APPENDIX 1

Clinical practice guideline recommendations for 72-year-old hypothetical patient.

Disease (Publisher, Yr)	Recommendation
Asthma (Global Initiative for Asthma [GINA], 2018)	**Non-pharmacological** • Patient education 1. Asthma information 2. Inhaler technique/skills 3. Adherence • Asthma self-management 1. Written asthma action plan 2. Self-monitoring of symptoms and/or lung infection 3. Regular medical review • Diet (high in fruits and vegetables) • Smoking cessation/avoidance of exposure to tobacco smoke • Exercise (with advice on management of exercise-induced bronchoconstriction) • Weight loss if obese 1. Weight reduction programme plus twice-weekly aerobic and strength exercises 2. Quantity of weight loss unspecified • Avoidance of exacerbating factors 1. Avoid occupational sensitisers for occupational asthma 2. Avoid medications that may make asthma worse 3. Avoid indoor air pollution 4. Avoid outdoor allergens 5. Avoid outdoor air pollutants • Annual influenza vaccination (but not pneumococcal vaccination) • Breathing exercises as an adjunct
	Pharmacological • See GINA's stepwise approach for pharmacological therapy of asthma • Allergen immunotherapy for adult patients with allergic rhinitis and sensitised to house dust mites
	Monitoring • Self-monitoring of symptoms and/or peak expiratory flow • A written asthma action plan • Regular medical review
	Follow-up • Within 1–3 mth after starting treatment/step up/step down and every 3–12 mth after that • Within 1–2 wk after self-managed exacerbation • Within 1 wk (2–7 days) after exacerbation • At every visit 1. Assess asthma control, i.e. 2 components: ▪ Symptom control (questionnaires, e.g. asthma control test) ▪ Risk factors for poor outcome 2. Treatment issues ▪ Response to treatment ▪ Side effects of treatment ▪ Step up or down accordingly ▪ Modifiable risk factors for exacerbation, including smoking cessation if applicable ▪ Inhaler techniques ▪ Adherence ▪ Written asthma action plan ▪ Patient's attitude and goals 3. Lung function test at least once every 1–2 yr
Depression (Ministry of Health Singapore, 2012)	**Non-pharmacological** • Psychoeducation

Disease (Publisher, Yr)	Recommendation
	1. Patient education about disease ('depression should be explained as a medical illness that is associated with changes in neurochemicals and brain functioning') 2. Lifestyle changes such as exercise and stress reduction • Psychotherapy 1. Cognitive behavourial therapy for distorted negative thoughts 2. Interpersonal therapy for interpersonal difficulties 3. Psychodynamic-interpersonal therapy for interpersonal difficulties 4. Problem-solving therapy for primary care patients with mild depression • Family intervention 1. Family involvement where indicated and with patient's agreement 2. Marital or couple therapy for significant marital distress • Supportive care for older adults and their caregivers
	Pharmacological • Antidepressants 1. SSRIs (1st line) 2. Serotonin-noradrenaline reuptake inhibitors 3. Tricyclic antidepressants 4. Noradrenergic and specific serotonergic antidepressants 5. Noradrenaline-dopamine reuptake inhibitor • Depression in older adults 1. Mild/moderate: SSRI or psychotherapy 2. Severe: SSRI and psychotherapy <u>Adjuncts</u> • Lithium augmentation • Thyroid hormone augmentation (levothyroxine or triiodothyronine)
	Monitoring NA
	Follow-up Frequency of visits not specified and depends on the severity of the depression, suicide risk, the patient's cooperation and the availability of social support
Diabetes mellitus (Ministry of Health Singapore, 2014)	**Non-pharmacological** • Diet (medical nutritional therapy in consultation with dietician) 1. Balanced diet (50%–60% carbohydrate, 15%–20% protein, < 30% fat) 2. Trans fat < 1%, cholesterol < 200 mg/day (same as general population) 3. Dietary fibre 20–35 g/day 4. Consistently distributed carbohydrate intake through the day 5. Low protein if CKD present (reduce to 0.8–1.0 g/kg/day) 6. Salt < 2 g/day if hypertension • Gradual weight loss of 5%–10% body weight if overweight/obese (0.25–1.0 kg/wk) • Smoking cessation • Alcohol abstinence of no more than 3 drinks/day (male) or 2 drinks/day (female) • Exercise 1. At least 150 min/wk 2. Moderate-to-vigorous aerobic exercise 3. Over ≥ 3 days of the week 4. No more than 2 consecutive days • Foot care 1. Foot care education and footwear advice 2. Use of appropriate footwear 3. Daily foot checks • Diabetes mellitus self-management education • Assessment of psychological and social well-being
	Pharmacological • Oral hypoglycaemia agents 1. Metformin as 1st line

