referring physician” (n=14), “consult nephrology service” (n=3), etc.

Comment: JPN-1, ESUR and ACR all state the efficacy of administering intravenous fluids to prevent contrast-induced nephropathy. The efficacy of oral hydration is not clear. Using the smallest amount of iodinated contrast necessary should be obvious in all cases.

4. Iodinated contrast media: Acute reactions

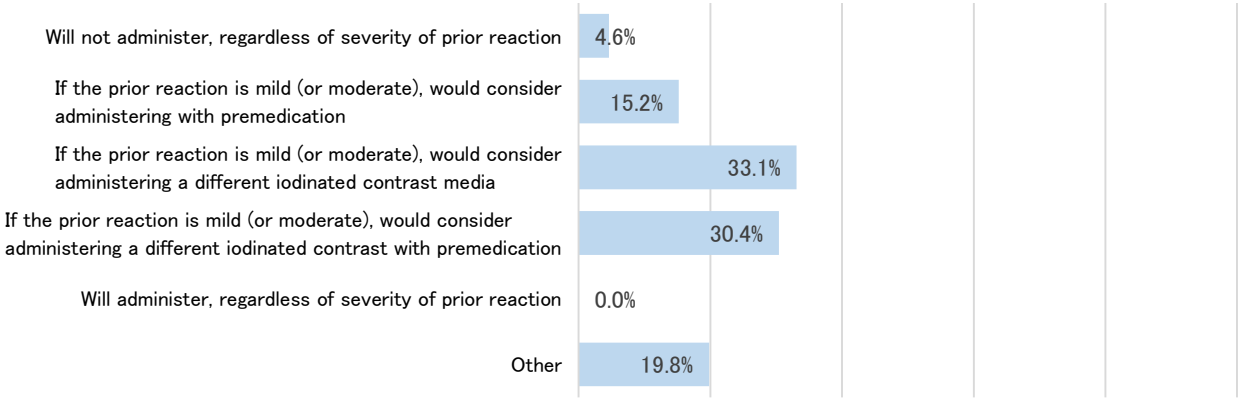
① Which factors increase risk of acute reactions to contrast? (Select all that apply)



＊Other includes “food allergies” (n=4), etc.

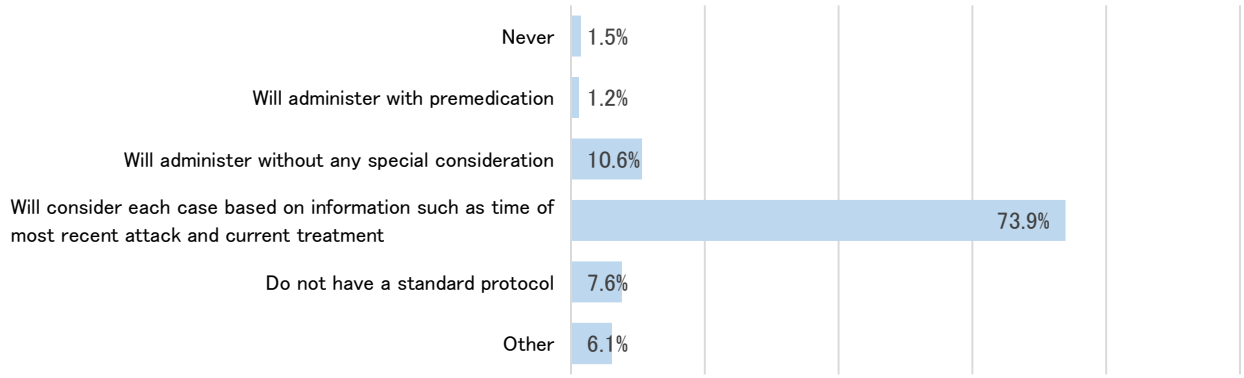
Comment: Both ESUR and ACR consider history of acute reaction to iodinated contrast, bronchial asthma, and history of other allergies to be risk factors. It is not established whether a prior history of asthma (including pediatric asthma) is a risk factor, nor is it clear whether a history of acute reaction to gadolinium contrast media is a risk factor.

② Will you administer iodinated contrast media to a patient with a history of acute reaction to it?

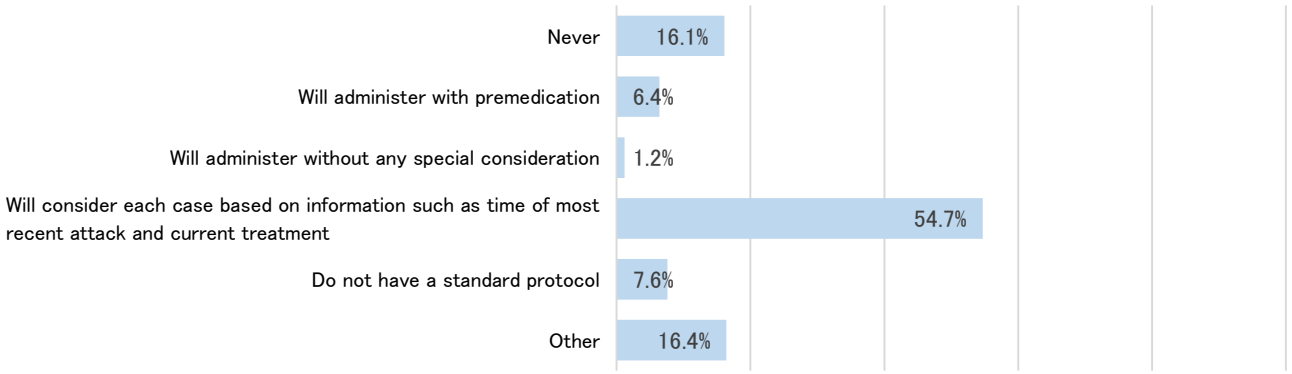


＊Other includes “at discretion of referring physician, or under direct supervision of referring physician” (n=20), etc.

