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University Hospitals of North Midlands
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Adrenal Incidentaloma

10th Nov 2017

Prof. Fahmy Hanna

PROUD TO CARE

Pilgrim not an Expert

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- **Objectives: To share**
  - **Sign-post available evidence:**
    - **European Society of Endocrinology guidelines, 2016**
    - **Review for the generalist: in press**
  - **Share our experience:**
    - **The challenges identified**
    - **Steps we have taken so far**
    - **Solutions**
  - **Gauge your thoughts/ideas**

Hope to leave you with more Q to reflect on!

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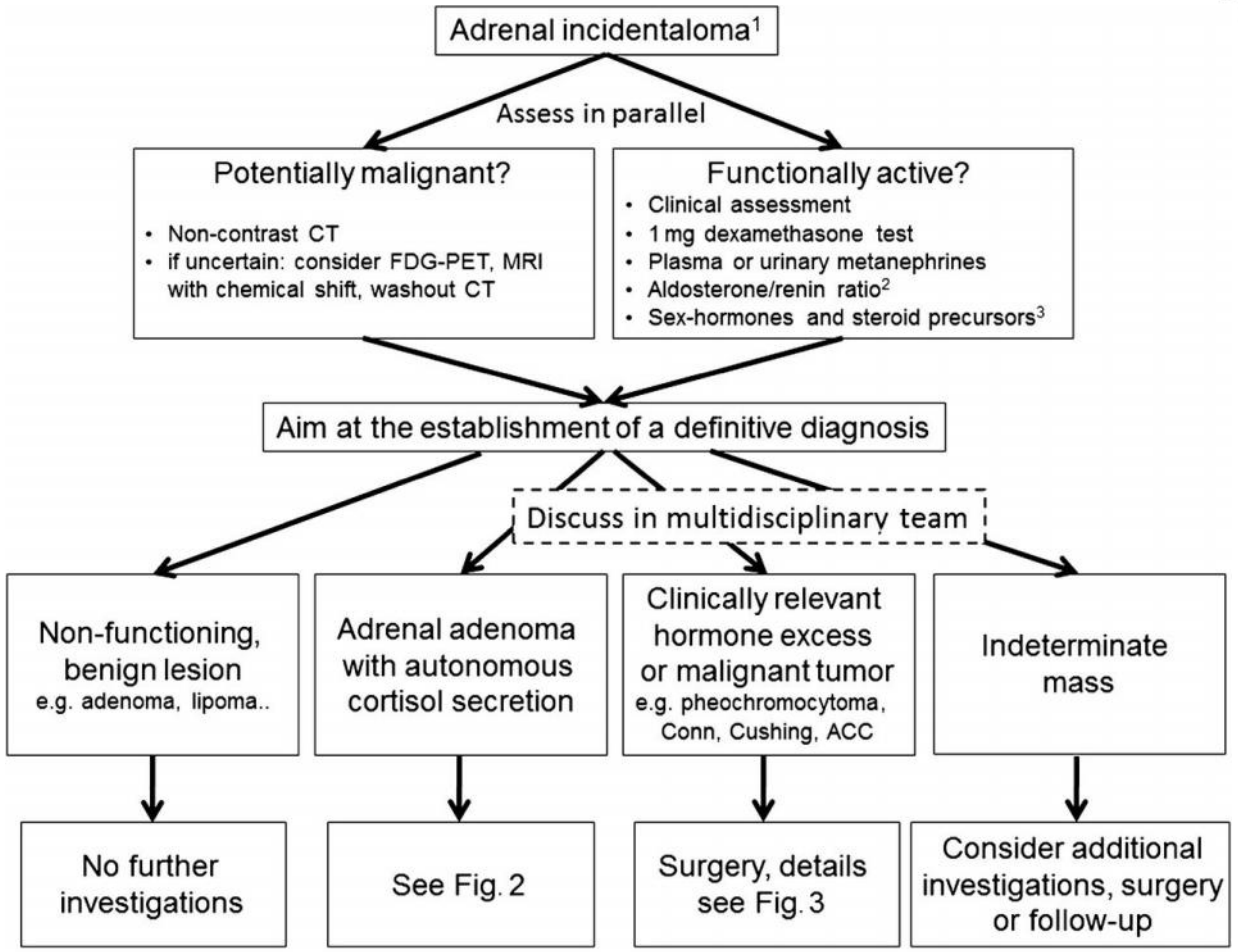
AI Management Overview;



