



Prevalence of Adrenal Incidentalomas and Assessment of Practitioner Follow-Up per Guidelines



Carissa Vinovskis BS¹, Ernesto Salcedo PhD², Margaret Wierman MD³, & Lauren Fishbein MD, PhD³

¹Modern Human Anatomy Program, University of Colorado School of Medicine, Aurora, CO U.S.A

²Department of Cell and Developmental Biology, University of Colorado School of Medicine, Aurora, CO U.S.A.

³Department of Medicine, Division of Endocrinology, University of Colorado School of Medicine, Aurora, CO U.S.A

Modern Human Anatomy Program
UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

Introduction

- Due to widespread increases in medical imaging, medical practitioners have seen a marked increase in the detection of adrenal incidentalomas (Figure 1)
- The main concerns for adrenal incidentalomas are the potential for malignancy and hypersecretion of hormones
- The American Association of Clinical Endocrinologists (AACE) has published guidelines¹ for clinicians that detail appropriate follow-up and management of adrenal incidentalomas
- Follow-up guidelines include repeated imaging studies at 6, 12, and 24 months, and annual hormone evaluation for 5 years

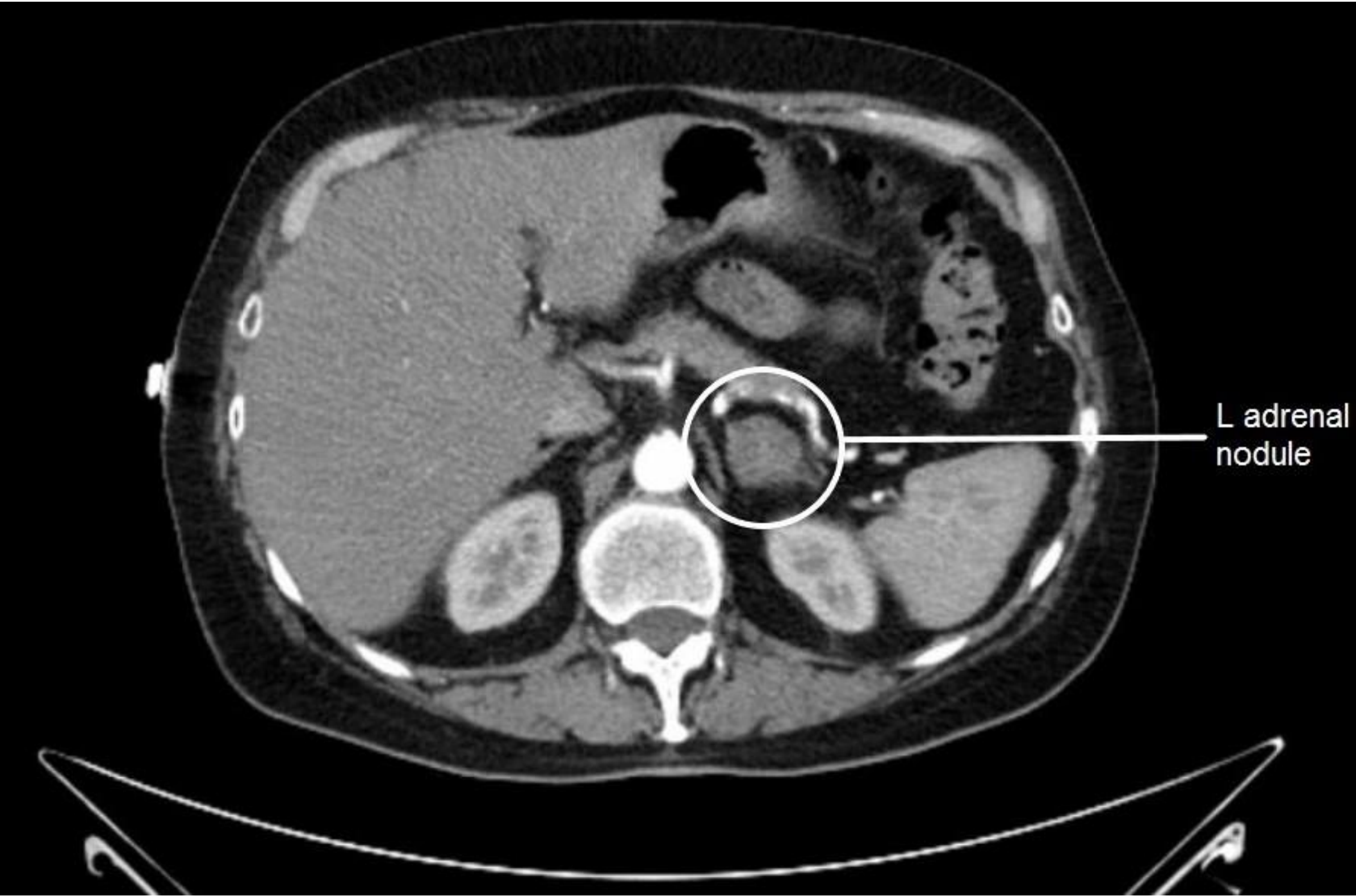


Figure 1. Incidentally discovered nodule located in the left adrenal gland

Project Aims:

- Determine prevalence of adrenal incidentalomas within a study population
- Assess whether practitioners comply with accepted guidelines for follow-up and management of adrenal incidentalomas

Methods: Experimental Design

Experimental Design: IRB Expedited Protocol 17-1029