③ Will you administer iodinated contrast media to a patient with a prior history of bronchial asthma (such as childhood asthma)?

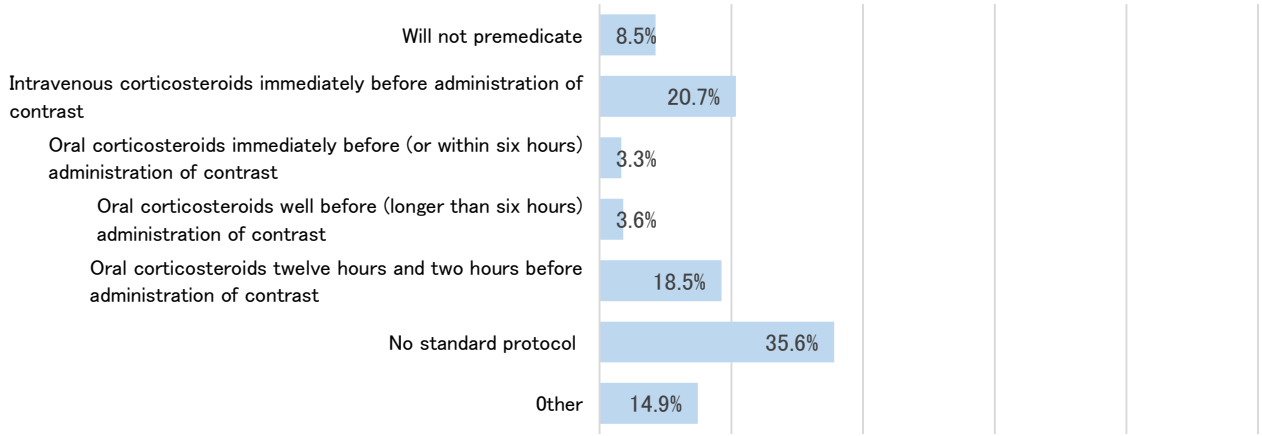


④ Will you administer iodinated contrast media to a patient currently being treated for asthma, or who has had a recent asthma attack?



＊ Other includes “at discretion of referring physician, or under direct supervision of referring physician” (n=36), etc.

⑤ In a non-emergency, how will you premedicate when there are risk factors for adverse reactions to iodinated contrast media?



＊ Other includes “at discretion of referring physician, or under direct supervision of referring physician” (n=24), etc.

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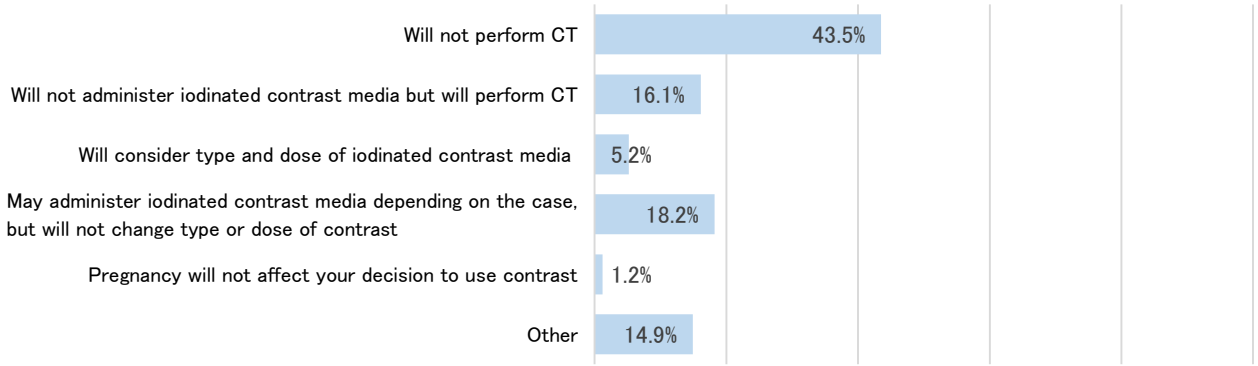
Comment: Both ESUR and ACR introduce premedication with corticosteroids as prevention for acute adverse reactions, but there is no clear evidence for their efficacy. Corticosteroids should be administered well before iodinated contrast media (ACR states at least 6 hours before contrast). Intravenous corticosteroids immediately prior to contrast administration are not recommended.