[1]For patients with history of extra-adrenal malignancy, see special section 5.6.4.
[2]Only in patients with concomitant hypertension and/or hypokalemia.
[3]Only in patients with clinical or imaging features suggestive of adrenocortical carcinoma.

Fassnacht et al. Eur J Endocrinol 2016;175:G1-G34

AI; Overview

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- **Definition:**
  - An adrenal mass, >10mm, detected on imaging which was not performed for suspected adrenal disease
- **Mostly, benign and non functioning:**

Classification (Series including all patients with Ad mass)	Median (%)	Range
Adenoma	80	30-96
Non-functioning	75	
Cortisol-secreting	12	
Aldosterone-secreting	2.5	
Phaeochromocytoma	7.0	
Adrenocortical Cancer	8.0	1.2-11
Metastasis	5.0	

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AI; Real World Challenges

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1. Uncertainties

2. Workload

3. Process

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AI; Real World Challenges
(1) Uncertainties

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- **Identified whilst looking for something else, by a "non-expert" (an unexpected extra hurdle)**
- **Uncertainties facing the "expert":**
  - **Why: Guidelines are mostly based on case series/expert opinions (> 80% low level)**
  - **Examples:**
    - **What about lesions 0.9 cm?**
    - **Are cut-off values for screening appropriate for AI as they have been in Cushing's, Conn's or Phaeo?**

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AI; Real World Challenges; (2) Workload

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- ~4-5% of all CT/MRI
  - Higher prevalence with age + Ageing population
  - More CT/MR in diagnostic pathways
- At UHNM; 12,000 scan PA (almost X4 in 6 years)
- Expected AI new cases: 450-600 PA
- Implications:
  - One third of our total endocrine contract!
  - Only ~30% get identified and referred on

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AI; We Miss Almost 70% (Even with a dedicated MDT)

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	Nov 2014	Nov 2015	Nov 2016
Total cases reported using the index phrases	57	76	77
Previously known malignancies (excluded)	30	41	15
Confirmed AIs	27	35	62
AIs referred	8	10	20
Percentage of AIs referred	**29.6%**	**28.6%**	**32.3%**

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AI; Real World Challenges; (3) Process

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- Lack of standardised referral process:
  - Different sources
  - Variable information
  - Missed cases
- Limited "expert" capacity (Time/money):
  - Chase missing information
  - Chase outstanding results (Cortisol, ARR and plasma/urinary metanephrines are back separately at different times)
  - When all results are back, all findings have to be retrieved in preparation of MDT
  - MDT outcome to be shared and enacted (including further testing)
  - Further review of results as decided by MDT
- What to do with equivocal results (ONDST of 63, undetectable renin, slightly raised plasma normetanephrine, …)

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Time in motion analysis of traditional pathway

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Step	who?	Time (mins)	min	max	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180
Pre-project																																								
receive & prep referral	secretary	10	5	15																																				
review referral letter & prelim decision	consultant	5	2	15																																				
std letter customised/printed & tests requested	secretary	12	10	15																																				
create MDT folder (printed letter + referral) pending results	secretary	10	5	15																																				
checks twice weekly investigation dates to anticipate results	secretary	5	5	5																																				
chasing lab tests results	secretary	50	20	90																																				
review results+/- dictate letters +/- allocate MDT slot	consultant	15	10	30																																				
re-review results & prepare MDT review	consultant	20	5	30																																				
MDT discussion	MDT	5	3	10																																				
MDT letter review & dictate	consultant	20	10	30																																				
type MDT letter	secretary	10	5	20																																				
sign MDT letter	consultant	2	1	3																																				
post MDT letter	secretary	4	3	5																																				
TOTAL		168	84	283																																				