Disease (Publisher, Yr)	Recommendation
	2. Sulfonylurea/dipeptidyl peptidase-4 inhibitor/alpha-galactosidase inhibitor are acceptable alternatives as 1st line • Insulin as appropriate • Lipids: statins if appropriate • BP: ACE-I or ARB if appropriate • Low-dose aspirin for primary prevention if appropriate
	Monitoring Self-monitoring of blood glucose (frequency unspecified)
	Follow-up • At every visit, measure HbA1c, BP and BMI and evaluate self-monitoring of blood glucose • Measure HbA1c ever 3–6 mth • Measure fasting lipids and serum creatinine at least annually • Urine albumin excretion, diabetic retinal photography/ophthalmology referral and foot examination (distal pulses) done annually
Dyslipidaemia (Ministry of Health Singapore, 2016)	**Non-pharmacological** • Diet 1. Rich in wholegrain foods, vegetables, fruits, legumes, nuts, fish, unsaturated oils 2. Low in trans fat, saturated fat, cholesterol, refined grains 3. Total fat intake 25%–34%, saturated fat < 7%, polyunsaturated fat ~ 10% 4. Trans fat < 1% or < 2 g/day, cholesterol < 300 mg/day 5. Simple sugars (monosaccharides and disaccharides) < 10% if high triglycerides 6. 25–30 g/day dietary fibre (increasing whole grains, fruits and vegetables, and reducing processed grains and sugar) 7. Saturated fat should be replaced with mono- and polysaturated fat • Weight loss if BMI > 23 kg/m^2 • Smoking cessation • Alcohol abstinence of no more than 3 drinks/day (male) or 2 drinks/day (female) • Exercise 1. 30–60 min/day (150–300 min/wk) 2. Moderate-intensity aerobic exercise 3. 5–7 days a week
	Pharmacological • Lipid-lowering agents 1. Statins 2. Ezetimibe 3. Resins (bile acid sequestrants) 4. Fibrates 5. Niacin 6. Omega-3 fish oil • Choice of lipid-lowering agent based on which lipid profile is deranged
	Monitoring NA
	Follow-up Aspartate transaminase, alanine transaminase and creatine kinase measured at baseline and repeated only if symptomatic
Hypertension (Ministry of Health Singapore, 2017)	**Non-pharmacological** • Diet 1. Increase vegetables, fruits and low-fat dairy products 2. Decrease saturated and total fats 3. Low salts (5–6 g/day) • Weight loss to BMI < 23 kg/m^2 and waist circumference < 90 cm (male) or < 80 cm (female) • Smoking cessation • Alcohol abstinence of no more than 2 drinks/day (male) or 1 drink/day (female)

Disease (Publisher, Yr)	Recommendation
	• Exercise 1. At least 30 min/day (150 min/wk) 2. Moderate-intensity dynamic exercise 3. 5–7 days a week • Patient education 1. Lifestyle modification 2. Medication adherence
	Pharmacological • Antihypertensive agents ▪ ACE-I ▪ ARB ▪ Diuretics (loop, thiazide, thiazide-like) ▪ Calcium-channel blocker ▪ Beta blockers • Consider compelling indications
	Monitoring Home BP monitoring not mentioned except for white-coat hypertension
	Follow-up • At every visit, check patient education on lifestyle modification and medication adherence • BP monitoring every 3–12 mth • BMI, fasting glucose, fasting lipid profile, urea and electrolytes, creatinine, and urine albumin excretion measured at least annually, or more frequently as per individual risk profile • ECG as per individual risk and cardiac profile
Osteoarthritis (National Institute for Health and Care Excellence, 2014)	**Non-pharmacological** • Patient education • Exercise 1. Local muscle strengthening 2. General aerobic fitness 3. Manipulation and stretching as adjunct • Weight loss if overweight or obese • Appropriate footwear (with shock-absorbing properties_ • Activity pacing <u>Adjuncts</u> • Thermotherapy • Transcutaneous electrical nerve stimulation for pain relief • Bracing, joint supports or insoles for pain/instability • Assistive devices (walking sticks, tap turners) if there are problems with activities of daily living
	Pharmacological • Topical analgesia 1. Topical NSAIDs • Oral analgesia 1. Paracetamol 2. Oral NSAIDs 3. COX-2 inhibitors 4. Opioids • Proton pump inhibitor co-prescribed with oral NSAIDs/COX-2 inhibitors <u>Adjuncts</u> • Topical capsaicin • Intra-articular corticosteroid injections
	Monitoring NA
	Follow-up • Annual follow-up if troublesome joint pain, more than 1 joint with symptoms, more than 1 comorbidity or taking regular medications for OA