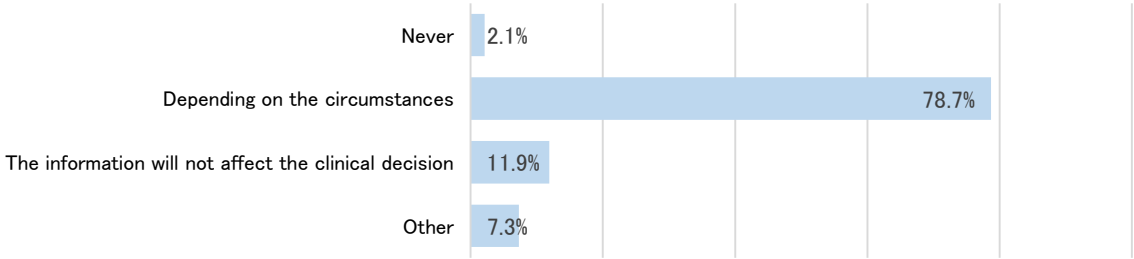
5. Iodinated contrast media: Pregnancy and nursing

① In a non-emergency, will you administer iodinated contrast media on a pregnant patient (or a patient with suspicion of pregnancy)?

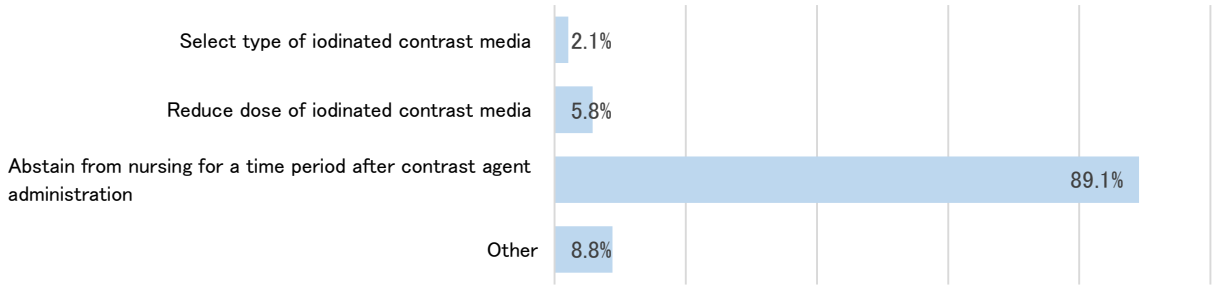


Comment: Use of iodinate contrast media obviously means radiation exposure to the patient and fetus. ESUR states that when iodinated contrast media is administered during pregnancy, thyroid function of the infant should be evaluated within one week after birth. In Japan, TSH evaluation is part of neonatal mass screening. ACR also states that evaluation of the neonate beyond routine screening is not necessary.

② Will you administer iodinated contrast media if the patient is a nursing mother?



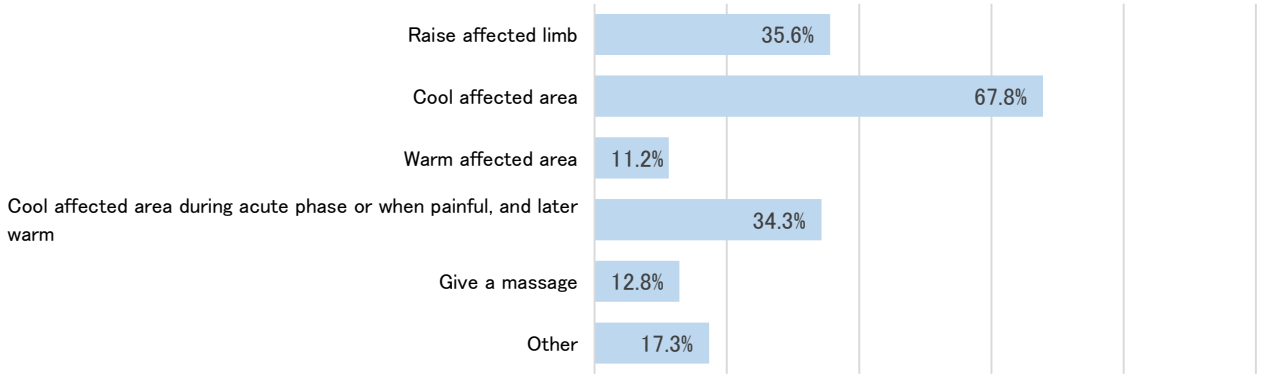
③ If you will administer iodinated contrast media on a nursing mother, what will you do?



Comment: ESUR states no special consideration for nursing mothers is needed when administering iodinated contrast media, and mothers should nurse as usual. According to ACR, less than 1% of the administered iodine will enter breast milk, and less than 1% of the iodine ingested will be absorbed through the digestive tract, and as a result, the amount of iodine entering the infant's body is less than 0.01% of the total iodine administered. This is a very small amount, and they conclude administration of iodinated contrast media to nursing mothers is not a problem. However, if the nursing mother feels anxious about this amount of iodine, she may, if she desires, abstain from nursing 12 to 24 hours after receiving iodinated contrast media.