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Our Approach

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MDT

+

electronic AI Management System (eAIMS)

+

Patient Engagement

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MDT

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- Prioritisation strategy; aligned to guidance
- Membership:
  - Endocrinology/DM specialist
  - Radiologist (uro-, isotope-, intervention-)
  - Clinical biochemist
  - Urologist
  - Nephrologist
  - Pathologist
  - Anaesthetist (phaeochromocytoma)
- Monthly meeting: & In between discussions

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Electronic AI Management System (eAIMS)

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- **Successful Health Foundation- "I-4-I"Award**
- **Aim:**
  - **Record all detail in one system (clinical + MDT)**
  - **Generate pre-populated outcome letter**
  - **Guide management (in progress)**
- **Implementation:**
  - **Successful development, security- and governance-checks concluded**
  - **Web-based to facilitate wider adoption.**

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eAIMS: Outcomes

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- A 78% reduction in the time from AI identification to MDT decision → patient anxiet
- A 30% reduction in staff hands-on time.
- A 28% reduced cost (independent health economics analysis, UEA)
- Improved patient safety: Minimising risk of
  - Transcription errors
  - Missed cases

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l1 Tony; it was 175 minutes and became 120 now
lenovo, 02/11/2017

Time in motion analysis of traditional pathway

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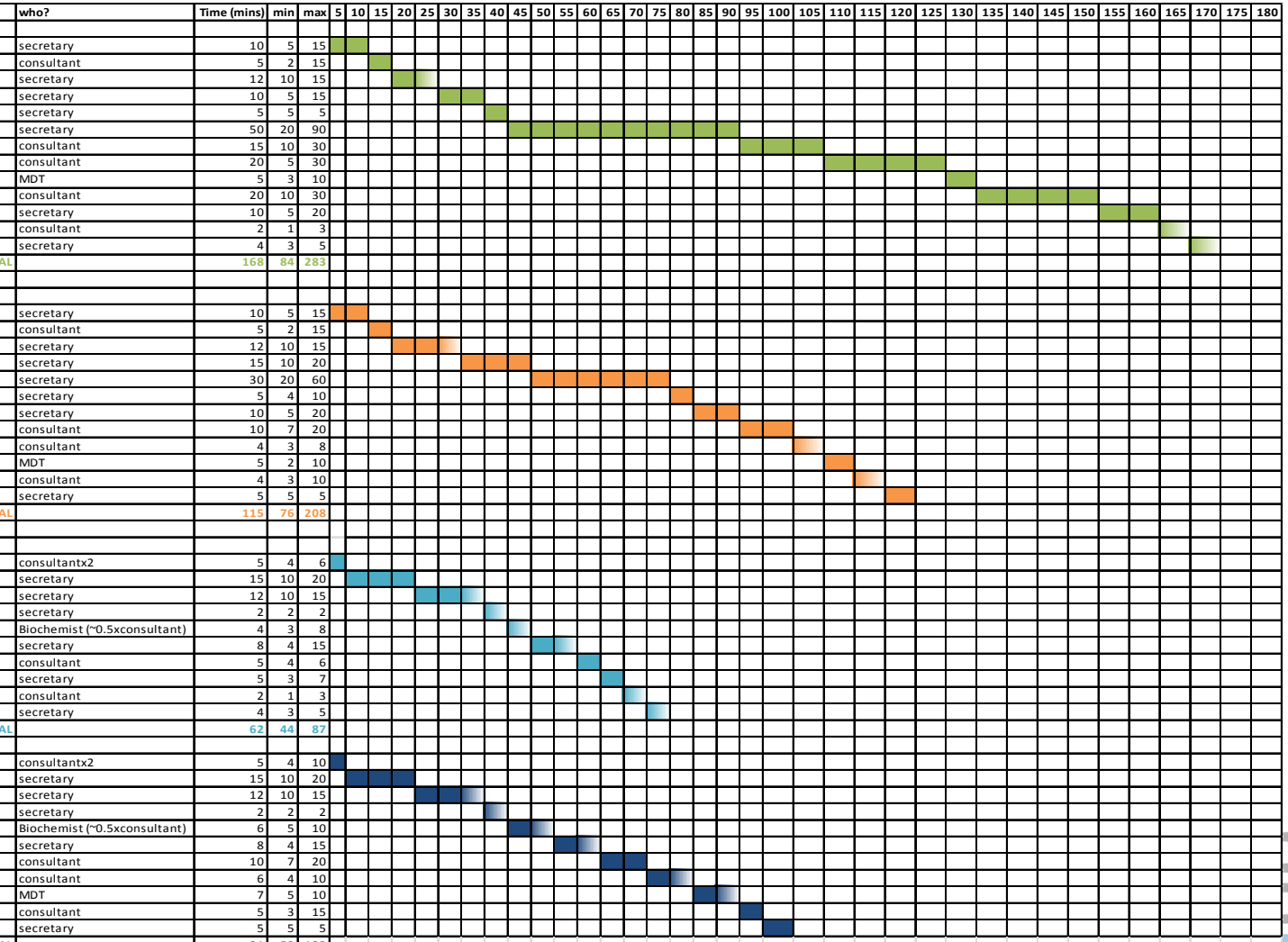
Step	who?	Time (mins)	min	max
Pre-project				
receive & prep referral	secretary	10	5	15
review referral letter & prelim decision	consultant	5	2	15
std letter customised/printed & tests requested	secretary	12	10	15
create MDT folder (printed letter + referral) pending results	secretary	10	5	15
checks twice weekly investigation dates to anticipate results	secretary	5	5	5
chasing lab tests results	secretary	50	20	90
review results +/- dictate letters +/- allocate MDT slot	consultant	15	10	30
