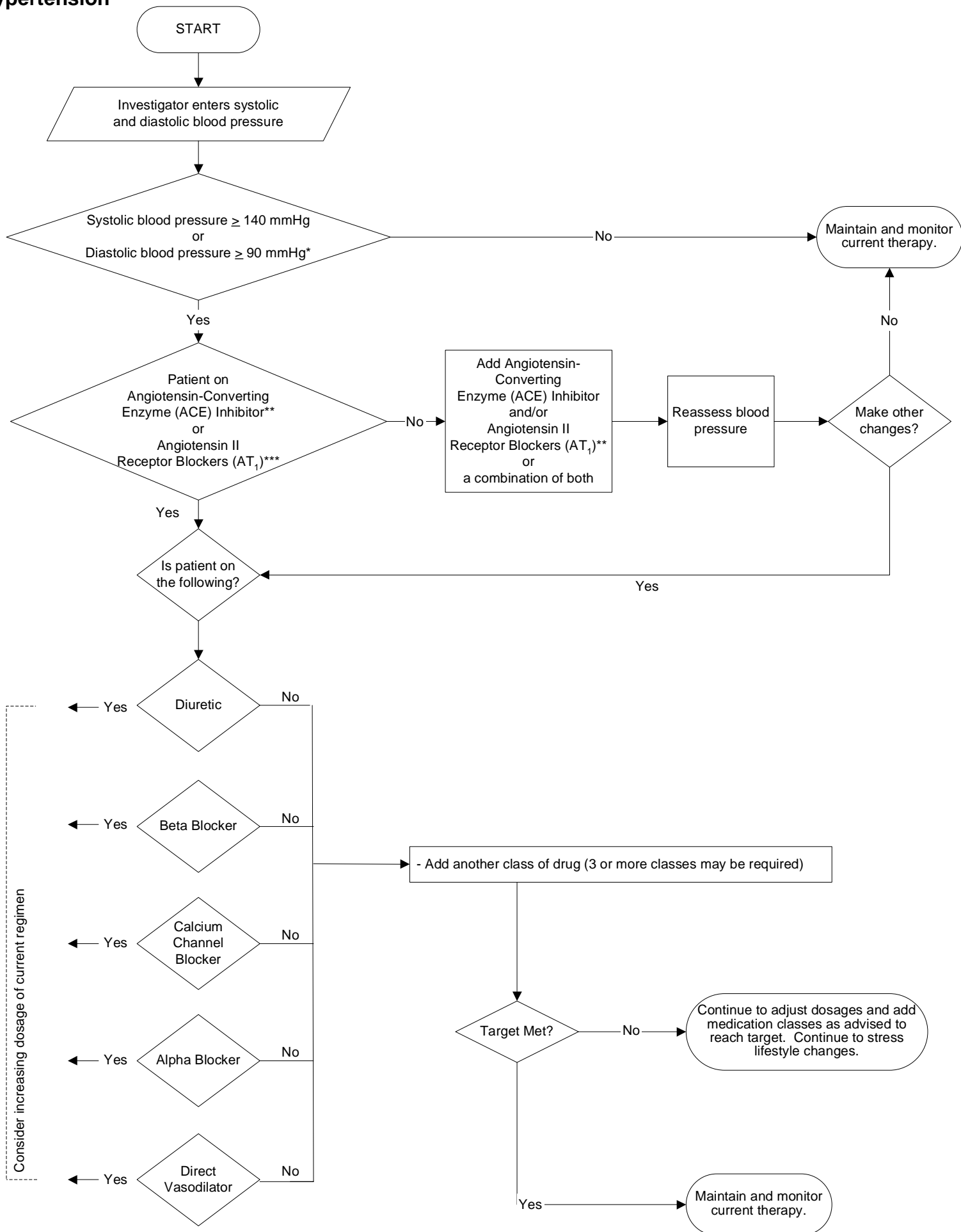


Hypertension



*Recommended target for diabetic patients is 130/80 mmHg.

**2003 European Hypertension Guidelines suggest an advantage of AT₁ over ACE Inhibitor for type 2 diabetes, JNC 7 does not. ^{1,2}

***AT₁= Angiotensin II Receptor Blocker = Angiotensin II Inhibitor

Hypertension

References:

1. Guidelines Committee. 2003 European Society of Hypertension-European Society of cardiology guidelines for the management of arterial hypertension. *Journal of Hypertension* 2003; 21:1011-1053.
2. Chobanian AV, Bakris GL, Black HR, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure - The JNC 7 Report. *Journal of American Medical Association* 2003; 289 (19): 2560-2572.
3. Jacobsen P, Andersen S, Rossing K, Jensen BR, Parving HH. Dual blockage of the renin-angiotensin system versus maximal recommended dose of ACE inhibition in diabetic nephropathy. *Kidney International* 2003; 63, 1874-1880.