6. Iodinated contrast media: Extravasation

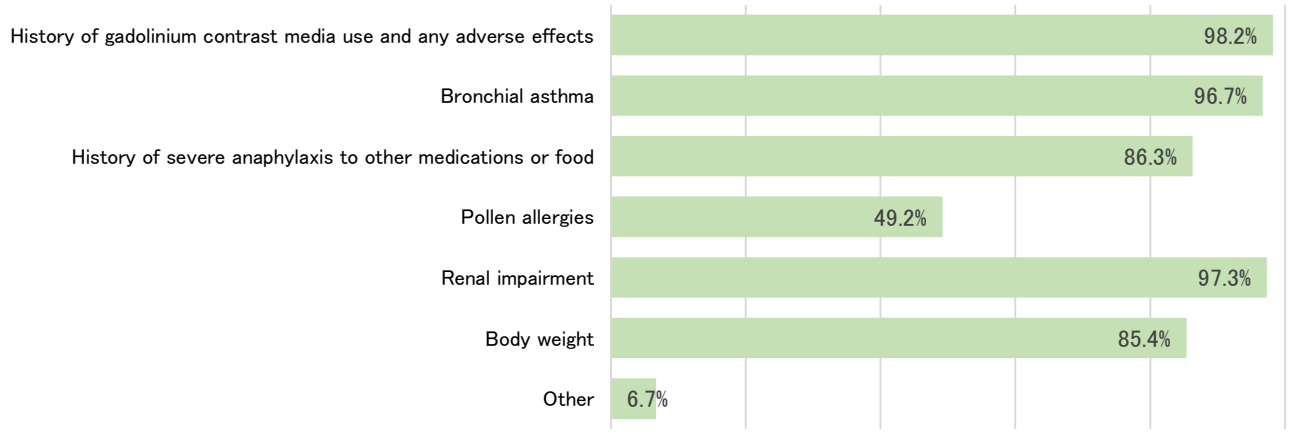
What would you do for moderate to severe extravasation of contrast administered intravenously? (Select all that apply)



Comment: ESUR recommends recording the extravasation on plain radiography, and that treatment should be conservative, such as raising the affected limb, ice packs, and careful monitoring. ACR states that there is no consensus for treatment, and that efficacy of raising the affected limb is not clear.

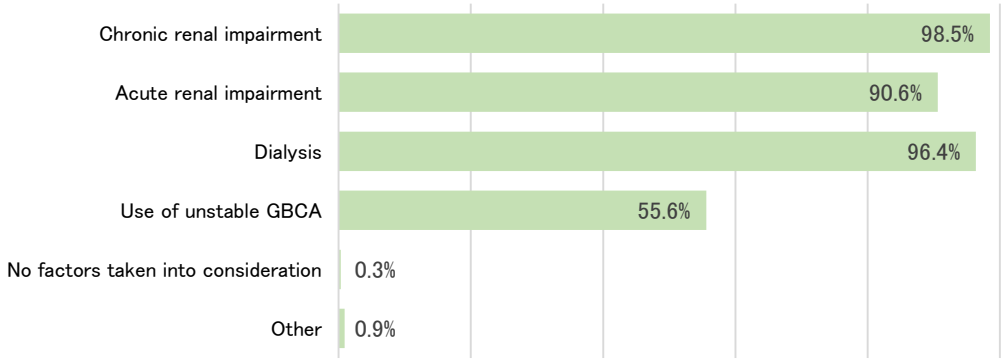
7. Gadolinium contrast media: Patient interview

Which of the following do you confirm by patient interview prior to intravenous administration of gadolinium contrast media? (Select all that apply)



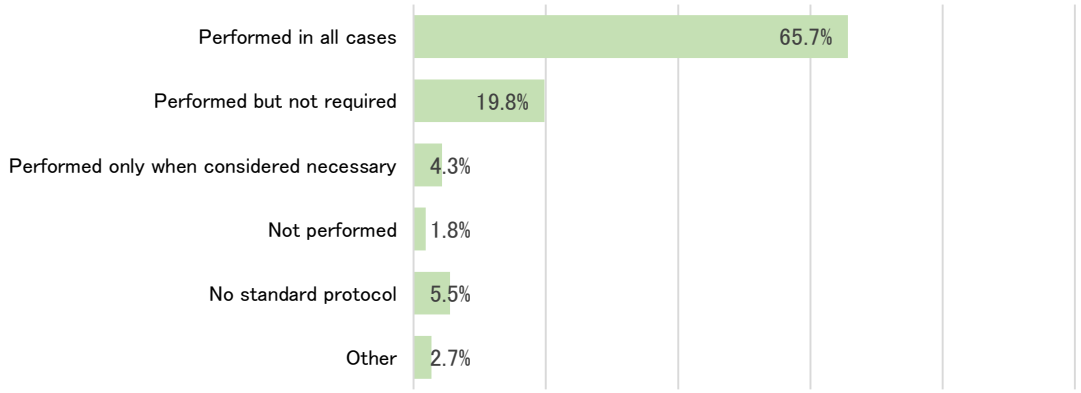
8. Gadolinium contrast media: Nephrogenic systemic fibrosis (NSF)

① Which do you consider risk factors for developing NSF? (Select all that apply)