re-review results & prepare MDT review	consultant	20	5	30
MDT discussion	MDT	5	3	10
MDT letter review & dictate	consultant	20	10	30
type MDT letter	secretary	10	5	20
sign MDT letter	consultant	2	1	3
post MDT letter	secretary	4	3	5
TOTAL		168	84	283
Phase 2 - eAIMS+prioritisation				
receive & prep referral	secretary	10	5	15
review referral letter & prelim decision	consultant	5	2	15
std letter customised/printed & tests requested	secretary	12	10	15
enter demographics & radiology data on eAIMS	secretary	15	10	20
chasing lab tests results	secretary	30	20	60
enter results on eAIMS	secretary	5	4	10
Provisional MDT letter printed	secretary	10	5	20
review results +/- dictate letters +/- allocate MDT slot	consultant	10	7	20
re-review results & prepare MDT review	consultant	4	3	8
MDT discussion	MDT	5	2	10
review provisional MDT letter as per MDT discussion	consultant	4	3	10
finalise MDT letter & transfer to Medisec	secretary	5	5	5
TOTAL		115	76	208
Phase 3 - eAIMS+proactive AI detection (low risk - **80% of pts**)				
review all AI cases	consultantx2	5	4	6
enter demographics & radiology data on eAIMS	secretary	15	10	20
std letter customised/printed & tests requested	secretary	12	10	15
inform biochem of impending tests (email)	secretary	2	2	2
enter results on eAIMS & informs sec	Biochemist (~0.5xconsultant)	4	3	8
Provisional MDT letter printed	secretary	8	4	15
review results & finalise letter	consultant	5	4	6
type MDT letter	secretary	5	3	7
sign MDT letter	consultant	2	1	3
post MDT letter	secretary	4	3	5
TOTAL		62	44	87
Phase 3 - eAIMS+proactive AI detection (high risk - **20% of pts**)				
review all AI cases	consultantx2	5	4	10
enter demographics + radiology data on eAIMS	secretary	15	10	20
std letter customised/printed & tests requested	secretary	12	10	15
inform biochem of impending tests (email)	secretary	2	2	2
enter results on eAIMS & informs sec	Biochemist (~0.5xconsultant)	6	5	10
Provisional MDT letter printed	secretary	8	4	15
review results +/- dictate letters +/- allocate MDT slot	consultant	10	7	20
re-review results & prepare MDT review	consultant	6	4	10
MDT discussion	MDT	7	5	10
review provisional MDT letter as per MDT discussion	consultant	5	3	15
finalise MDT letter & transfer to Medisec	secretary	5	5	5
TOTAL		81	59	132
TOTAL (low+high risk combined)		65.8	47	96