Disease (Publisher, Yr)	Recommendation
	• At every visit: 1. Monitor symptoms and ongoing impact on activities of daily living and quality of life 2. Monitor long-term course of the condition 3. Discuss patient's knowledge of the condition, ideas, concerns, expectations, preferences and access to healthcare 4. Effectiveness and tolerability of treatment 5. Support self-management

ACE-I: angiotensin-converting enzyme inhibitor; ARB: angiotensin II receptor blocker; BMI: body mass index; BP: blood pressure; CKD: chronic kidney disease; ECG: electrocardiography; HbA1c: glycated haemoglobin; NSAID: nonsteroidal anti-inflammatory drug; SSRI: serotonin-specific reuptake inhibitors

APPENDIX 2

Chronic conditions selected from the Chronic Disease Management Programme:[15]

Conditions with established disease management programmes (requiring reporting of clinical indicators):
1. Diabetes mellitus and pre-diabetes mellitus*
2. Hypertension*
3. Lipid disorders*
4. Asthma*
5. Chronic obstructive pulmonary disease
6. Chronic kidney disease (nephritis/nephrosis)

Mental illnesses (requiring participation of clinic/doctor in a shared care programme):
7. Schizophrenia
8. Major depression*
9. Bipolar disorder
10. Anxiety

Other chronic conditions:
11. Stroke
12. Dementia
13. Osteoarthritis*
14. Parkinson's disease
15. Benign prostatic hyperplasia
16. Epilepsy
17. Osteoporosis
18. Psoriasis
19. Rheumatoid arthritis
20. Ischaemic heart disease

**Chronic conditions selected.*

Selected chronic conditions and CPGs

Guideline focus	Title	Organisation	Yr
Asthma	Global Strategy for Asthma Management and Prevention	Global Initiative for Asthma	2018
Depression	Depression	Ministry of Health Singapore	2012
Diabetes mellitus	Diabetes mellitus	Ministry of Health Singapore	2014
Dyslipidaemia	Lipids	Ministry of Health Singapore	2016
Hypertension	Hypertension	Ministry of Health Singapore	2017
Osteoarthritis	Osteoarthritis: Care and Management in Adults	National Institute for Health and Care Excellence	2014

APPENDIX 3

Overall time spent on health-related activities.

Time spent on activity	Median time (min/day)	Time spent (hr/mth)	Time spent (hr/day)
Taking medications*	24.0	12.00	0.40
Following diet†	32.0	16.00	0.53
Home monitoring	17.3	8.67	0.29
Exercise‡	60.0	20.00	0.67
Attending appointments (without buffer)§	–	5.62	0.19
Attending appointments (with buffer)§	–	7.87	0.26
Total without buffer time	–	62.28	2.08
Total with buffer time	–	64.53	2.15

*Composite of three components: time to sort medications, prepare medications and take medications. Median time was derived from 20 min/day spent by patients with > 10 medications(22) and 4 min/episode of insulin administration.(23) †Composite of two components: time to prepare food and shopping for food. Median time was derived from 30 min/day for preparing food and 1 hr/mth (2 min/day) for shopping for food.(22) ‡Composite of two components: time spent engaging in exercise itself and time spent on preparation and wash-up. We assume that our hypothetical patient spends 30 min a day engaging in exercise for 5 days/wk (20 days/mth) as per CPG recommendations. We arbitrarily decided that time spent on preparation and wash-up amounts to 30 min/session. This is because clinicians will likely recommend water-based physical activities instead of land-based activities given our patient's bilateral osteoarthritis of the knees. §Composite of three components: travelling time, waiting time and time for the appointment itself. Values were derived from our calculations using operational time norms from National Healthcare Group Polyclinic