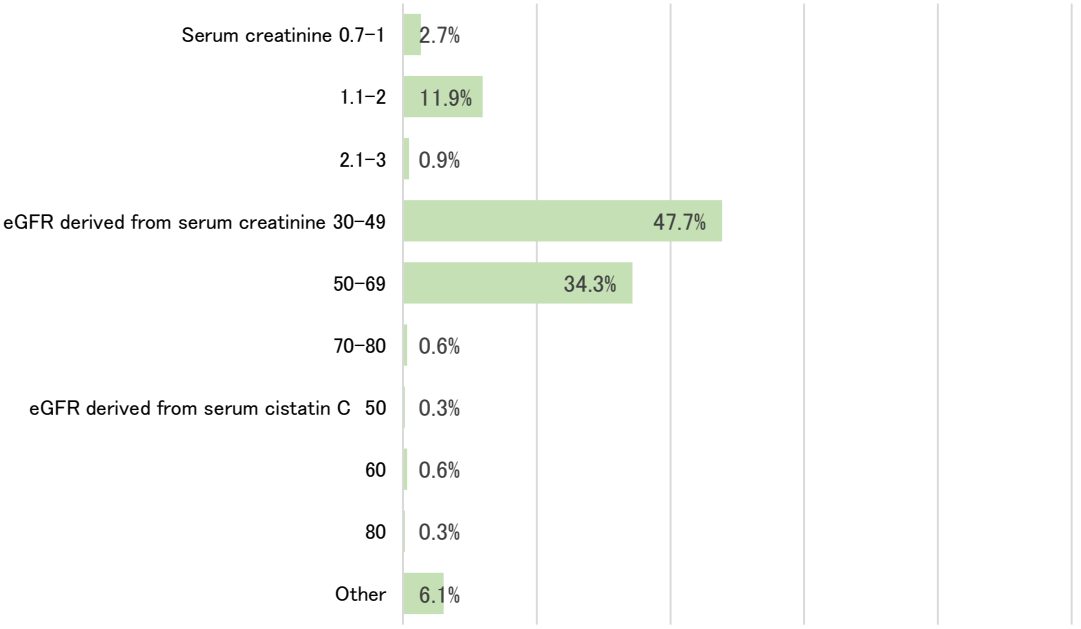
Comment: Both the ESUR and ACR consider chronic renal disease (CKD) stages 4 and 5 (eGFR<30) patients, dialysis patients, and acute renal insufficiency patients to be high risk, and CKD3 (eGFR=30–59) to be of moderate risk. Among gadolinium contrast media, use of Gadodiamide and Gadopentitate dimeglumine are considered highest risk, and Gadoterate meglumine and Gadoteridol are considered minimal risk. The passage on this issue in JPN-Gd is worded slightly differently, but the content is essentially identical to the ESUR and ACR.

② Do you examine renal function by means such as serum creatinine level prior to administering gadolinium contrast media?



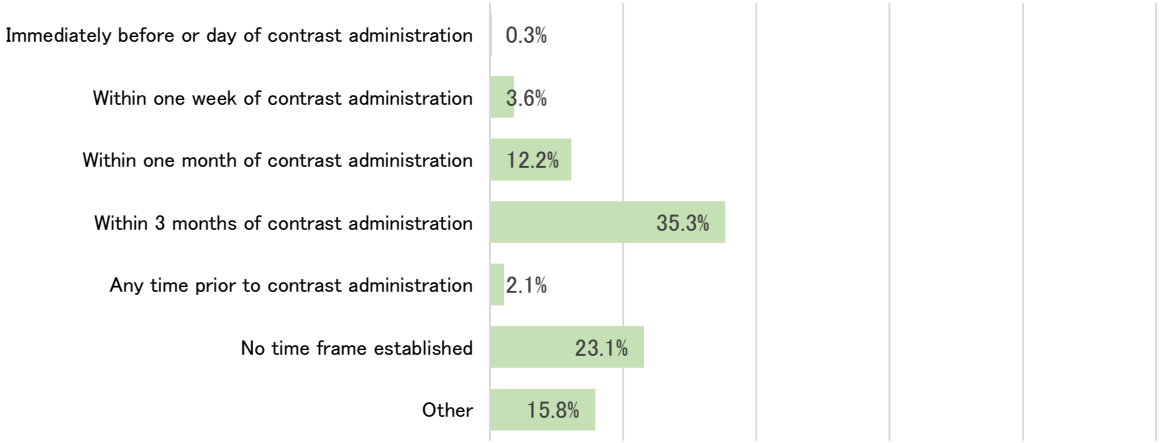
Comment: It is not clear whether renal function needs to be evaluated prior to gadolinium contrast media administration in all patients. Considering the possibility of occult renal impairment, ideally, renal function should be evaluated in all cases. JPN-Gd recommends evaluating renal function using eGFR, unless it is an emergency. ESUR states that renal function evaluation is not necessary when using minimal risk gadolinium contrast media, but are necessary when using high risk gadolinium contrast media. They also state that high risk gadolinium contrast media should be stored separately, to prevent their accidental use on patients with impaired renal function. ACR states that eGFR should be evaluated within 2 days prior to gadolinium contrast media administration in all cases.

③ How do you evaluate renal function? What is the cutoff value indicating high risk?



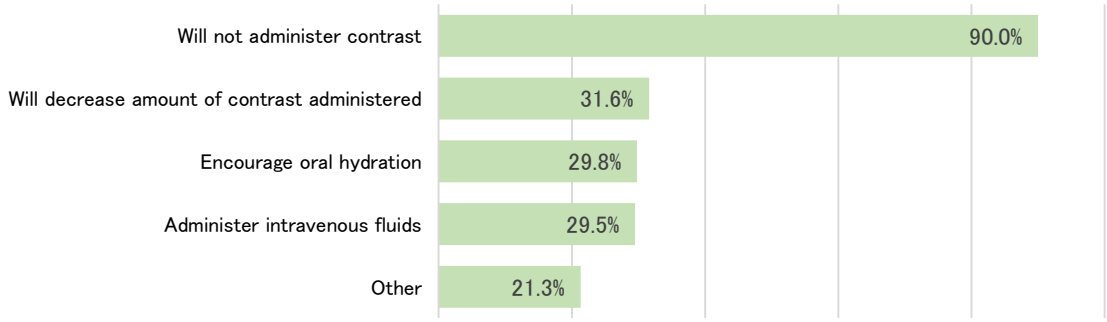
Comment: JPN-Gd, ESUR and ACR all recommend use of eGFR, and consider an eGFR less than 30 high risk.