Electronic AI Management System (eAIMS)

MDT/Clinic Outcome Letter

Diabetes and Endocrinology
Royal Stoke University Hospital
Please insert contact details
Newcastle Road
Stoke-on-Trent
ST4 6QG

13 Feb 2017

Dear Dr Dr Smithi,

Re: Xxxxxx Yyyyyyyy 16/08/1947 118 sfkslfj lksjf lsjfad, Kidsgrove, Staffs, XSSSS
Diagnosis: Left 15mm adrenal incidentaloma

Comorbidities:

Results:

Urea and electrolytes

Date	Sodium	Potassium	Urea	Creatinine	eGFR
12/07/2016	138 mmol/L	4.5 mmol/L	5.1 mmol/L	77 µmol/L	89 mL/min/1.73m²
28/07/2016	140 mmol/L	3.9 mmol/L	5.2 mmol/L	79 µmol/L	90 mL/min/1.73m²

Overnight dexamethasone suppression test

Date	Serum cortisol
12/07/2016	78 nmol/L

Aldosterone/Renin Ratio

Date	Aldosterone	Renin	Aldosterone/Renin Ratio
12/07/2016	69 pmol/L	-	-

Low-dose dexamethasone suppression test

Date	Cortisol Baseline	Cortisol End	ACTH Baseline	ACTH End	24 hour urinary free cortisol levels - Day 1	24 hour urinary free cortisol levels - Day 2	24 hour urinary free cortisol levels - Day 3	24 hour urinary free cortisol levels - Day 4
27/07/2016	692 mmol/l	71 mmol/l	27.4 pg/l	<5 pg/l	-	-	-	-

Plasma metadrenalines

Date	Plasma Normetadrenaline	Plasma Metadrenaline
12/07/2016	0.99 nmol/L	-

Salivary Cortisol

Date	Day 1 Morning	Day 1 Evening	Day 2 Morning	Day 2 Evening	day 3 Morning	Day 3 Evening
31/08/2016	17.8 nmol/L	3.0 nmol/L	15.5 nmol/L	3.0 nmol/L	17.2 nmol/L	3.5 nmol/L

Reason for discussion Adrenal incidentaloma picked up on CT scan in March 2016 when being investigated for abdominal discomfort.
MDT Outcome Repeat 2 day low dose Dexamethasone suppression test and salivary cortisol in 12 months. No further imaging required.

Way Forward

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- **Successfully secured 2nd Health Foundation "Spreading Innovation" grant:**
- **Applied for Scaling up (NIHR), waiting for outcome on outline bid. We aim to:**
  - **Spread the initiative in other pilot sites & reflect on the implementation process (Adaptive Learning)**
  - **Online Patient Portal with Q&A: ↓anxiet**
  - **Step-wise adoption by other collaborators**

Happy for collaboration

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Thank you for listening

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Prof Tony Fryer (Co-Lead; Clin Biochem)
Dr Basil Issa (Manchester; Endo)
Dr Cherian George (Radiology)
Prof Julius Sim (Keele; Statistics)
Prof Ric Fordham (UEA; H Economics)
Mrs Helen Robertson (MDT Co-ord)
Mr Chris Hale (eAIMS developer)
Mrs Elloise Maddock (IT Business Mgr)
Mr Mike Firn (QI lead)
Dr John Oxtoby (MD)
Dr Seyi Ogunmekan (1ry Care Rep)
Mr Paul Tanner (Patient Representative)

The Health Foundation

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UEA
University of East Anglia

