

Applied Epidemiology: Scenario-Based Study Design Workshop

Review the following study designs before answering the scenarios:

Case Report / Case Series (Chapter 7): Detailed clinical presentations of an individual patient (case report) or an accumulation of patients with similar clinical features/exposures (case series), primarily used for initial clinical observation and hypothesis generation rather than testing causal associations.

Ecologic Study (Chapter 7): An observational study in which the units of analysis are entire populations or groups rather than individuals, comparing aggregate-level exposure rates with aggregate-level disease rates across different populations or time periods.

Cross-Sectional Study (Chapter 7): An observational investigation (often called a "snapshot" study) where exposure and disease status are assessed simultaneously in each individual in a defined population at a single point in time, measuring prevalence.

Case-Control Study (Chapters 8 & 9): An observational study that begins by identifying individuals with the disease/outcome (cases) and a comparable group without the disease (controls), looking backward in time to compare the history of past exposure between the two groups.

Cohort Study (Chapters 8 & 9): An observational study that identifies individuals defined by exposure status (exposed vs. unexposed) who are initially free of the outcome, and follows them over time (either prospectively or retrospectively) to compare the incidence of disease.

Randomized Controlled Trial (Chapter 10): An experimental design in which the investigator directly controls and randomly assigns the exposure or intervention (e.g., treatment vs. placebo/standard care) to study participants to evaluate preventive or therapeutic efficacy.

"Based on the study descriptions above, identify the epidemiological study design utilized in the following scenarios and justify your answer using the unit of analysis and participant selection criteria."

Best wishes,

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Questions

1. Scenario 1:

Investigators want to evaluate whether a new monoclonal antibody reduces the rate of hospital readmission among patients with severe congestive heart failure. They recruit 600 eligible patients admitted to a cardiology unit, randomly allocate 300 to receive standard medical therapy plus the new antibody and 300 to receive standard medical therapy plus an identical placebo infusion, and follow both groups for 12 months to compare readmission rates.

2. Scenario 2:

To investigate the potential association between lifetime exposure to per- and polyfluoroalkyl substances (PFAS) in municipal water and renal cell carcinoma, researchers obtain public health data on the average annual per capita municipal water fluorochemical concentrations and the age-adjusted incidence rates of renal cell carcinoma across 50 administrative states.

3. Scenario 3:

A clinical team encounters five young adults presenting with a previously undocumented constellation of symptoms comprising acute sensorineural hearing loss, progressive peripheral neuropathy, and severe eosinophilia after consuming a novel herbal supplement. The clinicians compile a detailed narrative describing the patients' clinical history, laboratory findings, radiological imaging, and clinical progression.

4. Scenario 4:

Researchers are studying the relationship between sedentary office work and carpal tunnel syndrome. In January 2024, they distribute a single comprehensive health survey and physical assessment to all 1,200 employees of an insurance firm to determine who currently spends greater than 6 hours per day typing and who currently meets the diagnostic criteria for carpal tunnel syndrome.

5. Scenario 5:

To evaluate whether occupational exposure to silica dust increases the long-term risk of developing systemic sclerosis, investigators identify 1,500 quarry workers without systemic sclerosis and 1,500 unexposed postal workers of similar age and sex. Both groups are monitored through annual clinical screenings over a 15-year period to assess and compare the incidence of newly diagnosed systemic sclerosis.

6. Scenario 6:

Epidemiologists investigating an outbreak of an atypical form of non-Hodgkin lymphoma identify 250 individuals newly diagnosed with the condition at regional oncology centers. They concurrently select 500 individuals without the condition from the same geographical source population. Both groups are interviewed to obtain detailed historical information regarding past residential pesticide applications over the previous 20 years.

7. Scenario 7:

Using archival employment records and clinical files from an aluminum manufacturing plant from 1980 to 2020, researchers classify past factory workers into those who were exposed to welding fumes and those who were not. None of the workers had pulmonary fibrosis at the start of employment in 1980. The investigators review all subsequent medical records up to 2020 to calculate and compare the incidence of pulmonary fibrosis between the two historical exposure groups.

