Management of Hyperglycemia in Type 2 Diabetes, 2015: A Patient-Centered Approach

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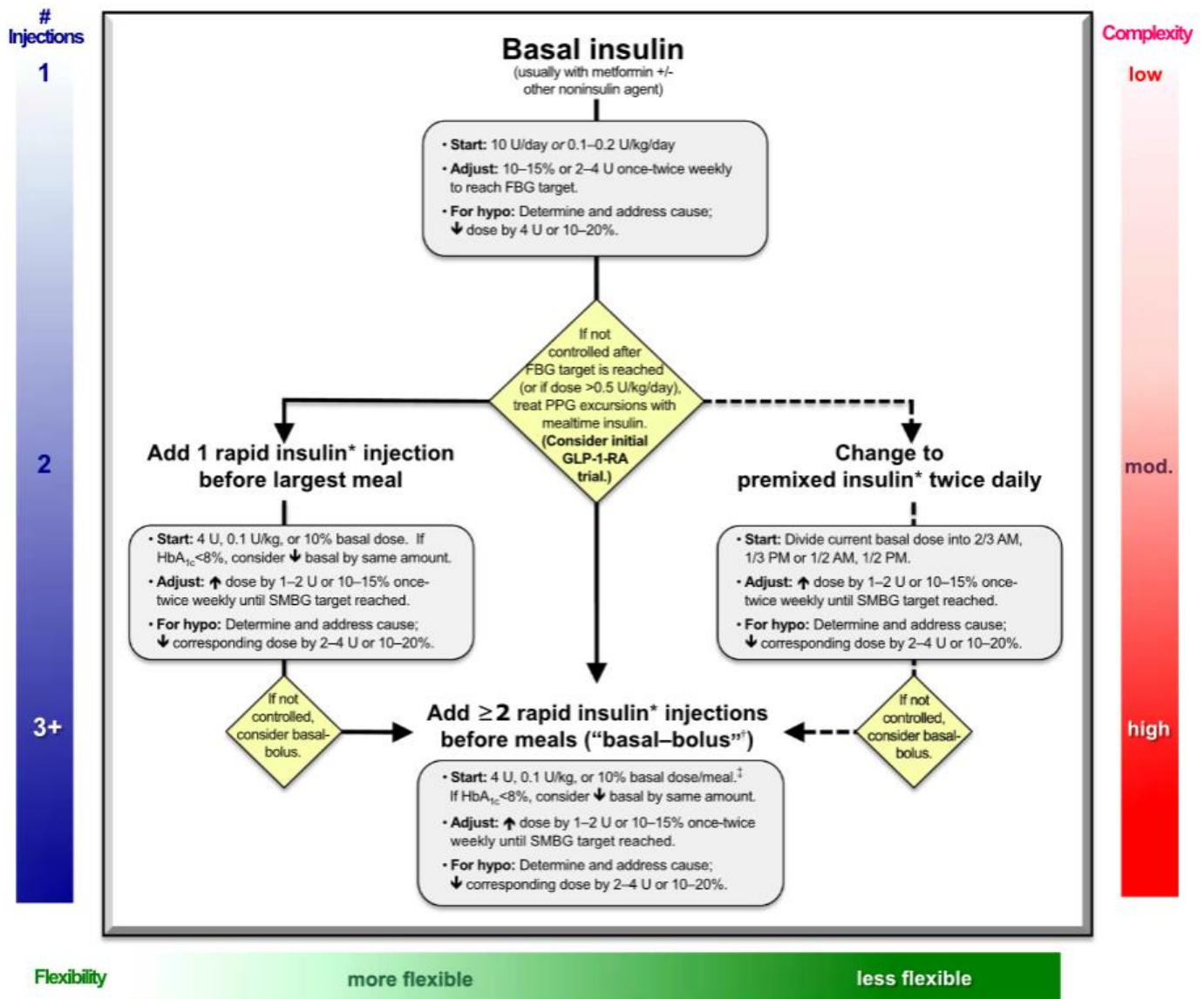
Figure 3—Approach to starting and adjusting insulin in type 2 diabetes. This figure focuses mainly on sequential insulin strategies, describing the number of injections and the relative complexity and flexibility of each stage. Basal insulin alone is the most convenient initial regimen, beginning at 10 U or 0.1–0.2 U/kg, depending on the degree of hyperglycemia. It is usually prescribed in conjunction with metformin and possibly one additional noninsulin agent. When basal insulin has been titrated to an acceptable fasting blood glucose but HbA$_{1c}$ remains above target, consider proceeding to "Combination injectable therapy" (see Fig. 2) to cover postprandial glucose excursions. Options include adding a GLP-1 receptor agonist (not shown) or a mealtime insulin, consisting of one to three injections of a rapid-acting insulin analog* (lispro, aspart, or glulisine) administered just before eating. A less studied alternative, transitioning from basal insulin to a twice daily premixed (or biphasic) insulin analog* (70/30 aspart mix, 75/25 or 50/50 lispro mix) could also be considered. Once any insulin regimen is initiated, dose titration is important, with adjustments made in both mealtime and basal insulins based on the prevailing blood glucose levels, with knowledge of the pharmacodynamic profile of each formulation used (pattern control). Noninsulin agents may be continued, although sulfonylureas, DPP-4 inhibitors, and GLP-1 receptor agonists are typically stopped once insulin regimens more complex than basal are utilized. In refractory patients, however, especially in those requiring escalating insulin doses, adjunctive therapy with metformin and a TZD (usually pioglitazone) or SGLT2 inhibitor may be helpful in improving control and reducing the amount of insulin needed. Comprehensive education regarding self-monitoring of blood glucose, diet, and exercise and the avoidance of, and response to, hypoglycemia are critically important in any insulin-treated patient. FBG, fasting blood glucose; GLP-1-RA, GLP-1 receptor agonist; hypo, hypoglycemia; mod., moderate; PPG, postprandial glucose; SMBG, self-monitoring of blood glucose; #, number. *Regular human insulin and human NPH-Regular premixed formulations (70/30) are less costly alternatives to rapid-acting insulin analogs and premixed insulin analogs, but their pharmacodynamic profiles make them suboptimal for the coverage of postprandial glucose excursions. †A less commonly used and more costly alternative to basal–bolus therapy with multiple daily injections in type 2 diabetes is continuous subcutaneous insulin infusion (insulin pump). ‡In addition to the suggestions provided for determining the starting dose of mealtime insulin under "basal–bolus," another method consists of adding up the total current daily insulin dose and then providing one-half of this amount as basal and one-half as mealtime insulin, the latter split evenly between three meals.