④ How recent must the serum creatinine value be?



Comment: JPN-Gd states the most recent data should be used. According to ACR, renal function should be evaluated within 2 days of contrast administration.

⑤ What do you do when a patient has impaired renal function? (Please select all that apply if your response varies by level of renal function)

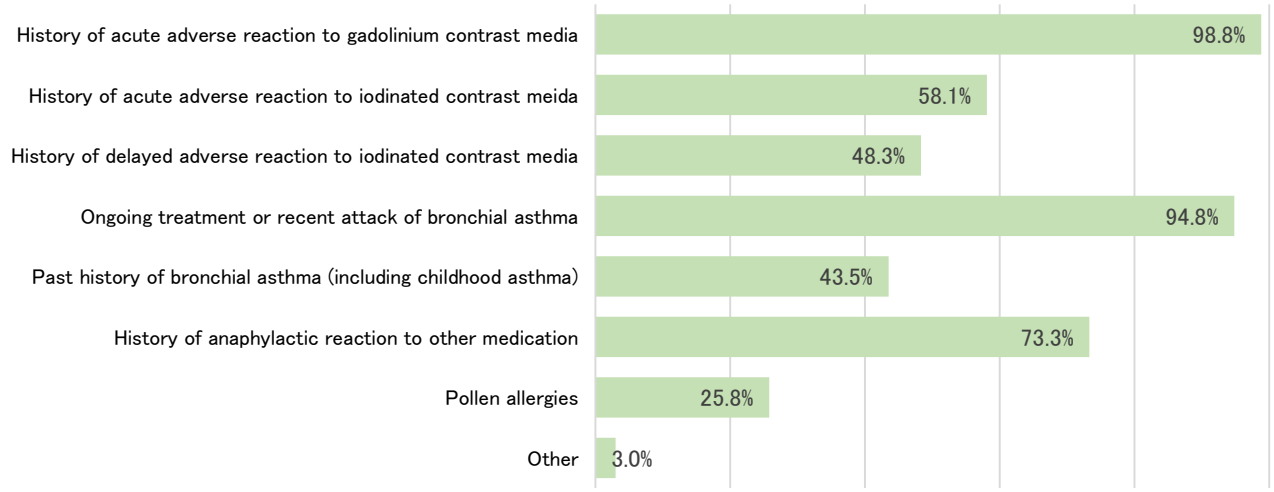


＊ Other includes “Change type of gadolinium contrast media (use gadolinium contrast media with lower NSF risk, or use a macrocyclic gadolinium contrast media)” (n=48), etc.

Comment: JPN-Gd states that when gadolinium contrast media must be given to patients who are high-risk for NSF, gadolinium contrast media with frequent reports of NSF should be avoided. ESUR clearly states that a patient should never be denied a well-indicated enhanced MRI examination. According to the guidelines, for patients who have stage CKD 4 and 5 should receive the lowest risk gadolinium contrast media with caution, and the interval between each dose should be at least 7 days. Oral hydration and intravenous fluids are not considered effective by JPN-Gd, ESUR or ACR.

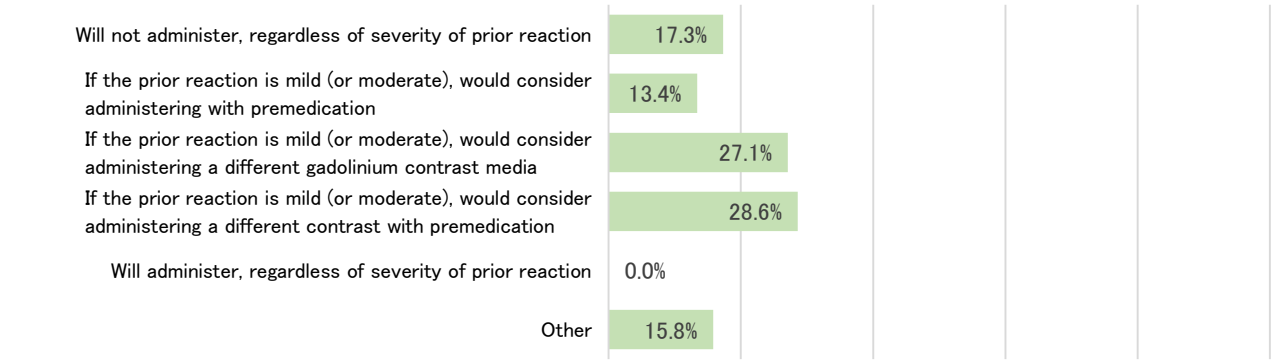
9. Gadolinium contrast media: Acute adverse reactions

① Which factors increase risk of acute reactions to contrast? (Select all that apply)



