The missing link: Leveraging companion animal and human electronic health record linkage to explore sex differences in household metabolic syndrome co-occurrence

Kathleen R. Mullen, Tracy L. Webb, Susan VandeWoude, G. Joseph Strecker, Adam Kiehl, Julie A. McMurry, Ian M. Brooks, Judith G. Regensteiner, Melissa Haendel

COLLEGE OF VETERINARY MEDICINE AND BIOMEDICAL SCIENCES
COLORADO STATE UNIVERSITY
University of Colorado Anschutz Medical Campus

Building Interdisciplinary Research Careers in Women's Health

BACKGROUND

1. Opportunities for understanding health factors and outcomes across species remain untapped.
2. We are creating a pet-patient registry for geographically-adjacent human (UCHealth) and veterinary (Colorado State University Veterinary Teaching Hospital) medical institutions.

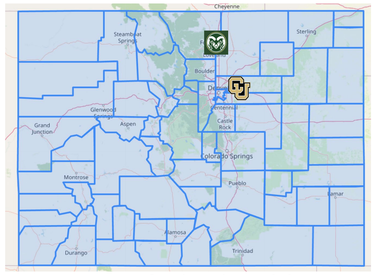
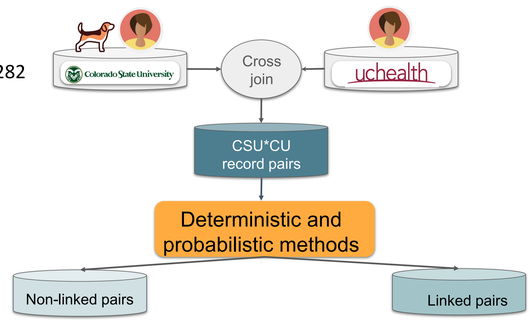


Figure 1: Map of Colorado with locations of CSU-VTH and UCHealth (CU).

3. We query the veterinary electronic health record (vEHR) database to assess the prevalence of terms related to metabolic syndrome (MetS-like) in companion animals (dogs, cats, and horses).

METHODS AND RESULTS

Time span: 2019-2024
Number of owners: 41,081
Number of animal patients: 76,282
Dogs: 55.5%
Cats: 13.0%
Horses: 15.3%
Other: 16.2%
Female animals: 47.9%



Time span: 2015-2024
Number of patients: 3,282,860
Female patients: 53.4%

Total matches = 12,115

Figure 2. Secure data linkage from geographically adjacent human and veterinary medical academic institutions. The total number of household matches (linked pairs of households with a UCHealth patient who took their animal to the CSU-VTH) is 12,115. Approximately 29% of pet owners or a member of their household are UCHealth patients.

Table 1. Discovery rate (%) and number (N) of vEHRs with phenotypic features and disease sequelae associated with MetS-like.

Key term	Discovery rate (%)	Animal patient records (N)
Elevated BCS	19.18	33,282
Overweight	3.94	6,830
Diabetes	2.14	3,710
Obesity	1.26	2,186
Over-conditioned	1.21	2,095
Diabetic	0.80	1,387
Obese	0.56	964
Cresty	0.38	657
DKA	0.30	520
Insulin resistance	0.24	415
Metabolic syndrome	0.19	325
Equine metabolic syndrome	0.17	293
EMS	0.07	114
Cresty neck	0.04	75
Regional adiposity	0.04	73

BCS, body condition score; EMS, equine metabolic syndrome; DKA, diabetic ketoacidosis.

Table 2. Sex differences in MetS-like key indicators in the CSU-VTH canine, feline and equine patients.

	Canine	Feline	Equine
Male castrate			
N with indicator(s)	6,212	1,725	553
N without indicator(s)	12,706	2,823	4,378
Prevalence (%)	**32.8**	**37.9**	**11.2**
Male intact			
N with indicator(s)	720	34	18
N without indicator(s)	3,037	245	535
Prevalence (%)	**19.2**	**12.2**	**3.3**
Female spayed			
N with indicator(s)	6,152	1,237	13
N without indicator(s)	12,499	2,540	82
Prevalence (%)	**33.0**	**32.8**	**13.6**
Female intact			
N with indicator(s)	565	32	436
N without indicator(s)	2,725	231	3,555
Prevalence (%)	**17.2**	**12.2**	**10.9**
p-value:	< 0.00001	< 0.00001	< 0.00001

MetS-like key terms were identified in the vEHR of 13,649 canine, 3,028 feline and 1,020 equine patients.

HIGHLIGHTS

1. EHR record linkage identified **12,115** household matches, indicating **29%** of CSU-VTH clients or a member of their household were UCHealth patients.
2. Key terms related to **metabolic syndrome** are present in the vEHR of canine, feline and equine patients.
3. There are significant **sex differences** in frequency of MetS-like key terms in companion animals.

CONCLUSION

1. The **Pet-patient registry** has the potential to provide insights into whole household health.
2. The **underlying pathophysiology** of sex differences in MetS and MetS-like may be revealed by cross-species study.

We greatly acknowledge the contributions of Toan Ong, PhD, Department of Pediatrics, University of Colorado Anschutz Medical Campus. This research is supported by the National Institute Of Arthritis And Musculoskeletal And Skin Diseases of the National Institutes of Health under Award Number K12AR084226.