8. Scenario 8:

A health department conducts a community-wide survey among 5,000 residents on a single weekend. Participants are assessed for current serum vitamin D levels and simultaneously evaluated for the presence of depressive symptoms using a standardized psychometric scale.

9. Scenario 9:

An international research group gathers national per-capita refined sugar consumption statistics and compares them against country-level pancreatic cancer mortality rates across 38 OECD nations to see if countries with higher sugar consumption exhibit higher mortality.

10. Scenario 10:

A single patient presents to an emergency department with acute fulminant hepatic failure. Diagnostic workup reveals an extremely rare congenital metabolic enzyme deficiency that was unmasked after initiating a standard course of a common over-the-counter analgesic. The attending physician documents the patient's initial presentation, biochemical trajectory, genetic sequencing, and response to therapeutic plasma exchange.

11. Scenario 11:

Investigators recruit 800 patients newly diagnosed with acute ischemic stroke and allocate them using a computer-generated random sequence to receive either a novel neuroprotective compound or an identical saline infusion within 3 hours of symptom onset. The primary outcome is functional independence scored at 90 days.

12. Scenario 12:

To examine the relationship between ambient ultraviolet radiation (UV) and multiple sclerosis, researchers analyze regional satellite UV index data across 12 geographic latitude zones and compare them against regional registry prevalence rates of multiple sclerosis in those zones.

13. Scenario 13:

A pediatrician publishes a detailed narrative of a 4-year-old child who developed profound multisystem inflammatory syndrome after a documented tick-borne coinfection, detailing laboratory markers, cardiac imaging, and clinical management.

14. Scenario 14:

During a national health exhibition, 2,500 adult attendees complete a self-administered questionnaire measuring their average weekly consumption of ultra-processed food and simultaneously undergo a point-of-care blood pressure screening to assess hypertension status.

15. Scenario 15:

Researchers identify 3,000 healthy, non-diabetic nurses who work night shifts and 3,000 age-matched nurses who work exclusively day shifts. Both groups are followed forward prospectively with biannual HbA1c tests over 10 years to determine the rate of incident type 2 diabetes.

16. Scenario 16:

Epidemiologists studying risk factors for idiopathic pulmonary fibrosis identify 180 patients diagnosed with the condition at tertiary respiratory clinics and select 360 hospital controls admitted for non-pulmonary elective surgeries. Both groups are surveyed about their lifetime history of bird keeping and wood-dust exposure.

17. Scenario 17:

A team of dermatologists describes seven unrelated adult patients presenting over a 6-month period with identical severe lichenoid skin eruptions occurring 2 weeks after using a newly formulated topical cosmetic serum.

18. Scenario 18:

Public health analysts compile country-level data from 45 nations on annual per-capita cigarette sales and compare them with national age-standardized mortality rates from coronary heart disease.

19. Scenario 19:

Using a national registry of shipyard workers from 1970, investigators classify workers based on documented occupational asbestos exposure levels recorded between 1970 and 1985. They track all individuals through comprehensive medical databases up to 2015 to evaluate and compare the incidence of malignant pleural mesothelioma.

20. Scenario 20:

In an outpatient dental network, a single-day survey is administered to 1,000 consecutive patients to record both their current daily frequency of electronic cigarette use and the presence of diagnosed periodontal disease.

21. Scenario 21:

Investigators recruit 1,200 overweight prediabetic adults and use a central randomization scheme to assign half to an intensive lifestyle modification program and half to standard general health educational brochures. Fasting blood glucose conversion to diabetes is evaluated after 3 years of follow-up.

22. Scenario 22:

A toxicologist evaluates the association between air quality and childhood asthma exacerbations by plotting county-level mean particulate matter ($PM_{2.5}$) levels against the rate of emergency department visits for pediatric asthma across all 67 counties of a state.