- CU Health Data Compass provided all chest, abdomen, and/or pelvis CT scans performed within the University of Colorado Health system from 09/2011-12/2016
- Compass marked all charts for patients who had a noted diagnosis of an adrenal nodule after the CT scan was performed
- CT scans of each patient with a recorded EMR diagnosis of an adrenal nodule was reviewed individually to completely evaluate the adrenal glands and to characterize any and all associated nodules.

Statistical Analysis:

- T tests and ANOVA were used to detect differences between group means.
- Categorical variables were evaluated using a Fisher exact test.

Methods: Inclusion Criteria

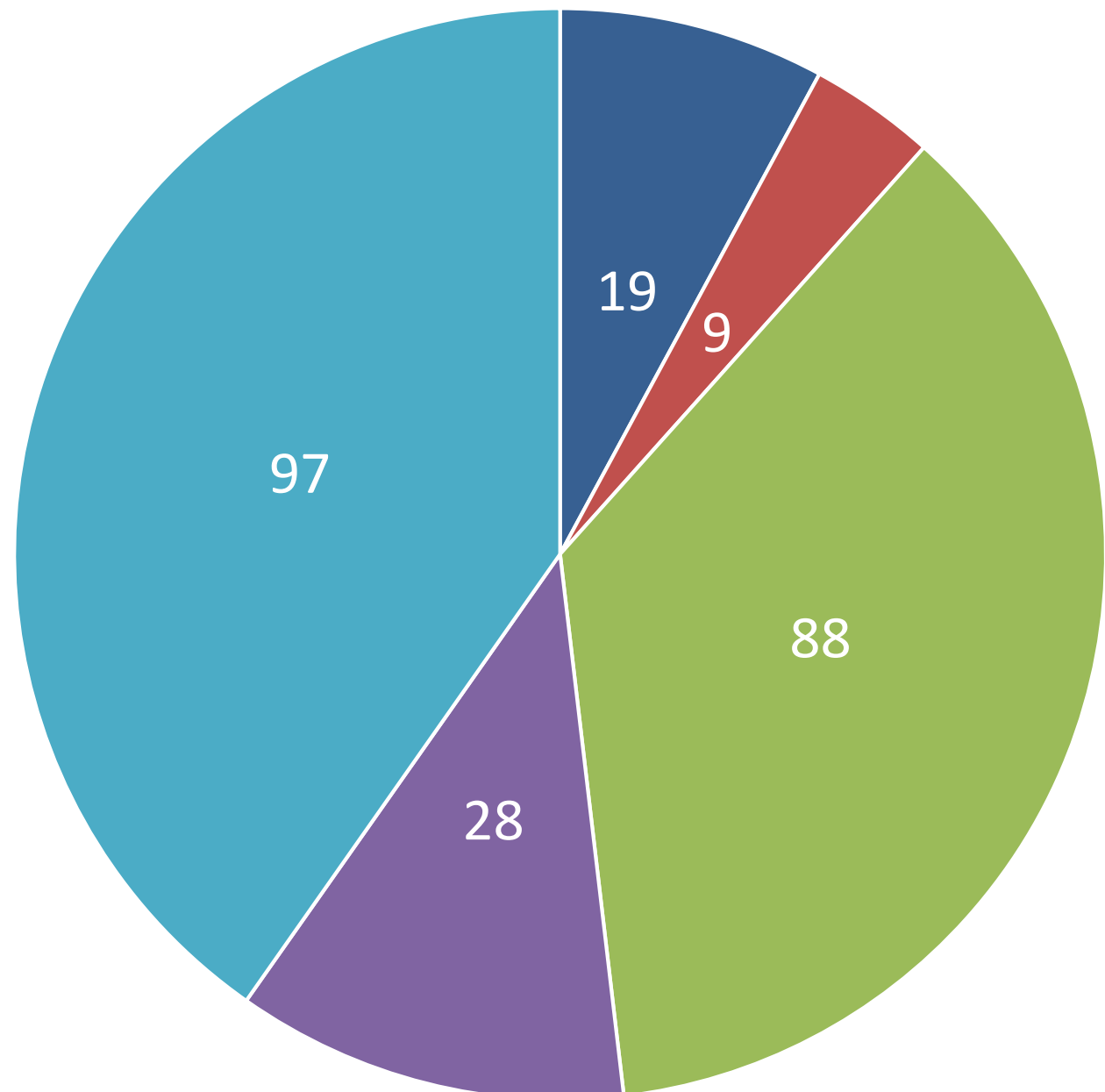
Inclusion Criteria for Initial Identification of Adrenal Nodules