Keele University

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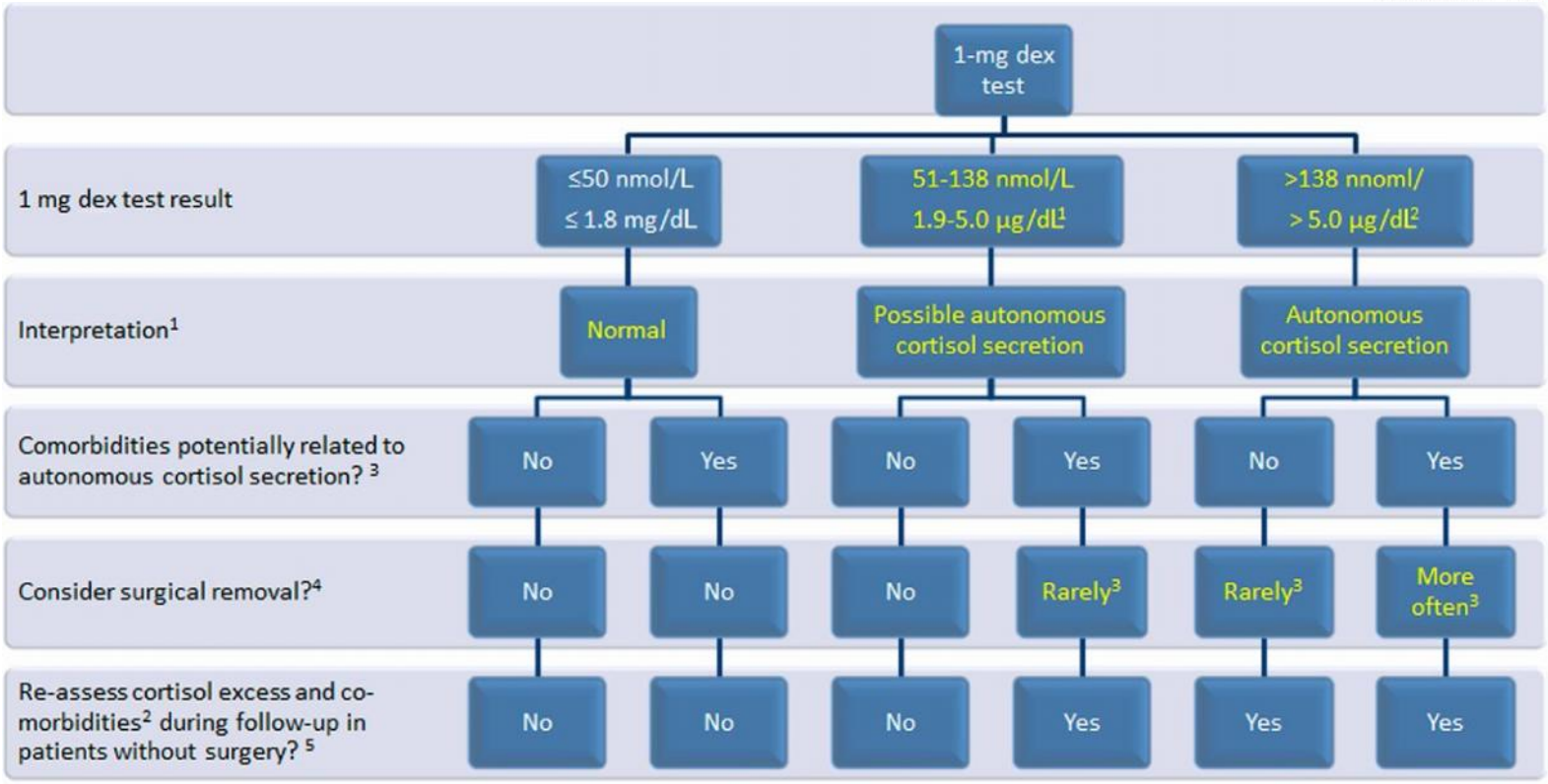
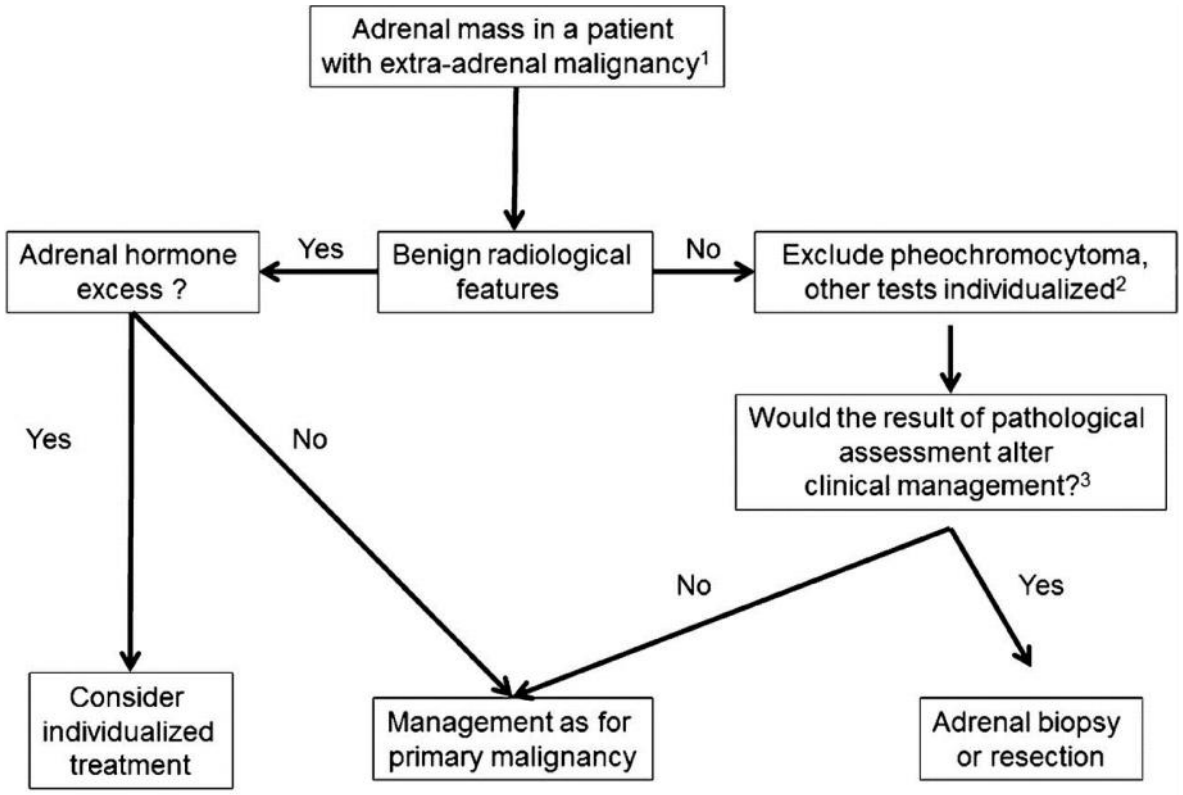
Figure 2 Assessment and management of 'autonomous cortisol secretion' in patients with adrenal incidentalomas.