Indications and contraindications for the major classes of antihypertensive drugs (2003 European Society of Hypertension)

Class	Conditions favouring the use	Contraindications	
		Compelling	Possible
Diuretics (thiazides)	Congestive heart failure; elderly hypertensives; isolated systolic hypertension; hypertensives of African origin	Gout	Pregnancy
Diuretics (loop)	Renal insufficiency; congestive heart failure		
Diuretics (anti-aldosterone)	Congestive heart failure; post-myocardial infarction	Renal failure; hyperkalaemia	
Beta - Blockers	Angina pectoris; post-myocardial infarction; congestive heart failure (up-titration); pregnancy; tachyarrhythmias	Asthma; chronic obstructive pulmonary disease; A-V block (grade 2 or 3)	Peripheral vascular disease; glucose intolerance; athletes and physically active patients
Calcium Antagonists (dihydropyridines)	Elderly patients; isolated systolic hypertension; angina pectoris; peripheral vascular disease; carotid atherosclerosis; pregnancy		Tachyarrhythmias; congestive heart failure
Calcium Antagonists (verapamil, diltiazem)	Angina pectoris; carotid atherosclerosis; supraventricular tachycardia	A-V block (grade 2 or 3); congestive heart failure	
Angiotensin - converting enzyme (ACE) inhibitors	Congestive heart failure; LV dysfunction; post-myocardial infarction; non-diabetic nephropathy; type 1 diabetic nephropathy; proteinuria	Pregnancy; hyperkalaemia; bilateral renal artery stenosis	
Angiotensin II receptor antagonists (AT1 - blockers)	Type II diabetic nephropathy; diabetic microalbuminuria; proteinuria; left ventricular hypertrophy; ACE-inhibitor cough	Pregnancy; hyperkalaemia; bilateral renal artery stenosis	
Alpha - Blockers	Prostatic hyperplasia (BPH); hyperlipidaemia	Orthostatic hypotension	Congestive heart failure

Links:

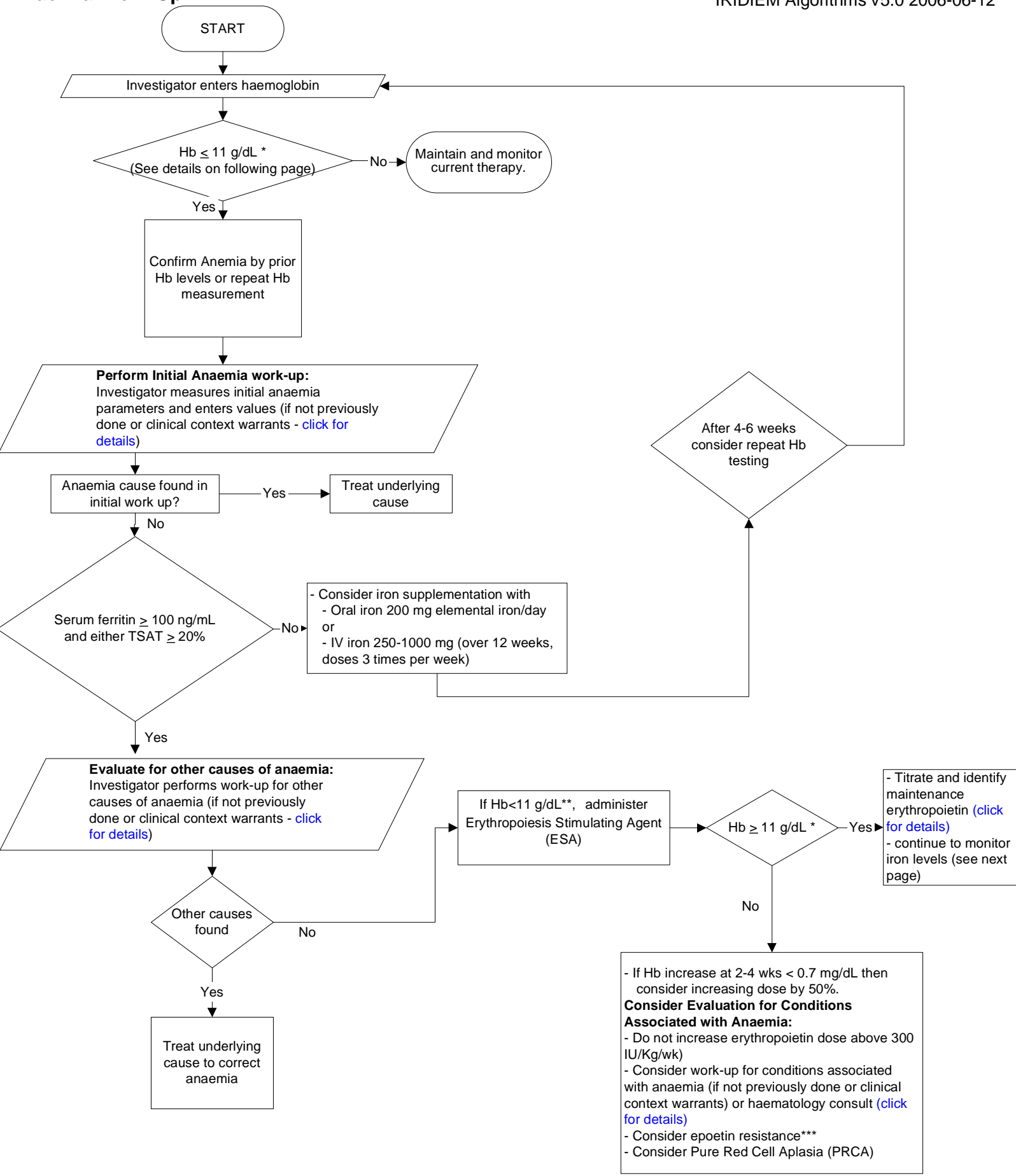
<http://www.nhlbi.nih.gov/guidelines/hypertension/jnc7card.htm>
<http://www.nhlbi.nih.gov/guidelines/hypertension/jnc7card.htm>
http://www.nhlbi.nih.gov/guidelines/obesity/ob_gdlns.htm

