One of the more revolutionary discoveries in modern medicine within the last century was the serendipitous discovery of penicillin by Alexander Fleming in 1928. Since then, several more antibiotic drug classes have been discovered and synthesized by researchers to specifically target different pathogens by their unique characteristics; +/- gram stain, aerobic, non-aerobic, etc. Unfortunately, the selection of inappropriate antibiotics and poor antibiotic stewardship have led to an increase in antibiotic resistant pathogens. The US Center for Disease Control and Prevention (CDC) report estimates approximately 2 million illnesses and 23,000 deaths annually are directly attributable to antibiotic resistant pathogens. The CDC has cited antibiotic resistant pathogens as a top threat to global health and has testified before US Congress in 2010 with the FDA and USDA that there is a definite association between the use of antibiotics in food animal production and the antibiotic-resistance crisis in humans. The most straightforward transmission mechanism is direct transmission from farm animals to farmers and other animal handlers. Epidemiological studies have found resistant antibacterial patterns in farms and farmworkers but not spread out to the community at large. Environmental contamination has been studied to be another mode of transmission. Environmental sampling from large industrial farms has discovered a prevalence
of resistant pathogens in waste laden soil and ambient air surrounding the farm and community at large. Additionally, spillover from contaminated wastewater has been attributed to resistant pathogen containing soil samples in studies. Lastly, some evidence has been documented of transmission by the consumption of undercooked animal products that contain resistant pathogens. There may be other transmission mechanisms that have not yet been elucidated or discovered, but nonetheless the available evidence of transmission to humans should be of concern to public health.

With the availability of data supporting the impact of antibiotics in agriculture on human health, regulations aimed at decreasing the amount of antibiotics used in agriculture have begun to be developed and implemented. It should be noted that antibiotic use in agriculture is only one piece of the puzzle; antibacterial stewardship efforts for increasing appropriate use in humans should continue to be sought. It is important for health care providers and policy makers to understand these associations to inform discussion, policies and other actions aimed at combating the antibiotic resistance epidemic.
References