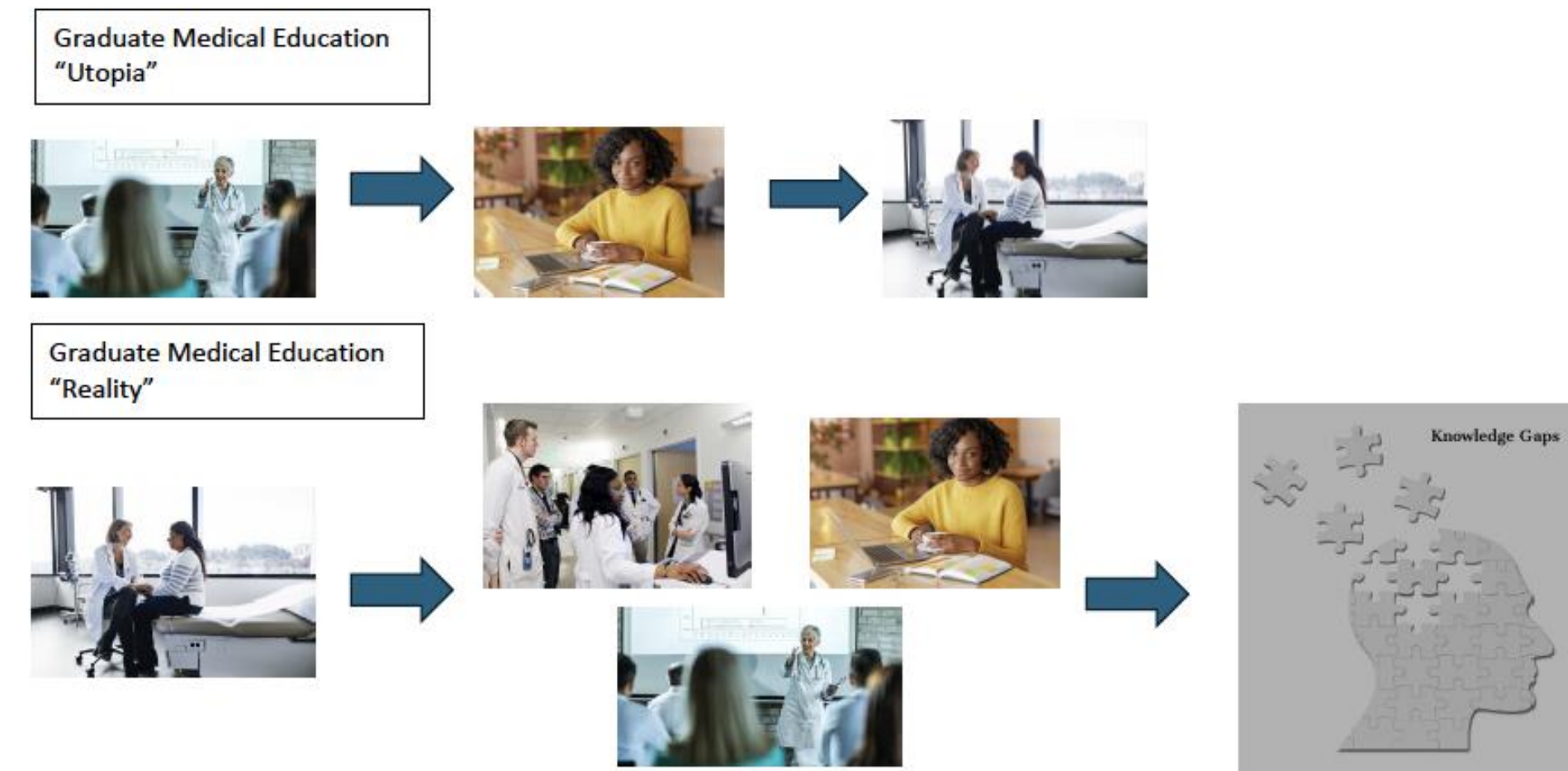


Introduction

Medical knowledge is an ACGME core competency that should be mastered by the end of post-graduate training. Balancing the role of student and provider presents challenges to the learning progression proposed by Bloom's Taxonomy, with the learner potentially applying knowledge during patient encounters without thorough understanding of knowledge applied, creating a false impression of knowledge mastery, when knowledge gaps truly exist. Building a strong foundational knowledge base in our trainees is essential. Despite exponential growth in medical knowledge, graduate medical education (GME) curricula continues to rely on traditional lectures, inconsistent patient care experiences, and learner-driven self-study to achieve knowledge competencies. Microlearning and spaced repetition may benefit the busy learner. Understanding our trainees' learning preferences will help us develop and implement desired, effective teaching tools, potentially reducing knowledge gaps.