APPENDIX 4

Time spent attending appointments

Activity/care	Time (min/unit activity)		Frequency of activity (times/yr)	Time (hr/mth)	
	Without buffer	With buffer*		Without buffer	With buffer*
Clinician review + HbA1c	95	125	4	0.53	0.69
Travel†	30				
Clinical review‡,§	25				
HbA1c‡	15				
Collect medications (pharmacy)‡	15				
Check out	10				
Influenza vaccination	55	85	1	0.08	0.12
Travel†	30				
Administer influenza vaccine‡	15				
Check out	10				
Dietician referral	65	95	1	0.09	0.13
Travel†	30				
Dietician review‡	25				
Check out	10				
Diabetic foot screening + diabetic retinal photography	90	120	1	0.13	0.17
Travel†	30				
Diabetic foot screening‡	25				
Diabetic retinal photography‡	25				
Check out	10				
Podiatry session	65	95	24	2.17	3.17
Travel†	30				
Podiatrist review‡	25				
Diabetic foot education					
Check out	10				
Psychology session	95	125	8	1.06	1.39
Travel†	30				
Psychotherapy	55				
Psychoeducation					
Check out	10				
Physiotherapy session	80	110	12	1.33	1.83
Travel†	30				
Physiotherapy‡	40				
Osteoarthritis education					
Check out	10				
DM self-education management	65	95	1	0.09	0.13
Travel†	30				
DSME itself‡	25				
Check out	10				
Asthma education§	15	45	1	0.02	0.06
Investigations/laboratory tests	95	125	1	0.13	0.17
Travel†	30				
Electrocardiography	15				
Fasting lipid profile	15§				
Fasting blood glucose					
Urine albumin-creatinine ratio					
Urea and electrolytes					
Serum creatinine					
Lung function test	25				
Check out	10				
Total time spent				5.62	7.87

*For each appointment, we calculated time spent as if more time was required due to unforeseen circumstances, such as missing the bus or exceptionally high patient volume in the polyclinics. This 'buffer time' was arbitrarily decided to be 30 min. †We arbitrarily decided that our hypothetical patient lives 15 min away from the neighbourhood polyclinic. Travelling time of 30 min indicated is for two-way travel from home to polyclinic and back. ‡Time indicated is inclusive of waiting time of 10 min, an approximation of median waiting time data obtained from operational data from NHGP. §Specific activities: (a) time spent on clinical review with the clinician was taken to be 15 min excluding waiting time, an approximation of median consultation time obtained from operational data from NHGP; (b) time spent on performing all haematological investigations was taken to be 5 min, excluding waiting time, as they would be done in the same sitting; and (c) for asthma education, time spent excludes travelling time, as the patient travels to the care manager during diabetic self-management education or the pharmacist during medication collection and it is not considered a separate appointment. DM: diabetes mellitus; DSME: diabetes self-management education; NHGP: National Healthcare Group Polyclinics

Time spent on home monitoring.

Home monitoring activity	Median time (min/unit activity)	Frequency (times/wk)	Time (min/mth)	Time (hr/mth)
Capillary blood glucose*	5	3	60	1.00
Foot check†	10	7	280	4.67
BP monitoring‡	10	1	40	0.67
Asthma symptoms/PEF§	5	7	140	2.33
Total time spent			520	8.67

*Time taken for capillary blood glucose monitoring was obtained from the literature.(22) †Time taken for foot care was obtained from the literature.(23) ‡We assumed that the time taken for BP monitoring is 10 min each, as most protocols recommend 5 min of rest before measurement and taking ≥ 2 readings with a full minute in between. §To our knowledge, there are no studies on time taken for asthma self-monitoring. We assumed that the time taken for disease monitoring of a single chronic condition is approximately 5 min/day, similar to capillary blood glucose monitoring. BP: blood pressure; PEF: peak expiratory flow