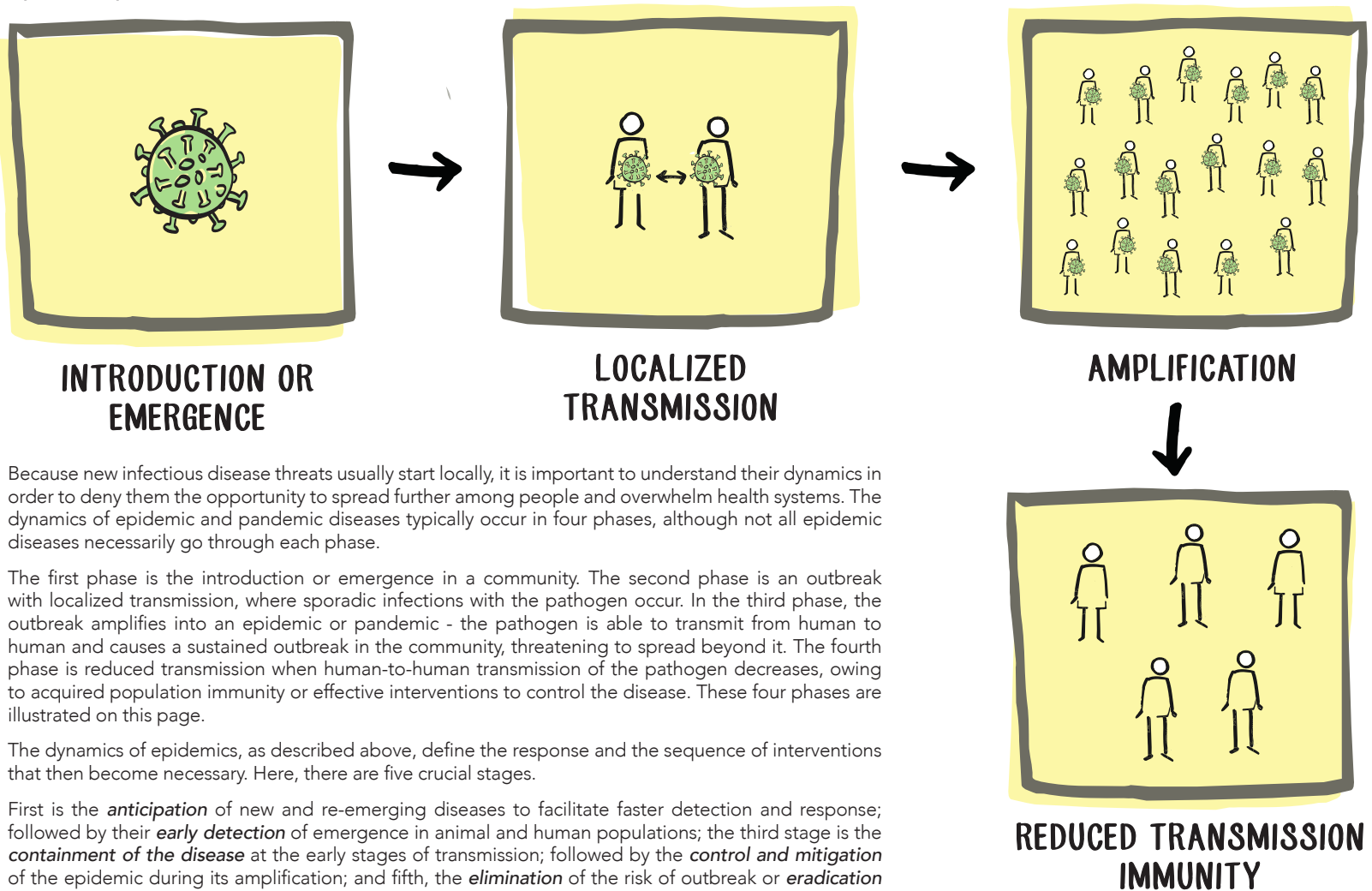


Epidemic phases



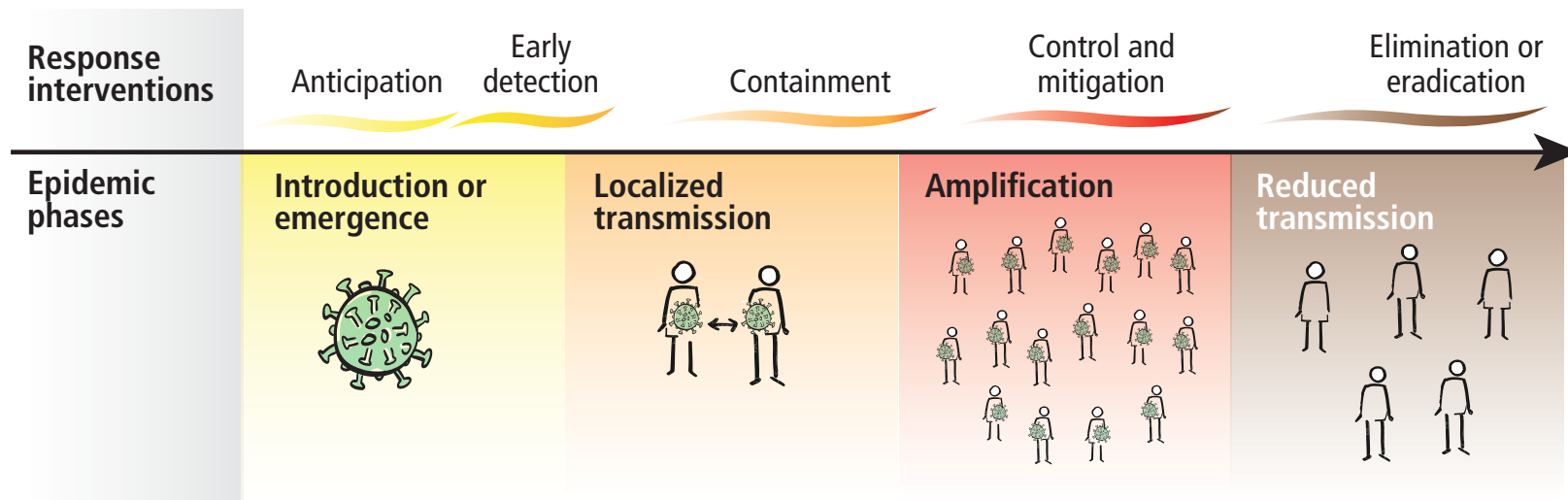
Because new infectious disease threats usually start locally, it is important to understand their dynamics in order to deny them the opportunity to spread further among people and overwhelm health systems. The dynamics of epidemic and pandemic diseases typically occur in four phases, although not all epidemic diseases necessarily go through each phase.

