RESEARCH ABSTRACT

PUBLIC HEALTH/WORKER SAFETY

Title: Quantitative Risk Assessment of Human MRSA Caused by Antibiotic Use in Swine - **NPB #09-161**

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SCIENTIFIC ABSTRACT

Recent news stories have suggested that routine use of antibiotics on pig farms may threaten human health by selecting for resistant "superbugs," such as methicillin-resistant *Staphylococcus aureus* (MRSA), that contaminate meat and/or farm workers. Conspicuously absent from these stories has been quantification of *how many* excess deaths, treatment failures, or days of illness each year are caused by MRSA arising from use of antibiotics in pig production. In other words, *How big is the risk?* We address this question by using available data to develop a conservative (plausible upper bound) estimate of risks to the public and to pig farm workers from pig-associated (Clonal Complex 398) MRSA deaths and illnesses in the United States. In contrast to the large risk numbers (e.g., 70,000 excess deaths per year) mentioned in some news stories, empirical data show that zero deaths or serious infections have been found to have been caused by pig-associated (CC398) MRSA in the United States. (The large numbers of excess deaths sometimes referred to is for hospital-associated MRSA and nosocomial infections, arising mainly from hospital antibiotic use and inadequate hand washing and infection control.) Since zero recorded cases does not necessarily imply zero risk, we use estimated colonization rates among pig farmers, and infection rates per colonized individual, to calculate how large the true risk might be of serious MRSA infection or deaths due to pig-associated (CC398) MRSA from pig farms. The answer is that less than 1 (and possibly as low as zero) excess infections per year are expected in the entire United States population from CC398 MRSA; moreover, this number is unlikely to increase sharply in future, if present conditions are maintained. Even if the risk to humans from CC398 MRSA eventually proves to be greater than zero, it is unlikely that ceasing use of antibiotics in pig production would affect the risk significantly. Indeed, current knowledge suggests that the main selection pressure favoring MRSA on pig farms may not come from antibiotics at all, but from zinc compounds fed to pigs, especially the recently weaned, to augment or substitute for antibiotics. Thus, although MRSA from pigs poses minimal health risks to humans at present, efforts to reduce the *perceived* risk (which can be much larger than the real risk, thanks in part to social amplification of perceived risk and irresponsible journalism) by banning animal antibiotic use is unlikely to create any detectable human health benefit. Ironically, a shift away from antibiotics and toward zinc products (as on some organic farms) might increase the prevalence of CC398 MRSA.