- Patients between the ages of 18 and 89 years old
- CT scans performed for non-endocrine related conditions
- CT scans revealed adrenal nodules found incidentally

Exclusion Criteria to Identify Truly Incidental Adrenal Nodules

- Imaging study performed for adrenal symptoms
- Patients with predisposing endocrine or tumor syndrome
- CT scans performed outside of imaging timeline
- Adrenal nodule initially diagnosed by imaging other than CT
- No adrenal nodule present on CT scan

Exclusion of Non-Incidental Adrenal Nodules (N=256)

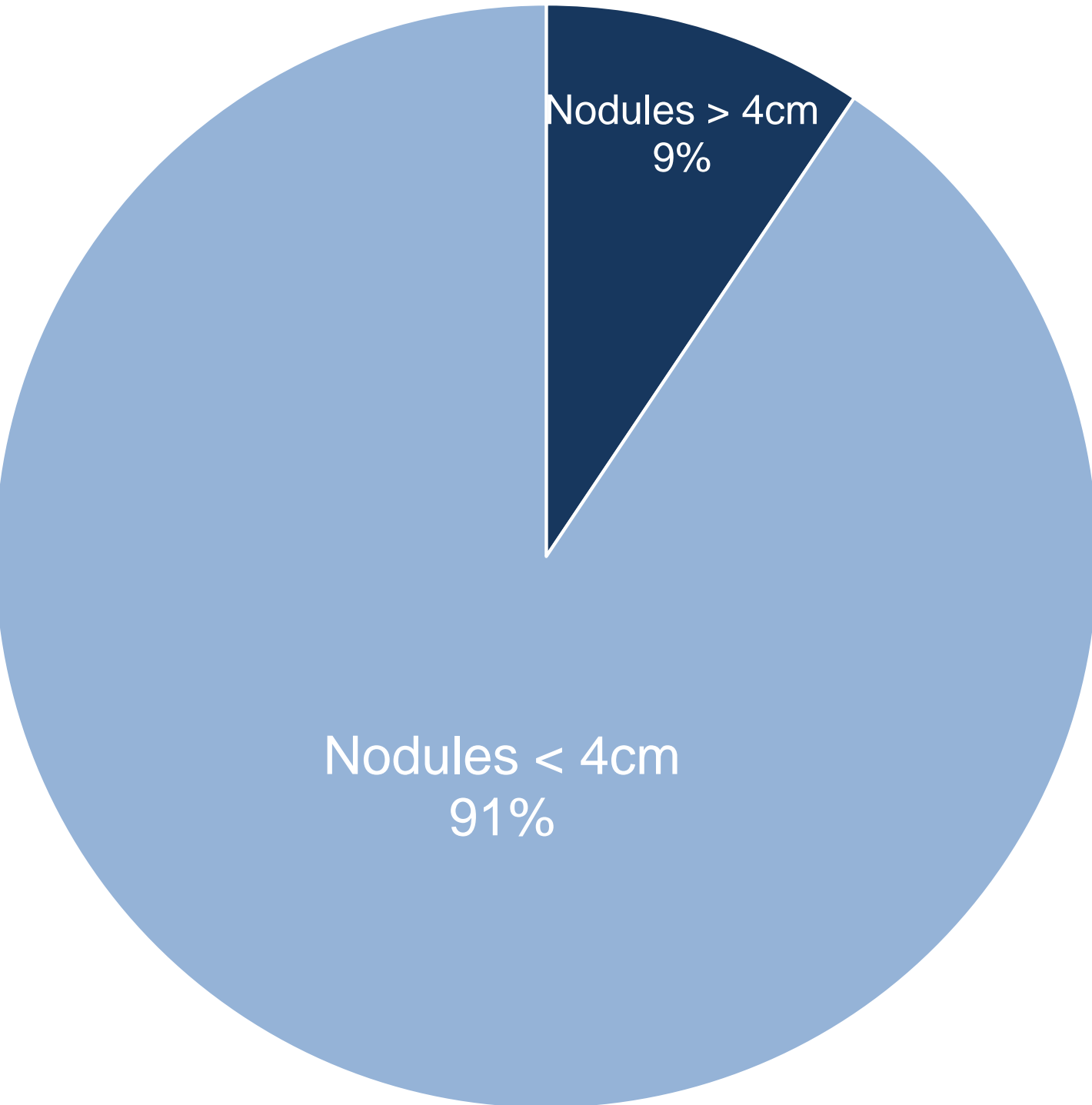


- Adrenal symptoms
- Predisposing endocrine or tumor syndrome
- CT scans outside of timeline
- Diagnosed by imaging other than CT
- No adrenal nodule present on CT scan

Figure 2. Exclusion of non-incidentally diagnosed adrenal nodules following chart review of 561 patient charts provided by UC Health Data Compass