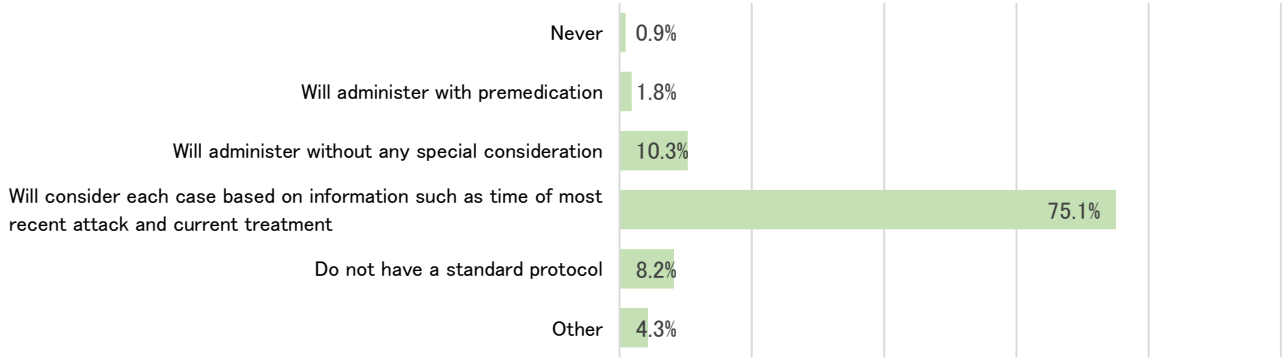
Comment: Both ESUR and ACR consider history of acute adverse reaction to gadolinium contrast media, bronchial asthma, and history of other allergies to be risk factors. It is not established whether a prior history of asthma (including pediatric asthma) is a risk factor, nor is it clear whether a history of acute reaction to iodinated contrast media is a risk factor.

② Will you administer gadolinium contrast media to a patient with a history of acute adverse reaction to it?

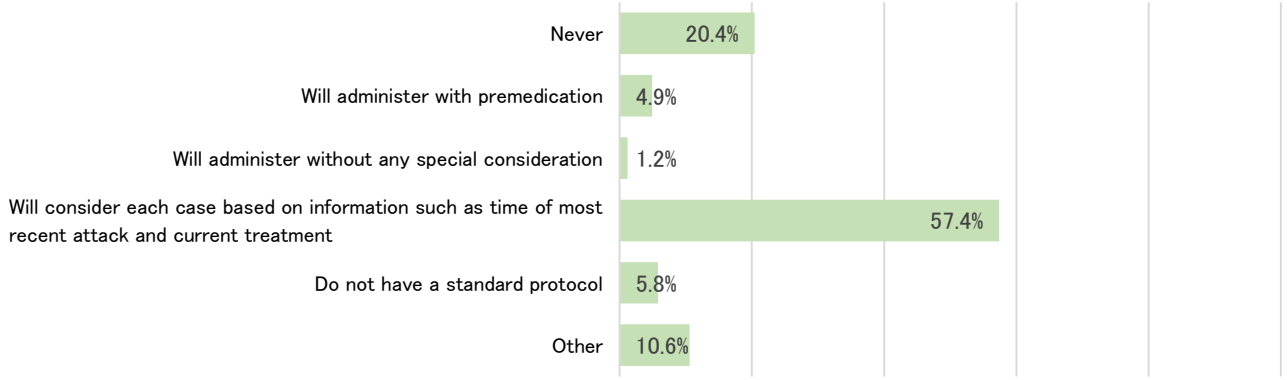


＊Other includes “at discretion of referring physician, or under direct supervision of referring physician” (n=20), etc.

③ Will you administer gadolinium contrast media to a patient with a prior history of bronchial asthma (such as childhood asthma)?

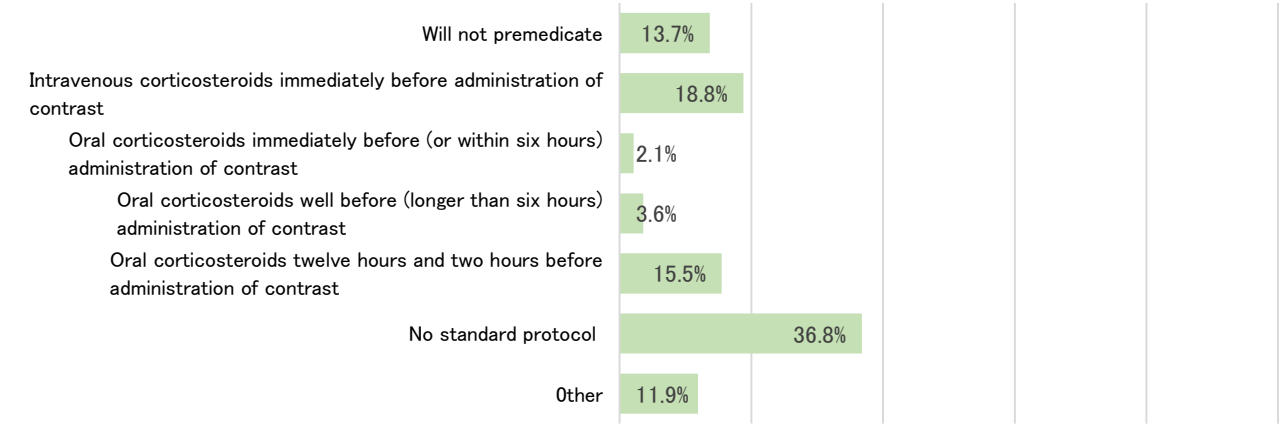


④ Will you administer gadolinium contrast media to a patient currently being treated for asthma, or who has had a recent asthma attack?