Initiate/Maintain drug therapy:

- Start with a low dose of a long-acting, once-daily drug, and titrate dose.
- Low-dose combinations may be appropriate.

Initiate/Maintain lifestyle modifications:

- Stop smoking, if applicable.
- Lose weight, if needed.
- Restrict sodium intake.
- Limit alcohol intake.
- Get aerobic activity.
- Maintain adequate potassium intake.
- Maintain adequate intakes of calcium and magnesium.



*See details on following page. Guideline II.1. European Renal Association - European Dialysis and Transplant Association. Revised European best practice guidelines for the management of anaemia in patients with chronic renal failure. *Nephrology Dialysis Transplantation*. 2004; 19 (supplement 2): ii1-47.

**Guideline III.1 suggests that erythropoietin treatment should be considered when the Hb concentration is consistently less than 11 g/dL on repeated testing.

***Eckardt KU. Anaemia of critical illness – implications for understanding and treating rHuEPO resistance. *Nephrology Dialysis Transplantation*. 2002; 17 (Suppl 5): 48-55 ([click for copy of article](#))

Anaemia Work Up

References:

1. European Renal Association - European Dialysis and Transplant Association. 1999 European best practice guidelines for the management of anaemia in patients with chronic renal failure. *Nephrology Dialysis Transplantation*. 1999; 14 (supplement 5): 2-50.
2. Guidelines Committee. 2003 European Society of Hypertension-European Society of cardiology guidelines for the management of arterial hypertension. *Journal of Hypertension* 2003; 21:1011-1053.
3. Eckardt KU. Anaemia of critical illness – implications for understanding and treating rHuEPO resistance. *Nephrology Dialysis Transplantation*. 2002; 17 (Suppl 5): 48-55.
4. Abramson SD. & Abramson N. 'Common' Uncommon Anemia's. *American Family Physician*. 1999; 55: 851-860.
5. Smith DL. Anemia in the Elderly. *American Family Physician*. 2000; 62: 1565-1576.
6. Hsu CY, McCulloch CE, Curhan GC. Iron status and hemoglobin level in chronic renal insufficiency. *Journal of the American Society of Nephrology* 2002; 13: 2783-2786.