Results: Non-Followed Nodules

Nodule Size of Non-Followed Adrenal Incidentalomas



Hounsfield Units of Non-Followed Adrenal Incidentalomas

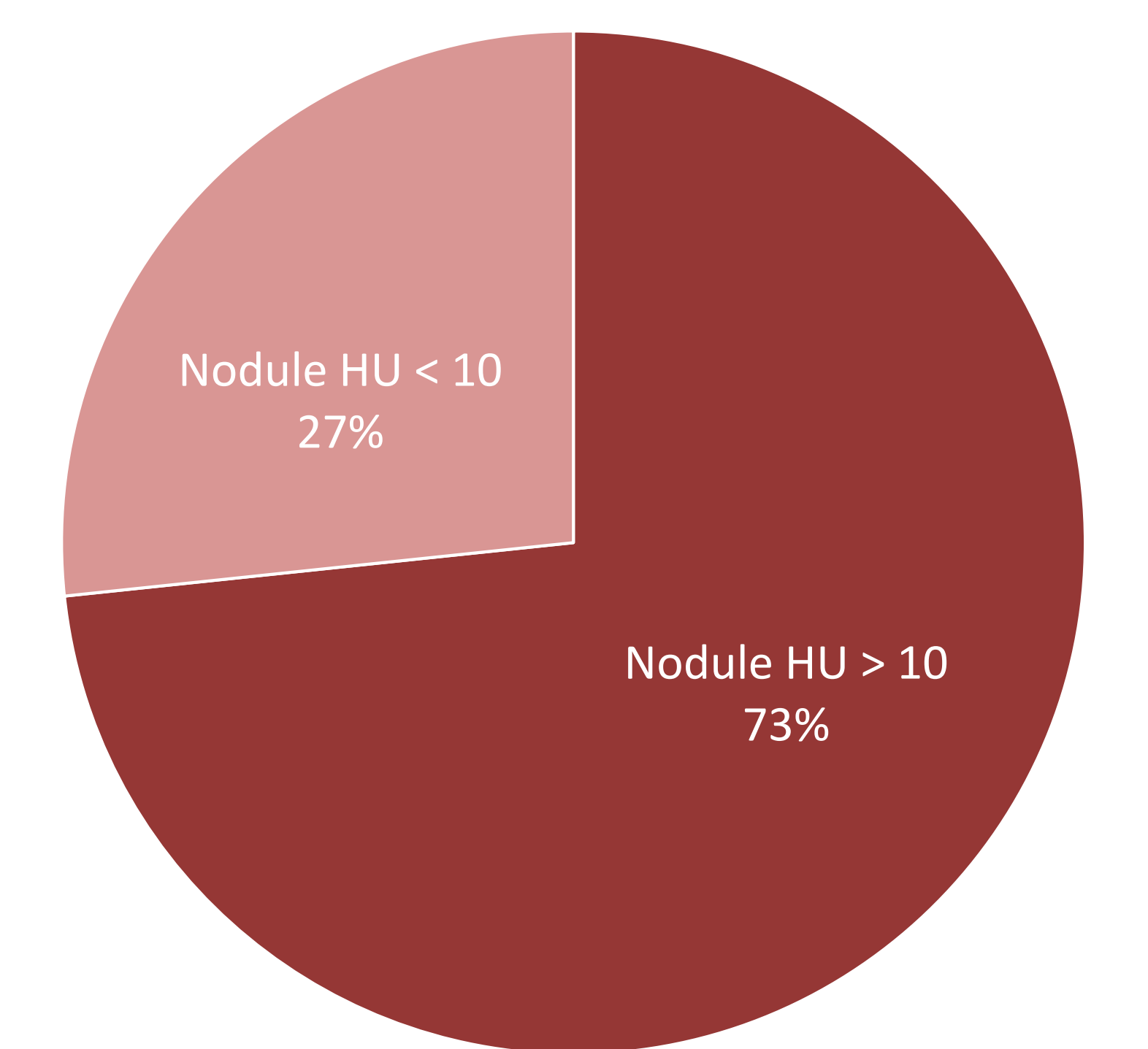


Figure 5. Analysis of specific nodule characteristics for adrenal incidentalomas that received no follow-up imaging studies. While the 2009 AACE guidelines recommend imaging follow-up for all nodules, regardless of size or Hounsfield Units, adrenal incidentalomas are considered more worrisome if size > 4cm and/or HU > 10.

Conclusions & Future Directions

- Prevalence of adrenal nodules within the study population was 0.4%.
- This value, which is lower than expected and reported in the literature, may be due to strict inclusion criteria and lack of accurate EMR notation of adrenal nodules, which were utilized to pull patient records
- Practitioner follow-up did not meet 2009 AACE guidelines.
- This means that potentially harmful or hormonally active or cancerous nodules may have been missed by practitioners.

Future Directions

- Further studies should evaluate all CT scans regardless of presence of EMR diagnosis of adrenal nodule to determine true prevalence
- More education to practitioners about adrenal incidentaloma guidelines should be provided

References

¹Zeiger, M. A., et al. "American Association of Endocrine Surgeons. The American Association of Clinical Endocrinologists and American Association of Endocrine Surgeons medical guidelines for the management of adrenal incidentalomas." *Endocr Pract* 15. Suppl 1 (2009): 1-20.

Acknowledgements

Thank you to the Modern Human Anatomy Program & and the University of Colorado Department of Endocrinology for the aid in the development of this project. Thank you to Dr. Katja Kiseljak-Vassiliades for providing additional direction and feedback. Many thanks to the Jennifer Thurston and the MSMHA Class of 2018 for their invaluable support and guidance.

