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Introduction to health research

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Dimension of health research

- Theoretical research and applied research
- Preventive and therapeutic research
- Bench based research and bedside research
- Exploratory research and confirmatory research
- Implementation research and translational research

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Fundamental principles to be followed

- Planning stage is very critical – spend enough time and involve the right people in planning
- Team work is critical
- Three levels of review are essential
 - Scientific review: novelty, rationality, justification
 - Ethics review: human subjects protection
 - Regulatory review: foreign funding, sample shipment, intellectual property, exchange of visitors



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Process of health research

- Ensure that data is collected systematically
- Draw meaningful conclusions
- Make appropriate decisions
- Take appropriate actions for prevention and control of diseases, conditions: Evidence based actions
- These should help in reduction of suffering and ultimately improve health and well-being of the community



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Breadth and depth of inquiry in health research

- Human host: healthy, susceptible, with disease, dead
- Surrounding environment and society: climatic factors, housing, vectors, animals, socio-cultural practices, family structure
- Health care infrastructure and delivery

Broad scope of health research

- Getting additional or new information
 - Are more of diphtheria and pertussis reported among adults in recent times?
 - What are the differences in full genome structure of HBV and HEV?
- Verifying and confirming available information
 - Are etiologies of pediatric pneumonia different in the children aged 5 or less in developed and resource limited countries?
 - Have the incidence and complications of diabetes changed with increasing consumption of pre-cooked and packaged food?
- Explaining cause and effect relationship
 - Does presence of a particular co-receptor [cause] on CD4 cells protect against HIV infection [effect]?
 - Are breast cancers [effect] more common in breast implant [cause] recipients?

Broad scope of health research

- Testing new drugs, vaccines, tools or interventions for prevention, treatment and control of a disease
 - Can INH prophylaxis delay onset of tuberculosis in HIV infected persons?
 - Will introduction of smokeless stoves result in reduction of respiratory morbidity and mortality in rural areas?
- Evaluating ongoing programs and assessing feasibility of new programs
 - Is injectable iron sucrose a better alternative to deal with pregnancy related anemia than oral iron?
 - Will the Integrated Disease Surveillance Program be able predicting the epidemics of influenza and bird flu in India?



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Making the right choice of study design

- Qualitative studies or Quantitative studies
- Observational studies or Experimental studies
- Retrospective studies or Prospective studies



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Some critical considerations in planning phase

- There should be adequate justification to conduct the research study
- The research question should have clarity and focus
- Case definitions of study variables and outcomes should be standard and unambiguous
- Sample and sample size:
 - Should be representative of the population [External validity or generalizability]
 - Should be adequate [power to draw meaningful inferences]



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Research can never be free of errors, but errors can be predicted and minimized

- Random error representing wrong result due to chance: unknown sources of variation that can distort findings in either direction
 - Can be minimized by increasing sample size and increasing precision
- Systematic error signifying wrong result due to bias - mostly due to variation that would distort the results in one direction
 - Can be minimized by improving study design



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Challenges in designing and implementation of research studies

In a scenario when we desire to study the relationship between a variable and an outcome

- Confounders: Affect both study variable as well as outcome
 - Effect can be minimized by proper study design and through stratified analysis
- Effect modifiers: Can alter [generally negatively] the relationship between the study variable and outcome by independently affecting outcome
 - Good to be aware of them through adequate literature review and not to include them in the study



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Study methods and measurements: Major issues

- Pilot study
- Study participants: Inclusion and exclusion criteria, recruitment targets and strategies
- Data collection instruments
- Measurements tools and assay
- Plan for statistical analysis
- Quality control and assurance at all levels



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Focus of health research

- How can health of the population be improved?
- Can we predict occurrence of a disease in an individual?
- How can various diseases be prevented?
- How can we effectively cure the diseases and reduce the associated morbidity and mortality?
- What are various societal, community based and programmatic interventions for disease prevention and control?

Health research aims at finding answers or practical solutions at individual and community levels

- At individual level
 - Promote healthy behavior, prevention at individual level, early diagnosis, adequate and appropriate treatment, rehabilitation
- At community level
 - Improve community behavior and practices, prevention and control programs, support to affected people, stigma reduction
- Healthy individuals build healthy nations!



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Thank you