＊ Other includes “at discretion of referring physician, or under direct supervision of referring physician” (n=30), etc.

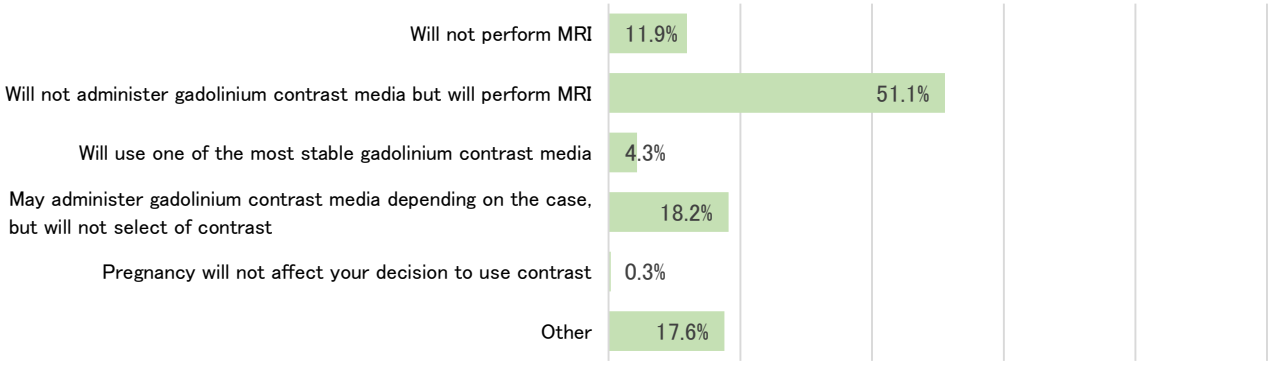
⑤ In a non-emergency, how will you premedicate a patient with risk factors for adverse reactions to gadolinium contrast media?



Comment: Both ESUR and ACR introduce premedication with corticosteroids as prevention for acute adverse reactions, but there is no clear evidence for their efficacy. The general thinking follows that of iodinated contrast media.

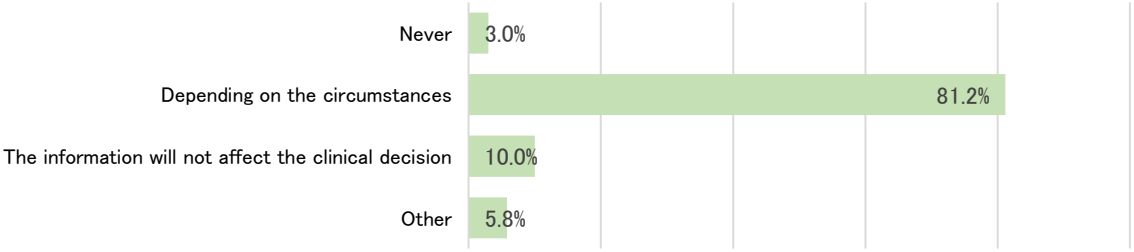
10. Gadolinium contrast media: Pregnancy and nursing

① In a non-emergency, will you administer gadolinium contrast media to a pregnant patient (or a patient with suspicion of pregnancy)?

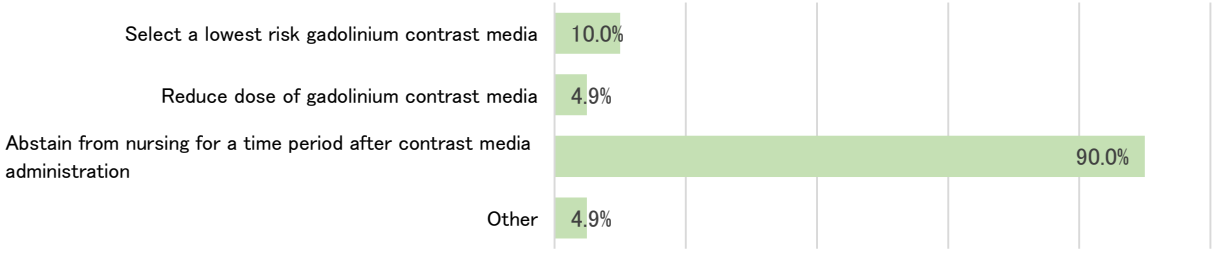


Comment: According to ESUR, the minimum dose of one of the most stable (i.e. lowest risk of NSF) can be given to pregnant women, and no neonatal tests are necessary. ACR states similarly.

② Will you administer gadolinium contrast media if the patient is a nursing mother?



③ If you will administer gadolinium contrast media to a nursing mother, what will you do?



Comment: ESUR states breast feeding should be avoided for 24 hours after administration of a high-risk gadolinium contrast media. ACR states that nursing after being given gadolinium contrast media is safe because the amount of gadolinium entering the infant is minimal. If the nursing mother is concerned, she can abstain from nursing for 12 to 24 hours.

Acknowledgement

The committee thanks Ayako Taketomi-Takahashi, M.D, Ph.D. from the Department of Diagnostic Radiology and Nuclear Medicine, Gunma University Graduate School of Medicine for her help in English version preparation.