23. Scenario 23:

Clinicians encounter an infant who presents with an unusual congenital facial dysmorphism and microphthalmia following high-dose maternal consumption of an off-label anti-nausea remedy during the first trimester, publishing a comprehensive case workup.

24. Scenario 24:

To examine risk factors for acute acoustic neuroma, investigators select 150 patients with confirmed acoustic neuroma and 300 control subjects without intracranial tumors matched by age and residential area. Detailed historical interviews are conducted to evaluate cell phone usage patterns over the prior 15 years.

25. Scenario 25:

A cohort of 5,000 disease-free men and women aged 50–70 are categorized at baseline according to their baseline circulating levels of high-sensitivity C-reactive protein (hs-CRP) and are monitored longitudinally for 12 years to record new incident cases of myocardial infarction.

26. Scenario 26:

A nationwide telephone survey asks 10,000 randomly dialed adults whether they currently suffer from chronic insomnia and whether they currently consume more than three caffeinated beverages per day.

27. Scenario 27:

An intensive care unit team documents the clinical course, ventilator settings, inflammatory markers, and lung biopsy findings of 12 young individuals admitted with acute severe respiratory distress syndrome following vaping with counterfeit cannabinoid oils.

28. Scenario 28:

Researchers compare the average annual household income by zip code with the hospital admission rates for congestive heart failure across 120 zip code zones in a major metropolitan region.

29. Scenario 29:

In a multi-center trial, 400 patients with treatment-resistant depression are randomly assigned to receive either an active transcranial magnetic stimulation (TMS) protocol or a sham procedure with identical acoustics. Depressive symptom scores are tracked weekly for 8 weeks.

30. Scenario 30:

To evaluate the potential cause of a rare pediatric bone cancer, investigators identify 80 diagnosed children from pediatric oncology hospitals and 160 healthy children from neighboring communities, interviewing parents about prior diagnostic radiological exposures in utero and during early infancy.

31. Scenario 31:

Researchers extract archived military deployment records from 1991 to categorize service members into those deployed to forward operational bases with open-air burn pits and those deployed to bases without burn pits. The cohort is followed through VA hospital electronic health records over the subsequent 25 years to determine the incidence of constrictive bronchiolitis.

32. Scenario 32:

During a routine occupational health screening across four automobile manufacturing plants, all 3,500 active assembly line workers undergo spirometry testing on the day of screening and complete a questionnaire detailing their current smoking status and workplace station.

33. Scenario 33:

A report describes a 52-year-old male who developed fatal lactic acidosis and acute renal shutdown following accidental ingestion of a specific botanical tea adulterated with aristolochic acid, complete with toxicological analysis.

34. Scenario 34:

Investigators compare municipal-level statistics on per-capita bicycle lane density (kilometers of lane per 10,000 residents) with municipal rates of obesity and cardiovascular mortality across 60 global cities.

35. Scenario 35:

Researchers assign 500 patients with chronic plaque psoriasis randomly to receive either an active biologic injection or a matched placebo vehicle every 4 weeks for 24 weeks, evaluating plaque clearance using the Psoriasis Area and Severity Index (PASI).

36. Scenario 36:

To investigate risk factors for amyotrophic lateral sclerosis (ALS), researchers assemble 400 patients diagnosed with ALS and 800 community-matched controls, evaluating their lifetime history of professional contact sports and head trauma via structured retrospective interviews.

37. Scenario 37:

A prospective study enrolls 10,000 disease-free pregnant women at 10 weeks of gestation, measures their serum perfluoroalkyl substance (PFAS) levels, and follows them through delivery to track the occurrence of preeclampsia.

38. Scenario 38:

A hospital infection preventionist reviews records of 8 distinct surgical patients who developed postoperative surgical site infections with a multi-drug resistant strain of *Burkholderia cepacia*, characterizing the specific surgical instruments, operating theater dates, and clinical courses.