Results: Prevalence and Follow-Up

Prevalence of Adrenal Incidentalomas in Study Population

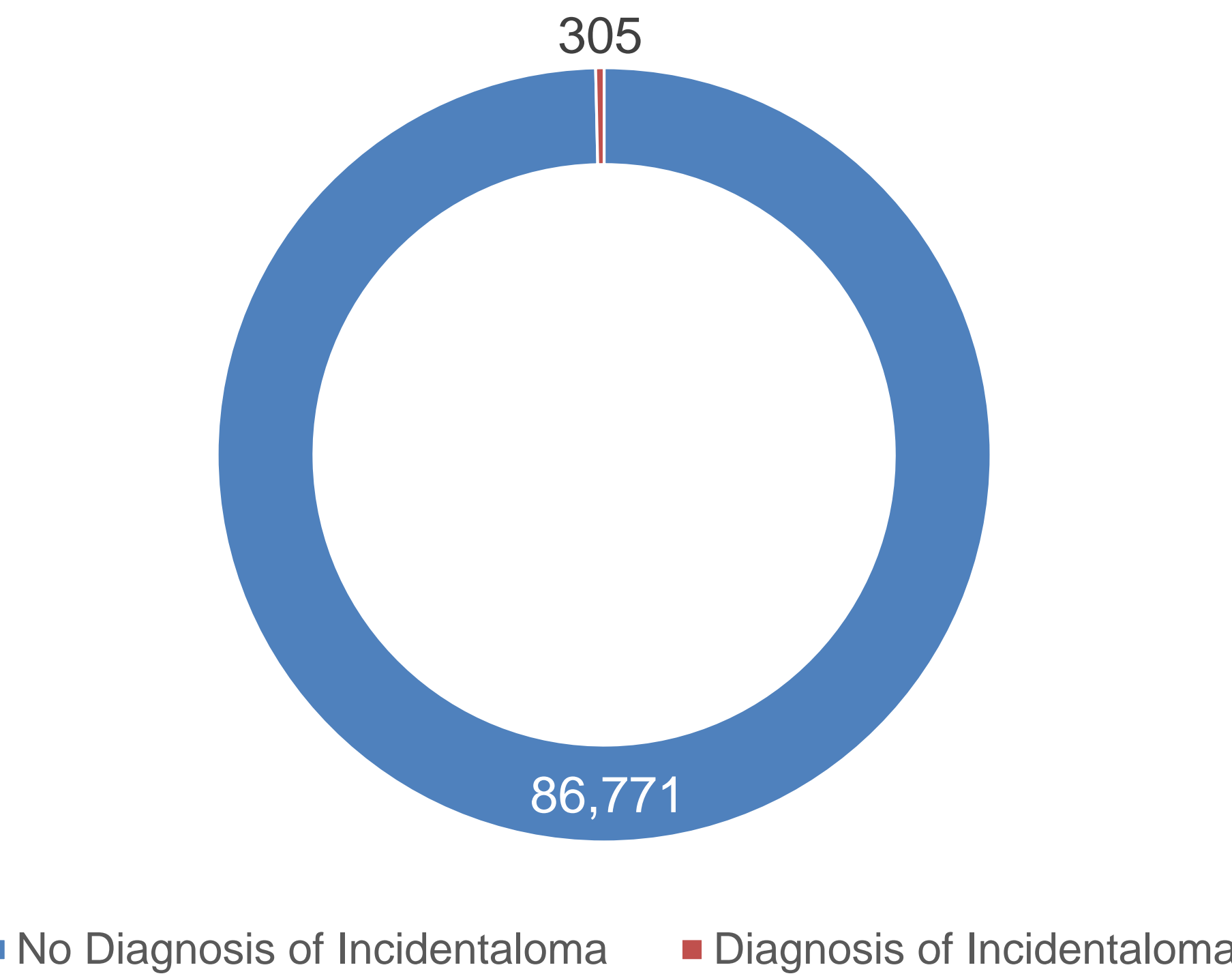


Figure 3. Out of 86,771 patients who received CT scans in the UCH Health System from 09/2011 – 12/2016, 305 patients had diagnosis of a true incidental adrenal nodule. The prevalence of incidentalomas within the study population was 0.4%