[1]The majority of, but not all, panel members preferred additional biochemical tests to better judge the degree of cortisol secretion. In patients with comorbidities, we suggest to measure plasma ACTH and to repeat the dexamethasone test in 3–12 months.
[2]We suggest additional biochemical tests to better judge the degree of cortisol secretion: plasma ACTH, 24-h urinary-free cortisol, (and/or late-night salivary cortisol) and repetition of the dexamethasone test in 3–12 months.
[3]See Table 2 for potentially cortisol-related comorbidities.
[4]Choice for surgery should always be individualized.
[5]Need of follow-up by an endocrinologist for 2–4 years.

Martin Fassnacht et al. Eur J Endocrinol 2016;175:G1-G34

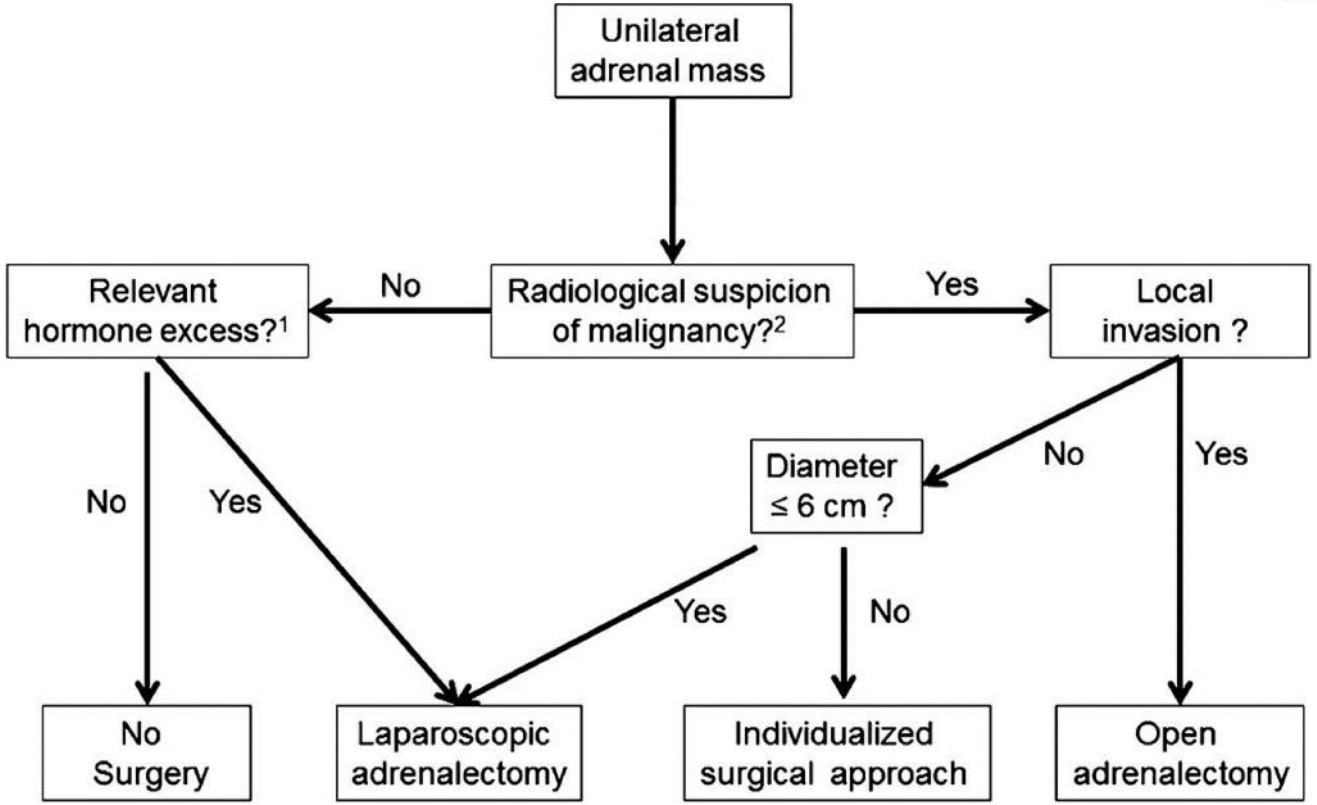
Figure 4 Evaluation of patients with adrenal mass and known extra-adrenal malignancy.



[1]Always take life expectancy in consideration.
[2]If there is hormone excess, treat individualized.
[3]FDG-PET–CT should be considered to exclude other metastatic deposits in patients with no other obvious metastatic lesions for whom surgical removal of the lesion is an option.

Martin Fassnacht et al. Eur J Endocrinol 2016;175:G1-G34

Figure 3 Flowchart on the management of adrenal masses considered for surgery.



[1]'Autonomous cortisol secretion' is not automatically judged as clinically relevant (see Section 5.3 for details).

[2]In tumors with benign radiological features and a tumor size >4 cm, surgery might also be individually considered(see text).

Martin Fassnacht et al. Eur J Endocrinol 2016;175:G1-G34