39. Scenario 39:

At an annual university orientation, 4,000 incoming undergraduate students complete an electronic questionnaire assessing their current sleep duration and their current score on a validated Generalized Anxiety Disorder (GAD-7) inventory.

40. Scenario 40:

Epidemiologists examine the correlation between average annual state-level sales of sugar-sweetened beverages (in gallons per capita) and state-level childhood obesity prevalence obtained from school fitness testing records.

41. Scenario 41:

Investigators recruit 1,000 patients with moderate osteoarthritis and randomly assign them to receive a daily formulation of chondroitin sulfate or an identical starch capsule placebo. Joint pain scores and radiological joint space narrowing are assessed over a 2-year duration.

42. Scenario 42:

Using electronic medical archives from a health insurance network covering 1995 to 2015, researchers identify all women prescribed third-generation oral contraceptives and a matched cohort of women prescribed second-generation oral contraceptives between 1995 and 2000 (all free of thromboembolic history at entry) and compare the incidence of venous thromboembolism occurring between 1995 and 2015.

43. Scenario 43:

To determine risk factors for acute angle-closure glaucoma, 120 patients presenting with an acute attack are compared with 240 controls attending an eye clinic for routine refractive error correction, focusing on past medication history involving systemic anticholinergics.

44. Scenario 44:

A report details the clinical, histological, and immunophenotypic presentation of a single adult who developed an exceptionally rare hepatosplenic T-cell lymphoma after prolonged immunosuppressive therapy for Crohn's disease.

45. Scenario 45:

A community health clinic administers a one-time questionnaire and point-of-care rapid lipid panel to 800 attending adults to calculate the proportion of subjects with dyslipidemia and their current dietary fat intake patterns.

46. Scenario 46:

Researchers compare national vaccination coverage rates for influenza with national winter mortality rates due to viral pneumonia across 25 European countries over five consecutive flu seasons.

47. Scenario 47:

A group of 8,000 adults with confirmed normotension are classified into three baseline physical activity categories (sedentary, moderate, active) via wearable fitness trackers and monitored over 8 years to observe the onset of newly developed essential hypertension.

48. Scenario 48:

Investigators recruit 350 patients with newly diagnosed bladder carcinoma and 700 controls without cancer admitted to the same urology service for benign conditions. Both groups provide historical exposure data regarding occupational solvent exposure and hair dye use over their working lifetimes.

49. Scenario 49:

A clinical paper documents the cases of six infants presenting to a regional hospital within 48 hours of each other with acute severe methemoglobinemia, describing their blood chemistry, clinical management with methylene blue, and exposure to private well water containing high nitrate levels.

50. Scenario 50:

A clinical trial allocates 1,600 patients with early Alzheimer's disease using block randomization to receive an amyloid-targeting monoclonal antibody infusion or a matching placebo infusion every two weeks. Cognitive decline is evaluated over an 18-month follow-up window.

51. Scenario 51:

Investigators recruit 1,400 patients presenting with acute myocardial infarction across 10 centers and use a computer-generated schedule to assign them to receive either an intravenous PCSK9 inhibitor or standard statin monotherapy within 12 hours of admission. Major adverse cardiac events are evaluated at 1 year.

52. Scenario 52:

To evaluate whether regional water hardness influences cardiovascular health, researchers obtain mean municipal tap water calcium/magnesium concentrations and age-standardized ischemic heart disease mortality rates across 150 administrative districts.

53. Scenario 53:

An intensive care team publishes a clinical report describing an individual who developed refractory warm autoimmune hemolytic anemia and acute renal failure following an accidental envenomation by a rare desert scorpion species, outlining the laboratory workup and plasmapheresis response.

54. Scenario 54:

During a routine health audit at a technology campus, 1,800 software engineers complete a single survey assessing both their average daily hours of blue-light screen exposure and current symptoms of dry eye disease based on the Ocular Surface Disease Index.