Links:

<http://www.aafp.org/afp/990215ap/851.html>
<http://www.aafp.org/afp/20001001/1565.html>
http://www.kidney.org/professionals/doqi/guidelines/doqi_uptoc.html#an

Parathyroid Hormone

http://www.kidney.org/professionals/doqi/guidelines/doqiupan_v.html
<http://www.eneph.com/pdf/v30n6p355.pdf>
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=12091604&dopt=Abstract

C - Reactive Protein

http://www.kidney.org/professionals/doqi/guidelines/doqiupan_v.html

Target Hb > 11 g/dL details:

- < 11.5 g/dL in adult female patients
- < 13.5 g/dL in adult male patients
- < 12.0 g/dL in adult male patients aged > 70 years

1. Targets should be defined for individual patients, taking gender, age, ethnicity, activity and co-morbid conditions into account.
2. Optimal target Hb concentration may vary in patients with significant co-morbidity
 - Hb > 12 g/dL are not recommended for patients with severe cardiovascular disease unless continuing severe symptoms (e.g. angina) dictate otherwise.
 - Until data become available, it seems prudent to recommend a cautious approach to raising Hb concentrations to levels >12 g/dL in patients with diabetes, especially with concurrent peripheral vascular disease.
 - Patients with chronic hypoxaemic pulmonary disease may benefit from a higher Hb target.

Initial Anaemia Work-up:

- Red Blood Cell indices (mean corpuscular volume and mean corpuscular Hb)
- Absolute reticulocyte count on a standardized machine
- Iron stores by measurement of the serum ferritin concentration
- Iron supply for erythropoiesis by the measurement of percentage red cell hypochromia, reticulocyte Hb content (ChR) or by the TSAT, measured on more than one occasion
- C Reactive Protein (CRP)

Evaluation for other causes of anaemia:

- Serum B12 and folate concentrations
- Differential White Blood count
- Tests for haemolysis (haptoglobin, lactate dehydrogenate, bilirubin, coombs test)
- Serum (and Urine if available) electrophoresis/immunoblotting
- Serum Aluminum
- Hb electrophoresis and bone marrow examination in select cases
- Assessment of occult gastro-intestinal bleeding

Conditions Associated with Anaemia:

- Chronic blood loss (gut, uterus)
- Infection/inflammation (access infections, surgical inflammation, tuberculosis, systemic lupus erythematosus, chronically rejecting allografts, AIDS)
- Hyperparathyroidism/osteitis fibrosa
- Aluminium toxicity
- Haemoglobinopathies (e.g. alpha and beta thalassaemias, sickle cell anaemia)
- Folate or vitamin B12 deficiency
- Multiple myeloma, myelofibrosis
- Other malignancy
- Malnutrition
- Haemolysis
- Drug intake (e.g. high dose ACE inhibitor or AT1 receptor antagonist therapy)
- Uraemia

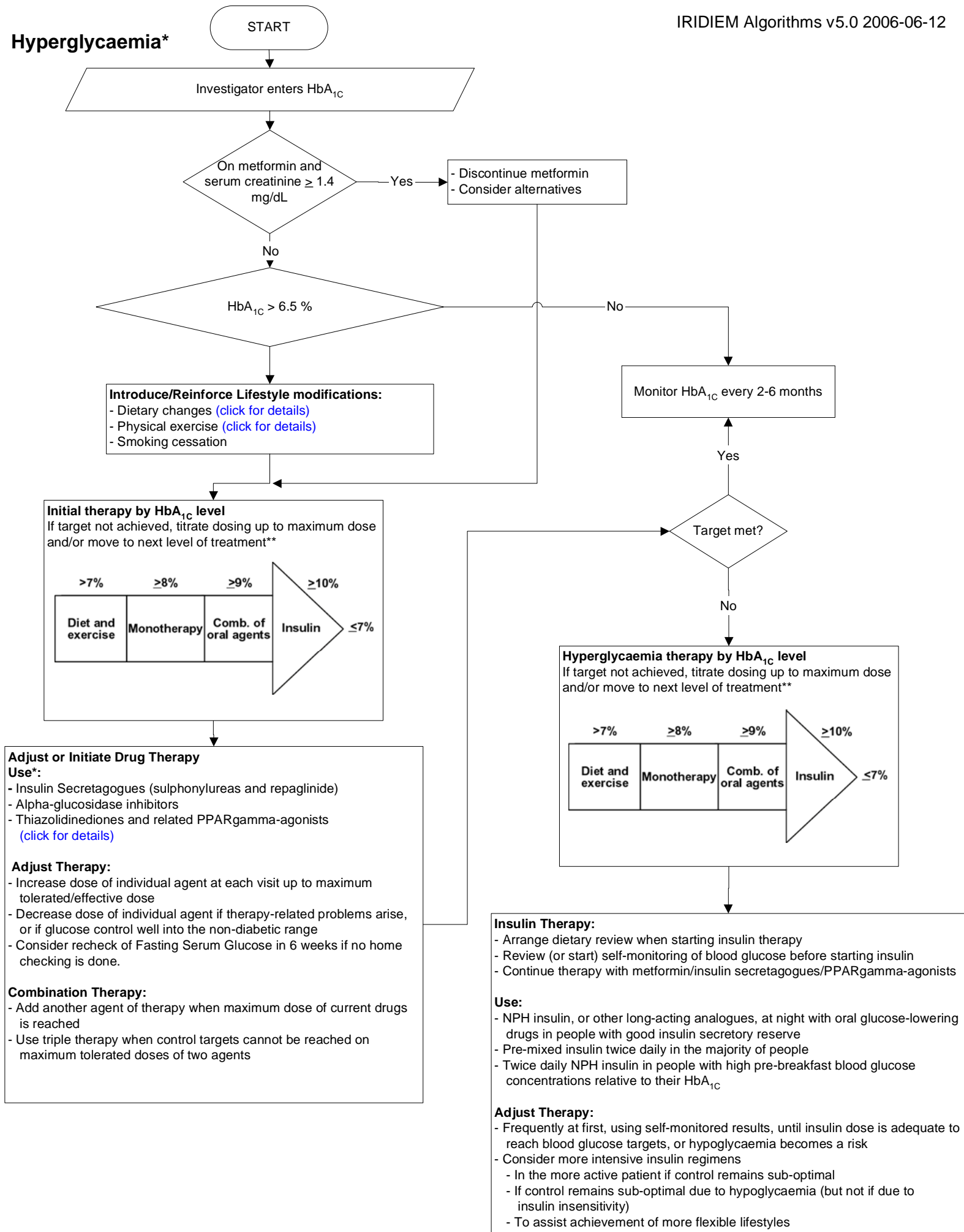
Maintenance erythropoetin:

Initial maintenance erythropoetin dose is typically 20-30% less than the dose needed to achieve Hb \geq 12 g/dL

Iron Monitoring Details:

- All CKD patients with renal anaemia undergoing treatment with an (ESA) should be given supplementary iron to maintain (or reach) the targets (see details above), regardless of dialysis status. Patients undergoing haemodialysis usually have greater iron requirements than those not undergoing haemodialysis.
- I.V. administration is the optimum route for the delivery of iron to patients with CKD, as oral iron is poorly absorbed in uraemic individuals.
- The optimal I.V. iron dose is 25-150 mg/week for the first 6 months of ESA therapy.

Hyperglycaemia*



Adjust or Initiate Drug Therapy Use*:

- Insulin Secretagogues (sulphonylureas and repaglinide)
- Alpha-glucosidase inhibitors
- Thiazolidinediones and related PPARgamma-agonists ([click for details](#))

Adjust Therapy:

- Increase dose of individual agent at each visit up to maximum tolerated/effective dose
- Decrease dose of individual agent if therapy-related problems arise, or if glucose control well into the non-diabetic range
- Consider recheck of Fasting Serum Glucose in 6 weeks if no home checking is done.

Combination Therapy:

- Add another agent of therapy when maximum dose of current drugs is reached
- Use triple therapy when control targets cannot be reached on maximum tolerated doses of two agents

Insulin Therapy:

- Arrange dietary review when starting insulin therapy
- Review (or start) self-monitoring of blood glucose before starting insulin
- Continue therapy with metformin/insulin secretagogues/PPARgamma-agonists

Use:

- NPH insulin, or other long-acting analogues, at night with oral glucose-lowering drugs in people with good insulin secretory reserve
- Pre-mixed insulin twice daily in the majority of people
- Twice daily NPH insulin in people with high pre-breakfast blood glucose concentrations relative to their HbA_{1c}

Adjust Therapy:

- Frequently at first, using self-monitored results, until insulin dose is adequate to reach blood glucose targets, or hypoglycaemia becomes a risk
- Consider more intensive insulin regimens
 - In the more active patient if control remains sub-optimal
 - If control remains sub-optimal due to hypoglycaemia (but not if due to insulin insensitivity)
- To assist achievement of more flexible lifestyles

*Metformin is not included in treatment advice due to its contraindication in renal impairment, but it is listed in the detailed information for completeness.
 **Image used with permission from Dr. James Gavin.

Hyperglycaemia

References:

1. International Diabetes Federation - Europe. A desktop guide to Type 2 diabetes mellitus. *Diabetic Medicine*; 16; 716-730.
2. American Diabetes Association (2004). Clinical Practice Guidelines. *Diabetes Care*. 2004; 27 (Suppl 1): 1-161.
3. Harris MI, Eastman RC, Cowie CC, Flegal KM, Eberhardt MS. *Diabetes Care* 1999; 22: 403-408.

