Table 3.1 Combination of beta-lactamase inhibitor with a beta-lactam antibiotic.

Inhibitor type	β-Lactamase inhibitor	β-Lactam antibiotic
Beta-lactam	Clavulanic acid	Amoxicillin
		Ticarcillin
	Sulbactam	Ampicillin
	Tazobactam	Piperacillin
		Ceftolozane
Non-beta-lactam	Avibactam	Ceftazidime

- Non-beta-lactam inhibitors. Avibactam is a non-beta-lactam inhibitor. Its structure contains a bridged diazabicyclooctane (DBO) and is a tight-binding, covalent reversible inhibitor for most enzymes. It is used in combination with extended-spectrum cephalosporins (ceftazidime) and is under development for use with ceftaroline and aztreonam. Some other non-beta-lactam inhibitors under development include the DBOs RG6080 and relebactam (MK-7655) in combination with imipenem and the boronic acid RPX7009 in combination with meropenem (Bush and Bradford 2016).

The beta-lactamase inhibitors, which share structural similarity with penicillin, exert their activity by binding to beta-lactamases at their active site, decreasing the quantity of enzyme available for hydrolysis of antimicrobial beta-lactam. This class of beta-lactamase inhibitors is able to inhibit most Ambler class A beta-lactamases (excluding carbapenemases such as KPC) but not those from Ambler class B, C, or D (Drawz and Bonomo 2010; Zasowski et al. 2015). Thus, they confer activity against beta-lactamase-producing organisms, such as methicillin-susceptible staphylococci and some Gram-negative organisms including *H. influenzae*, *Moraxella* spp., and virtually all anaerobes (Drawz and Bonomo 2010).

Two new combinations of cephalosporin plus beta-lactamase inhibitor were approved recently by the Food and Drugs Administration (FDA) (Goodlet et al. 2016) as well as by the EMEA.

Ceftazidime plus avibactam is a combination of third-generation cephalosporin with a new non-beta-lactamase inhibitor. This combination protects ceftazidime from Ambler class A enzymes (including KPC carbapenemases), Ambler class C enzymes (AmpC cephalosporinases), and some class D enzymes (including OXA-type carbapenemases) (Hidalgo et al. 2016). Therefore, through the addition of avibactam, ceftazidime's activity is expanded to many ceftazidime-resistant and carbapenem-resistant *Enterobacteriaceae* and