55. Scenario 55:

A research team identifies 4,500 factory workers with documented heavy occupational exposure to trichloroethylene and 4,500 unexposed administrative workers from the same industrial sector, all verified to be free of kidney pathology at baseline. Both groups are followed prospectively with annual renal ultrasound and urinalysis over 20 years to compare the incidence of renal cell carcinoma.

56. Scenario 56:

To identify risk factors for early-onset gastric adenocarcinoma, 220 patients aged under 45 years with confirmed gastric cancer are selected from oncology clinics alongside 440 age- and sex-matched hospital controls admitted for non-malignant orthopedic procedures. Participants are questioned about their dietary habits and preserved meat intake during childhood and adolescence.

57. Scenario 57:

A clinical team describes nine pediatric patients admitted to a regional medical center over three months presenting with acute cerebellitis and opsoclonus-myoclonus syndrome following a confirmed cluster of enterovirus A71 infections.

58. Scenario 58:

Public health researchers compare annual provincial per-capita alcohol consumption (liters of pure alcohol per person) with provincial-level cirrhosis mortality rates across 10 Canadian provinces.

59. Scenario 59:

Using archival radiation dose badges and health physics records from a nuclear facility operating between 1960 and 1990, researchers categorize former workers by cumulative occupational ionizing radiation exposure at entry (when all were leukemia-free) and follow their electronic mortality registries through 2020 to compare leukemia incidence.

60. Scenario 60:

A community survey of 2,000 residents in an agricultural valley collects blood samples on a single day to measure circulating organophosphate metabolite concentrations while simultaneously evaluating participants for peripheral neuropathy using a standardized neurological scoring tool.

61. Scenario 61:

Researchers enroll 600 individuals with chronic non-specific low back pain and randomly allocate them to either a 12-week supervised Pilates rehabilitation regimen or a self-guided educational stretching pamphlet. Functional disability scores are compared at the end of the intervention period.

62. Scenario 62:

An investigator evaluates whether community greenspace reduces metabolic disorders by correlating satellite-derived Normalized Difference Vegetation Index (NDVI) values with municipal-level prevalence rates of type 2 diabetes across 85 metropolitan statistical areas.

63. Scenario 63:

A hematologist documents the clinical trajectory of a 68-year-old patient who developed acquired factor VIII inhibitor deficiency (acquired hemophilia A) 10 days after receiving a newly formulated synthetic mRNA booster, detailing clotting factor assays and immunosuppressive response.

64. Scenario 64:

To evaluate whether proton pump inhibitor (PPI) therapy is associated with acute interstitial nephritis, 150 biopsy-proven cases are identified from a nephrology registry and compared with 300 control patients without nephritis admitted to the same inpatient service, looking back at outpatient pharmacy dispense records over the preceding 6 months.

65. Scenario 65:

A cohort of 12,000 healthy middle-aged adults free of cardiovascular disease undergo baseline coronary artery calcium (CAC) scoring and are followed prospectively for 15 years to track the occurrence of new sudden cardiac arrest events.

66. Scenario 66:

During a one-day medical congress, 900 attending physicians complete an anonymous questionnaire regarding their current weekly exercise frequency and whether they currently have a formal diagnosis of hypertension.

67. Scenario 67:

Infectious disease specialists compile the clinical, laboratory, and contact-tracing data of six laboratory technicians who contracted brucellosis simultaneously following an accidental containment leak in a microbiology research facility.

68. Scenario 68:

An international study plots national annual per-capita dairy fat consumption against national female breast cancer incidence rates across 30 European countries.

69. Scenario 69:

In a multi-center trial, 950 patients with diabetic macular edema are randomly allocated to receive monthly intravitreal injections of an anti-VEGF agent or sham laser treatment, with visual acuity measured at 52 weeks.