Agent Detail

Sulphonylureas :

- Good evidence base, provided patient has useful islet B-cell function
- *Hypoglycaemia a significant problem* :
glibenclamide > glipizide = chlorpropamide > gliclazide > tolbutamide (some other agents lack data);
avoid glibenclamide / chlorpropamide particularly if renal impairment or in the thin insulin-sensitive patient (especially if elderly)

Repaglinide :

- New rapid-acting insulin secretagogue; possible advantage in hypoglycaemia avoidance and control of post-prandial glucose excursions
- Also known as: Prandin[®] , GlucoNorm[®]

Alpha-glucosidase inhibitors :

- Effective control of post-prandial hyperglycaemia, but poorly tolerated by many patients; dose titration may help tolerance
- Examples include: Acarbose[®] , Precose[®] , Miglitol[®] , Glyset[®]

PPARgamma-agonists :

- New agents, offering effective glucose-lowering particularly in combination with insulin and insulin secretagogues
- *Contraindicated* if any history of liver disease, and require organized monitoring of liver function tests until hepatic safety assured
- Examples include: Thiazolidinediones (Troglitazone[®] , Rosiglitazone[®] , Pioglitazone[®] ; Actos[®] ; Avandia[®])

Metformin :

- Strong evidence base in the overweight, lowers LDL cholesterol, but gastro-intestinal side effects in some patients; dose titration may help tolerance
- *Contraindicated (risk of lactic acidosis)* if renal impairment, overt liver disease, or severe cardiac failure; monitor renal function at least yearly
- Examples include: Glucophage[®] , Glucovance[®]

Dietary changes:

- Saturated fat: <10% of calories
- Polyunsaturated fat : <10 % of calories
- Carbohydrate: : use foods containing soluble fibre in a carbohydrate rich diet
- Simple sugars : need not be rigorously excluded from the diet, but should be limited
- Protein : <15 % of calories
- Monounsaturated fat : use to maintain palatability and balance calorie intake
- Total calories : as required for normal body mass index
- Fresh fruit / vegetables : encouraged as part of meal-time calorie intake
- Alcohol : if desired, as part of total daily calorie intake

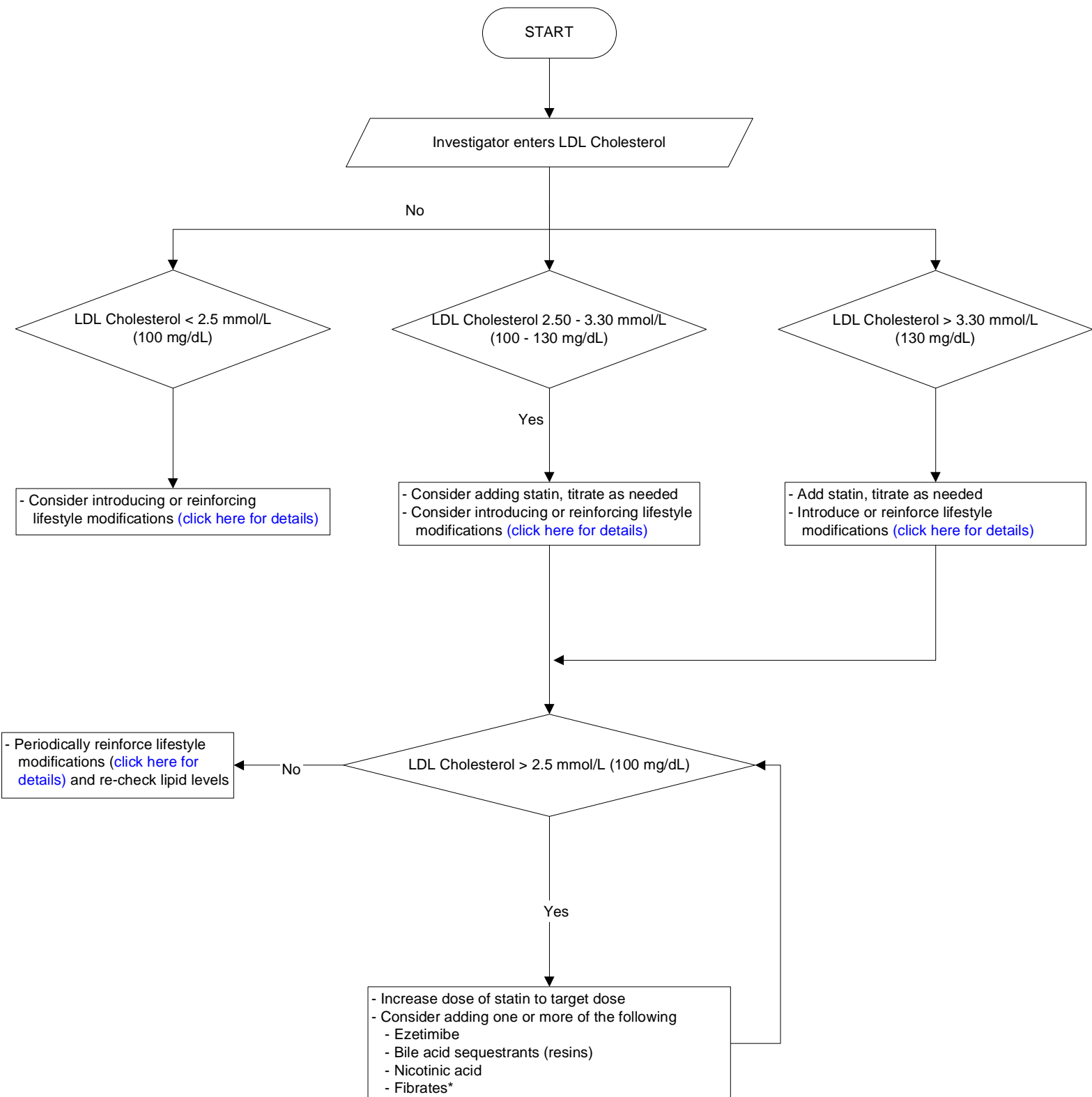
Advise that physical exercise:

- Can benefit insulin sensitivity, blood pressure, and blood lipid control
- Should be done at least every 2 - 3 days for optimum effect
- May increase the risk of acute and delayed hypoglycaemia

Manage physical exercise using:

- Formal recording of levels of physical activity
- Identification of new exercise opportunities (getting to and from work, domestic activities and hobbies) and encouragement to develop these
- Appropriate self-monitoring, additional carbohydrate and dose adjustment of glucose lowering therapy for those using insulin or insulin secretagogues
- Warnings:
 - About delayed hypoglycaemia, especially with more prolonged, severe or unusual exercise for those using insulin therapy
 - That alcohol may exacerbate the risk of hypoglycaemia after exercise
 - About risks of foot damage from exercise
 - Need to consider ischaemic heart disease in those beginning new exercise programmes

Hypercholesterolemia



* Some fibrates are contraindicated in advanced renal disease³.

Hypercholesterolemia

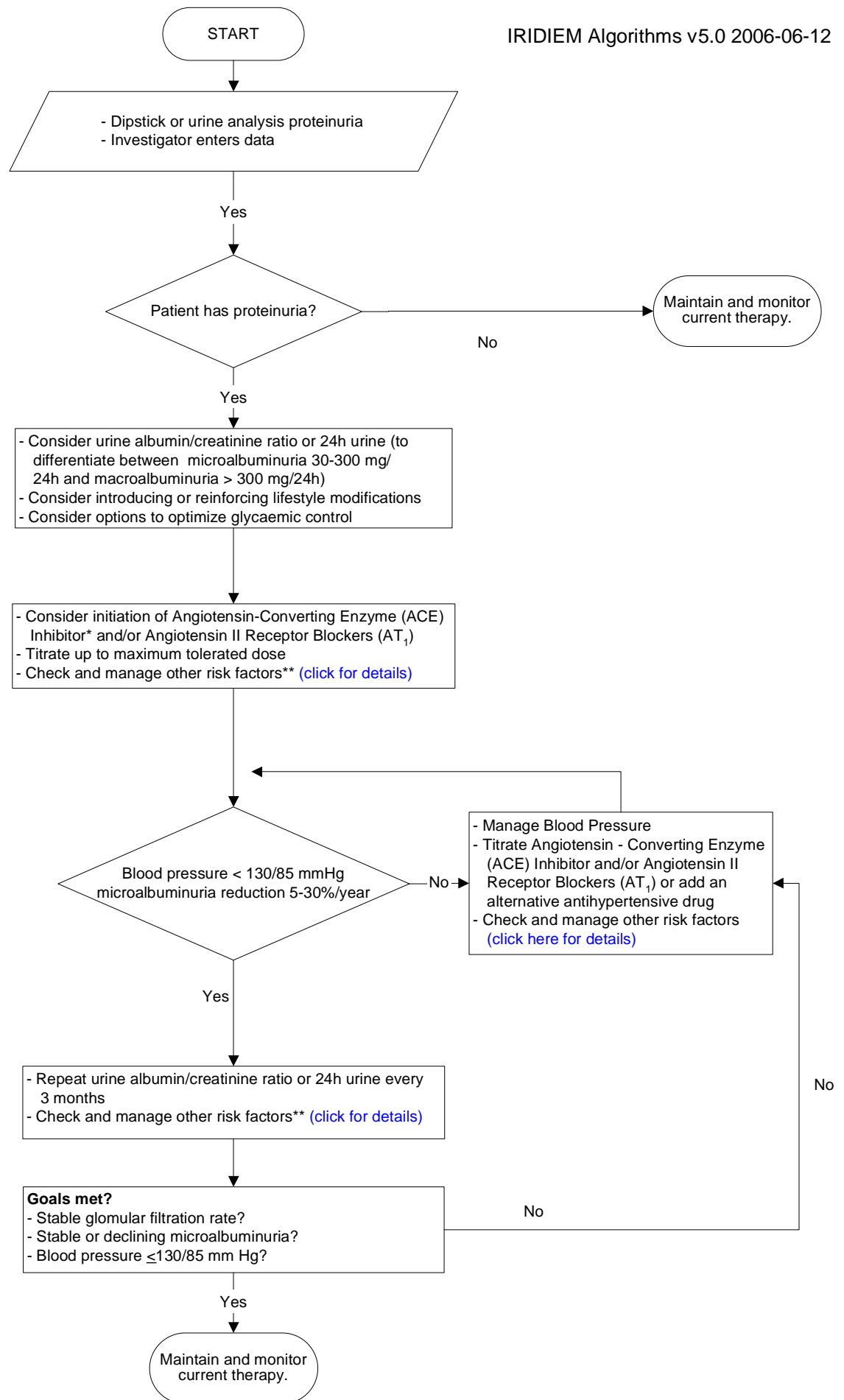
References:

1. Recommendation of the Second Joint Task Force of European and other Societies on Coronary Prevention. *European Heart Journal*. 1998; 19: 1434-1503.
2. WHO. The world health report 2002: reducing risks, promoting healthy life. 2002; chapter 5: 116.
3. Thomason PDR. *Physicians' Desk Reference*. 58th ed. Montvale, NJ: Thomason PDR; 2004.
4. American Diabetes Association (2004). Clinical Practice Guidelines. *Diabetes Care*. 2004; 27 (Suppl 1): 1-161

Lifestyle modifications include:

- Medical Nutritional Therapy (MNT)
- Increased physical activity
- Weight loss
- Smoking cessation

