The clinical and economic impact of the "incidental finding" after MR angiography for hypertension

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Purpose: The clinical and economic consequences of incidental findings (IF) on imaging examinations are not well-defined. Our purpose is to preliminarily estimate the impact of (IF) identified after MR angiography (MRA) for exclusion of renal artery stenosis (RAS) in individuals with hypertension.

Materials and Methods: 119 consecutive hypertensive (ICD-9 codes 401-405) patients who underwent renal MRA for evaluation of RAS were identified retrospectively. An IF was defined, a priori, as any MRI finding not related to the renal arteries. The frequency and type of IF were classified as 1) having an impact on clinical management or 2) unlikely to have an impact on clinical management. Impact on clinical management is defined as precipitating additional imaging or laboratory testing. When available, additional tests and procedures not related to imaging were also collected. Subsequent imaging costs related to IF were calculated using 2002 Medicare APC fee schedule.

Results: 87 individuals (73%) had IF (Table 1). Frequency of IF by organ system is as follows: liver, 17 patients; gallbladder, 16 patients; pancreas, 2 patients; kidney, 52 patients; adrenal gland, 3 patients; spleen, 6 patients; bone, 16 patients other incidental findings, 24 patients. A total of 20 patients (17%) received additional work-up. The range of IF included primary and secondary cancer, aortic aneurysm and adrenal adenomas; as well as cysts, hemangiomas and degenerative disc disease. Since 34 individuals (29%) could have more than one IF, the frequencies described previously do not sum to 100%. The cost of additional imaging generated by identification of IF is $4944.80, or an average of $41.55 per patient. The primary limitation is the apparent idiosyncracy in follow-up imaging. We re-classified types of IF as being significant or non-significant, where significant IF would potentially require additional imaging or treatment. In patients who were lost to follow-up, we assumed that all patients with significant IF will receive at least 1 additional imaging test, based on reported IF. In a patient with more than one IF, the gravest IF is assigned additional imaging. The most appropriate imaging test was assigned based on the reported IF. Imaging test assignment was performed by two radiologists, with disagreements resolved by consensus. Frequency of significant IF by organ system is as follows (Table 2).

Organ system	Patients with incidental findings	Incidental findings with clinical impact
Liver	17	3
Gallbladder	16	3
Pancreas	2	1
Kidney	52	8
Adrenal gland	3	2
Spleen	6	0
Bone	16	4
Other	24	2

Organ system	Patients with incidental findings	Significant incidental findings
Liver	17	4
Gallbladder	16	2
Pancreas	2	2
Kidney	52	10
Adrenal gland	3	3
Spleen	6	2
Bone	16	4
Other	24	4

The range of significant IF included metastasis, renal cell carcinoma, aortic aneurysm and adrenal adenomas. Assuming that all patients with significant IF had at least 1 additional imaging exam, the additional costs due to presumed imaging rose to $5368.58, or an average of $45.11 per patient.

A secondary limitation is one of coding error. Approximately 500 MR angiograms are performed per year, 80% of which are performed for evaluation of renal artery stenosis.

Conclusion: IF occur frequently in individuals presenting for evaluation of RAS by MRA, 20% of whom had a clinically meaningful IF. The additional expenditure on imaging attributable to IF is modest. The clinical and economic consequences of the IF must be considered, before implementing radiographic screening or diagnostic strategies.