The first phase is the introduction or emergence in a community. The second phase is an outbreak with localized transmission, where sporadic infections with the pathogen occur. In the third phase, the outbreak amplifies into an epidemic or pandemic - the pathogen is able to transmit from human to human and causes a sustained outbreak in the community, threatening to spread beyond it. The fourth phase is reduced transmission when human-to-human transmission of the pathogen decreases, owing to acquired population immunity or effective interventions to control the disease. These four phases are illustrated on this page.

The dynamics of epidemics, as described above, define the response and the sequence of interventions that then become necessary. Here, there are five crucial stages.

First is the **anticipation** of new and re-emerging diseases to facilitate faster detection and response; followed by their **early detection** of emergence in animal and human populations; the third stage is the **containment of the disease** at the early stages of transmission; followed by the **control and mitigation** of the epidemic during its amplification; and fifth, the **elimination** of the risk of outbreak or **eradication** of the infectious disease. These stages are elaborated in the illustration, and in the section that follows.

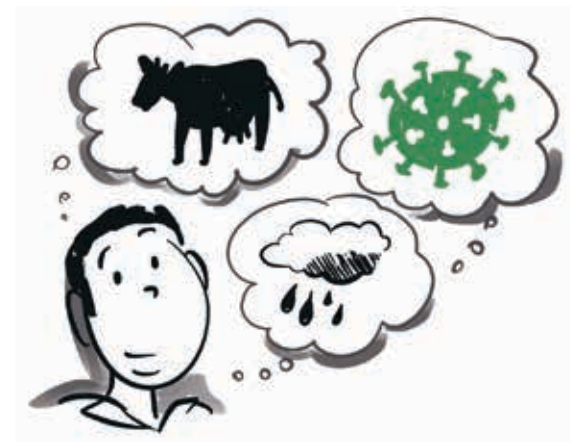
Epidemic phases and response interventions



Anticipation: In this first stage of response, emergence cannot be predicted, but it can certainly be anticipated, and the anticipation of risks enables a focus on the most likely threats. Anticipation encompasses forecasting the most likely diseases to emerge, and the quick identification of the drivers that will worsen the impact or facilitate the spread. Preparedness plans, based on lessons learned from past experiences, should contain a variety of scenarios to allow for a reactive response to the unexpected.

Early detection: Emerging and re-emerging diseases include new ones about which there is little scientific knowledge. These, therefore, often require investigation into their sources at the same time as the use of coordinated, rapid-containment measures. New diseases require new interventions. And because they appear irregularly or rarely, there is a need for constant vigilance, proactive risk assessment and the development of new management tools.

Early detection allows the rapid implementation of containment measures, which are the key to reducing the risk of amplification and potential international spread. Early detection begins at the health care setting, so health care workers must be trained to recognize potential epidemic disease, report quickly an unusual event (such as an unusual cluster of cases or deaths). Their role is also to reduce the risk of community transmission by isolating severely-ill patients; to prevent household transmission by protecting health care givers at home; and to reduce the mortality rate. Health care workers must also know how to protect themselves and employ infection prevention and control measures and how to avoid outbreaks amplified in health care facilities.



Once a new disease is recognized by the health system, early laboratory confirmation is essential. When this cannot be done at country level, the affected countries must be confident they can count on the support of a network of more sophisticated regional or global laboratories. It is critically important for global health security that there is a system for safely taking samples and shipping specimens to relevant laboratories in full compliance with biosafety and biosecurity regulations.

Containment: Effective and rapid containment of emerging diseases is just as vital as early detection in order to avoid a large scale epidemic. Rapid containment should start as soon as the first case is detected regardless of the etiology, which is most likely to be unknown. It requires skilled professionals to safely implement the necessary countermeasures. Pre-training of these professionals is essential to guarantee the safety and efficiency of the operations.

Control and mitigation: Once the infectious disease threat reaches an epidemic or pandemic level, the goal of the response is to mitigate its impact and reduce its incidence, morbidity and mortality as well as disruptions to economic, political, and social systems.

Elimination or eradication: Control of a disease may lead to its elimination, which means that is sufficiently controlled to prevent an epidemic from occurring in a defined geographical area. Elimination means that the disease is no longer considered as a major public health issue. However, intervention measures (surveillance and control) should continue to prevent its re-emergence.

Eradication of a disease – much more difficult and rarely achieved - involves the permanent elimination of its incidence worldwide. There is no longer a need for interventions measures. Three criteria need to be met in order to eradicate a disease: there must be an available intervention to interrupt its transmission; there must be available efficient diagnostic tools to detect cases that could lead to transmission; and humans must be the only reservoir.