70. Scenario 70:

To investigate the etiology of Guillain-Barré syndrome (GBS), researchers select 110 diagnosed patients admitted to regional neurology services and 220 matched controls admitted for acute appendicitis or elective cholecystectomy, assessing prior symptomatic gastrointestinal illnesses and stool cultures for *Campylobacter jejuni* in the preceding 8 weeks.

71. Scenario 71:

Using a historic military database from 2003, researchers identify 8,000 service members who sustained mild traumatic brain injury (TBI) during combat deployments and a comparison cohort of 8,000 deployed troops with no documented TBI (all free of neurodegenerative diagnoses in 2003). Both groups are monitored via Veterans Affairs electronic records through 2023 to assess the incidence of early-onset dementia.

72. Scenario 72:

A random telephone poll of 5,000 adults across three metropolitan areas records current self-reported average daily soda consumption and current body mass index (BMI) category.

73. Scenario 73:

An oncologist details the case of a 34-year-old marathon runner who presented with a unique primary cardiac angiosarcoma presenting as recurrent exertional syncope, documenting pathology, multimodality imaging, and surgical resection findings.

74. Scenario 74:

Researchers examine whether ambient air pollution increases chronic kidney disease (CKD) risk by correlating annual county-average nitrogen dioxide (NO₂) concentrations with county-level incidence rates of end-stage renal disease across 100 counties.

75. Scenario 75:

Investigators randomly allocate 500 children with treatment-resistant focal epilepsy to receive either an add-on daily purified cannabidiol oral solution or a matched placebo syrup for 14 weeks, comparing the median percentage reduction in monthly seizure frequency.

76. Scenario 76:

To explore whether maternal valproate use during early pregnancy increases the risk of spina bifida, researchers identify 95 infants born with spina bifida at tertiary maternity centers and 190 infants born without congenital anomalies at the same facilities, reviewing maternal first-trimester antiepileptic drug records.

77. Scenario 77:

A prospective cohort study enrolls 20,000 healthy men and women aged 40–65, assesses their baseline plasma total antioxidant capacity via high-throughput assays, and follows them forward over 12 years to record incident strokes.

78. Scenario 78:

A clinical report outlines the presentations of 11 construction workers who presented over a 4-week span with acute chemical pneumonitis and fever after using an unventilated floor sealant containing aliphatic isocyanates.

79. Scenario 79:

A health department conducts a door-to-door assessment of 1,500 urban apartments on a single Saturday, evaluating the presence of indoor mold growth and the concurrent presence of physician-diagnosed childhood asthma in each household.

80. Scenario 80:

Public health researchers analyze country-level data to correlate national per-capita health care expenditures (USD per citizen) with national infant mortality rates across 54 member states of a global health agency.

81. Scenario 81:

Investigators recruit 300 patients undergoing elective coronary artery bypass grafting and use sealed opaque envelopes to randomize them to receive either perioperative tight glycemic control via automated insulin infusion or standard intermittent insulin therapy. Postoperative deep sternal wound infection rates are compared at 30 days.

82. Scenario 82:

Using a 1985 registry of coal miners, researchers classify 3,200 miners according to their cumulative underground dust exposure levels between 1985 and 1995 (all confirmed to have normal baseline chest radiography in 1985). Their medical files and surveillance radiographs are reviewed through 2015 to calculate the incidence of progressive massive fibrosis.

83. Scenario 83:

To determine if past exposure to dental amalgam restorations is associated with Parkinson's disease, 300 patients with Parkinson's disease are compared with 600 controls without neurodegenerative illness, reviewing comprehensive historical dental charting records from the preceding 25 years.

84. Scenario 84:

A single case description highlights an 81-year-old individual who developed complete visual recovery following spontaneous resolution of central retinal artery occlusion, detailing fluorescein angiography, optical coherence tomography, and serial visual field tests.

85. Scenario 85:

A cross-sectional survey evaluates 2,200 university staff members on a single administration day to establish the proportion of employees with burnout using the Maslach Burnout Inventory and their self-reported average overtime hours per week.