Proteinuria



*Use caution to avoid systolic BP < 120 mmHg. If adverse effects, discontinue use of Angiotensin - Converting Enzyme (ACE) Inhibitor. Another antihypertensive drug may be indicated².

Recent evidence supports use of ACE inhibitor and diuretic³.

Proteinuria

References:

1. Mogensen CE. Microalbuminuria and hypertension with focus on type 1 and type 2 diabetes. *Journal of Internal Medicine* 2003; 254: 45-66.
2. Mogensen CE, Keane WF, Bennett PH, et al. Prevention of diabetic renal disease with special reference to microalbuminuria. *Lancet* 1995; 346: 1080-1084.
3. Mogensen CE, Giancarlo V, Serge H, et al. Effect of low-dose perindopril/indapamide on albuminuria in diabetes - preterax in albuminuria: PREMIER. *Hypertension* 2003; May: 1063-1071.
4. Guidelines Committee. 2003 European Society of Hypertension-European Society of cardiology guidelines for the management of arterial hypertension. *Journal of Hypertension* 2003; 21:1011-1053.
5. Chobanian AV, Bakris GL, Black HR, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure - The JNC 7 Report. *Journal of American Medical Association* 2003; 289 (19): 2560-2572.
6. Rossert J, Wauters J.-P. Recommendations for the screening and management of patients with chronic kidney disease. *Nephrology Dialysis Transplantation* 2002; 17(Suppl 1): 19-28.

Lifestyle modifications:

- Avoid excessive protein intake
- Smoking cessation
- Light to moderate aerobic exercise

Other risk factors include:

- Hyperlipidemia
- Urinary tract infection
- Acute illness
- Cardiac failure
- Metabolic decompensation
- Non-steroidal anti-inflammatory agents
- Heavy exercise
- Smoking