

9. How can I best interpret the results to apply them to the care of my patients?	This meta-analysis suggests that when indicated a CT scan w/ contrast is unlikely to have an effect on the development of AKI. This should be tempered understanding that there was heterogeneity in the studies as is the case with individual patients which should be included in patient-centered decision making.
10. Were all patient important outcomes considered?	Outcomes considered were AKI, Dialysis, and Death. Increased length of stay in the hospital and further renal procedure (US v biopsy were not studied). No economic analysis, appropriateness of ordering IVC or other issues such as allergic reactions, rates of extravasation, difficulties with IV access, time to results.
11. Are the benefits worth the costs and potential risks?	Strength of the data in a meta-analysis must reflect the quality of the studies and in this case study quality is not strong enough to be broadly applicable or practice changing. A meta-analysis of well controlled, prospective, RCT's are needed in order to address this question more definitively

Limitations:

Study did not have any randomized trials and observational trials are predisposed to selection and performance bias

Very heterogeneous groups of patients in studies likely added to overall heterogeneity of results.

The decrease risk of death or need for dialysis is suspect in those getting IVC and likely speaks to unmeasured confounders or clinical heterogeneity between the groups.

Patient getting contrast scans v non-contrast scans could have had different illness that would make them more susceptible for AKI or dialysis

Studies did not control for IVF administration to avoid AKI

Clinical Bottom Line:

If a contrast CT scan is indicated this meta-analysis suggests that the risk of developing AKI may be low. The data was based upon flawed, observational studies and should be interpreted within that context. The clinical appropriateness of ordering the IVC study combined with patient-centered decision making could help mitigate some of these issues.

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EVMS JC: Critical Appraisal Worksheet: Systematic Review/Meta-analysis

Date: 10/30/17

Reviewer: Thomas Massey

Citation: McDonald JS, McDonald RJ, Comin J, Williamson EE, Katzberg RW, Murad MH, Kallmes DF. Frequency of acute kidney injury following intravenous contrast medium administration: a systematic review and meta-analysis. *Radiology*. 2013 Apr;267(1): 119-28

Guide	
1. Did the review explicitly address a sensible question?	Yes. What is the frequency of AKI in patients w/ imaging w/ IV contrast administration v patients w/ imaging w/o IV contrast administration
2. Was the search for relevant studies details and exhaustive?	Yes. All published studies were reviewed up to 2011, with 1489 studies identified. Only 13 of these studies (0.9%) were ultimately used. They also used a research librarian to assist. Some will look at conference abstracts which they did not report.
3. Were the primary studies of high methodological quality?	They were either retrospective or prospective observational studies (4 studies) with control groups. They had a Newcastle Ottawa Score range from 6-8 (out of 8).
4. Were the criteria for study inclusion pre-determined and clearly stated?	Yes. Required to have a non-contrast receiving control group, needed to be IV administration (not intra-arterial), and used AKI measurements with either SCr or GFR calculations.
5. Did the authors adequately assess the quality of the included studies?	Yes a researcher and a radiologist reviewed all 1489 studies by reading abstracts. 48 studies were pulled and reviewed by two other radiologists. If there was disagreement between them a third radiologist reviewed the study for admission
CLINICAL IMPORTANCE	
6. What were the overall results of the review? <i>(Are the results of all included studies clearly displayed? Are the results similar from study to study? Is there a clinical bottom line? If the study results combined, was it appropriate to do so?)</i>	Average AKI Rate in all studies was 6.4% (1004 out of 15582) in the contrast medium group. Range of 2.1% to 19%. Death and Dialysis rate: 2.4, 0.3% Average AKI Rate in all studies was 6.5% (675 out of 10368) in the non-contrast medium group. Range of 1.3 to 19.8 Death and Dialysis Rate: 6.7, 1.2%
7. How precise are the results? <i>(What were the confidence intervals? p-values?)</i>	AKI: Overall results with contrast IV w/ a RR of 0.79 w/ CI (0.62-1.02) w/ p of 0.07 Dialysis: Overall results with contrast IV w/ a RR of 0.88 w/ CI (0.23-3.43) w/ p of 0.85 Death: Overall results with contrast IV w/ a RR of 0.95 w/ CI (0.55-1.67) w/ p of 0.87
8. Were the results similar from study to study?	The ^I 2 scores for AKI, death and dialysis were 60%, 65%, and 34%. Which suggests fairly high heterogeneity in the first two measures. Less than 50% is moderate, < 25% is considered low heterogeneity between studies. This may be accounted for to some extent by two of the thirteen studies showing an overall higher incidence of AKI in contrast group compared to control group. 1. For Polena et al RR 14.00 CI (1.89-103.79), P 0.01, 150 pts 2. Heller et al RR 1.85 CI (1.04-3.29), P 0.04, 884 pts
APPLICABILITY	

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