Imaging and Hormonal Evaluation Follow-Up

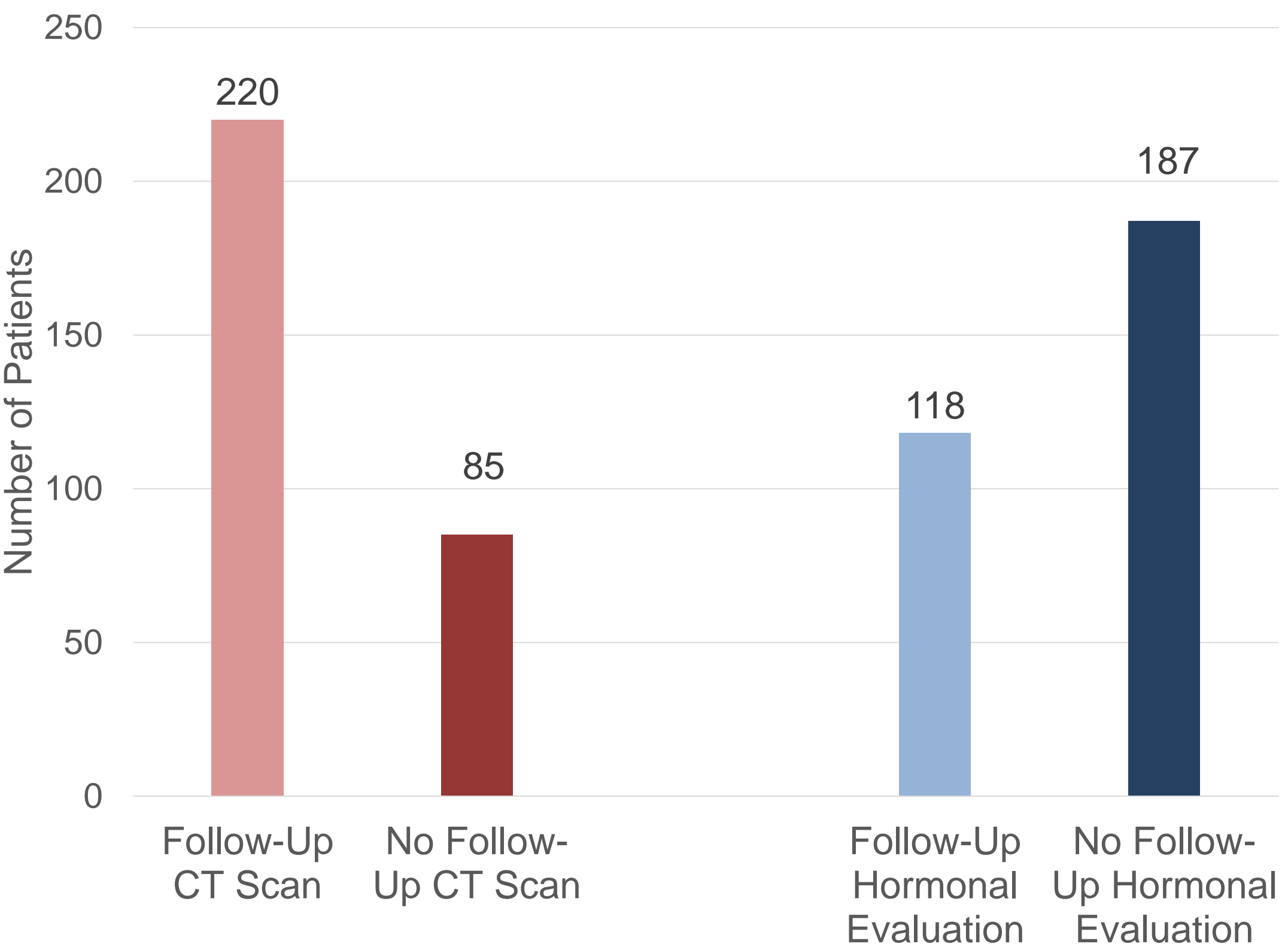


Figure 4. Out of 305 patients with true adrenal incidentalomas, 28% received no imaging follow-up and 61% received no adrenal hormone follow-up, despite AACE guideline recommendations for imaging studies over 2 years and hormonal evaluation over 5 years