The tokamak H-mode is defined by a narrow insulating region — the pedestal — at the plasma edge where turbulence is suppressed and sharp pressure gradients develop. The properties of the pedestal largely determine the quality of confinement and are also closely connected to issues of heat exhaust and plasma-material interactions. The pedestal is, therefore, at the center of the most pressing issues facing fusion energy. I will describe recent progress in understanding the dynamics of turbulence and transport in the singularly ITER-relevant JET-ILW pedestal. Gyrokinetic simulations using the GENE code identify the microtearing mode (as opposed to the kinetic ballooning mode proposed by a prominent theory) to be the dominant transport mechanism in the pedestal. The capabilities and insights developed in this study are used to model turbulence in prospective ITER pedestals, revealing the possibility of previously unforeseen challenges. I will discuss possible solutions to these challenges and the consequences of these insights for ITER.