86. Scenario 86:

Researchers compare state-level rates of mandatory motorcycle helmet laws (binary: law vs. no law) with state-level traumatic brain injury mortality rates per 100,000 motorcyclists across all 50 US states.

87. Scenario 87:

In a blinded trial, 750 patients with mild-to-moderate atopic dermatitis are randomly assigned to receive either a twice-daily novel topical Janus kinase (JAK) inhibitor cream or an identical inert vehicle base for 8 weeks, evaluating the Investigator's Global Assessment treatment success rate.

88. Scenario 88:

Epidemiologists follow 6,000 non-smoking, disease-free adults whose urinary cotinine levels are measured at baseline to categorize secondhand smoke exposure, following them forward for 10 years to determine the incidence of chronic obstructive pulmonary disease (COPD).

89. Scenario 89:

A report characterizes the clinical findings, laboratory serologies, liver histology, and survival outcomes of 14 organ transplant recipients who developed acute hepatitis E virus transmission traced back to a single shared contaminated blood plasma donor pool.

90. Scenario 90:

To identify risk factors for clear-cell adenocarcinoma of the vagina, 40 young women with the condition are compared with 160 matched control females without cancer, assessing maternal history of diethylstilbestrol (DES) ingestion during pregnancy via obstetrical record reviews.

91. Scenario 91:

A regional health survey evaluates 1,100 school teachers on a single professional development day to determine the prevalence of chronic voice disorders and simultaneous classroom acoustic noise level categories.

92. Scenario 92:

Investigators plot regional per-capita sales of over-the-counter NSAIDs against regional incidence rates of upper gastrointestinal bleeding across 24 administrative health authorities.

93. Scenario 93:

Investigators enroll 1,100 patients with heart failure with preserved ejection fraction and randomly allocate them to receive either a sodium-glucose cotransporter 2 (SGLT2) inhibitor or a matching placebo once daily. The primary outcome is a composite of cardiovascular death or hospitalization for heart failure evaluated over 2.5 years.

94. Scenario 94:

Using occupational records from 1975, researchers identify 2,000 workers employed in rubber manufacturing plants with high aromatic amine exposure and 2,000 unexposed textile workers (all free of urinary tract tumors in 1975). Mortality and cancer registry files are reviewed through 2010 to measure the incidence of transitional cell carcinoma of the bladder.

95. Scenario 95:

To evaluate whether previous severe Epstein-Barr virus (EBV) mononucleosis increases the risk of multiple sclerosis, researchers identify 500 patients diagnosed with multiple sclerosis and 1,000 age-matched general population controls, examining historical adolescent serological records and medical charts.

96. Scenario 96:

A clinical presentation details a single patient with systemic lupus erythematosus who developed fulminant macrophage activation syndrome following initiation of a checkpoint inhibitor for metastatic melanoma, including bone marrow findings and cytokine profiles.

97. Scenario 97:

A single-day assessment across 15 nursing homes evaluates 1,400 residents to measure the proportion receiving polypharmacy (≥ 5 concurrent medications) and the simultaneous presence of cognitive impairment on the Mini-Mental State Examination (MMSE).

98. Scenario 98:

Researchers analyze the correlation between state-level per-capita fast-food restaurant outlet density and state-level prevalence rates of non-alcoholic fatty liver disease (NAFLD) derived from national survey databases.

99. Scenario 99:

A clinical paper summarizes 10 consecutive cases of adult patients presenting to an emergency service with methemoglobinemia and severe cyanosis within 3 hours of dining at a local bistro, detailing toxicology confirmation of sodium nitrite contamination in the table salt.

100. Scenario 100:

A prospective study enrolls 15,000 healthy individuals aged 50–75 with normal cognitive baseline testing, documents their baseline adherence score to a Mediterranean-DASH Intervention for Neurodegenerative Delay (MIND) diet, and follows them longitudinally for 10 years to assess incident Alzheimer's disease diagnosis.