	Clinical Teaching	Teaching Conferences	Independent Self-Study
Learner-specific	Varied exposure to patients at varied moments in management	Inconsistent attendance due to service responsibilities	Lack of time due to service responsibilities
	Excessive service responsibilities	Limited attention due to service-related distractions	Ineffective or lack of formal study schedule
	Varied learning preferences	Cognitive overload	Lack of knowledge about best study resources
	Inadequate supplemental reading	Inadequate supplemental reading	
Faculty-specific	Knowledge retention	Knowledge retention	Knowledge retention
	Lack of expertise	Excessive teaching material	
	Lack of time for teaching due to patient load/non-patient care obligations	Lack of learner engagement/passive learning	
	Lack of preparation time for teaching	Teaching material not at the level of the learners	
	Inadequate teaching tools to assist with clinical teaching		
Program/Institution-specific	Inappropriate patient volume per learner (excessive or low)	Insufficient time for teaching conferences	Lack of involvement with self-study plans and resources
	Inadequate support for non-medical management	Inadequate procedures to protect time for learning	Inadequate learning resources to promote knowledge retention
	Inadequate staffing	Teaching conference format limited to traditional didactic lectures	
		Missing topics in educational curriculum	

Objectives and Methods

Objectives: Our aim is to gain insight from residents and fellows about 1) preferred teaching/learning strategies in the clinical environment, teaching conferences, and independent study; 2) prior experience and preference for microlearning and spaced repetition in learning curriculum; and 3) learning barriers.

Methods: A RedCap survey was launched to internal medicine residents at Baylor College of Medicine (BCM) and St. Vincent's Hospital and BCM hematology/oncology fellows.

Results/Discussion

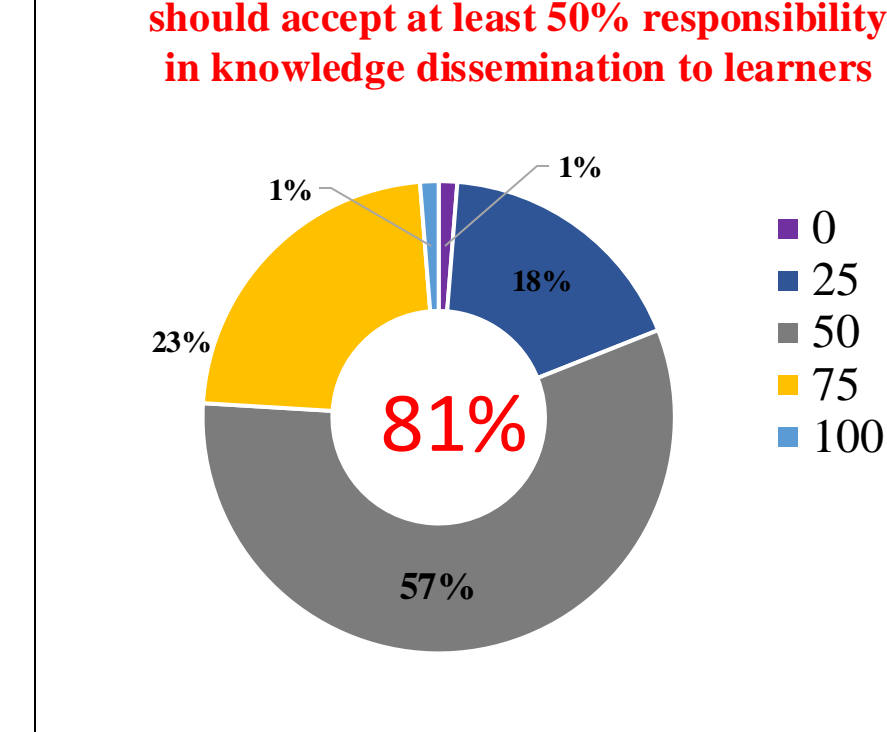
General Perception about Learning in GME Programs

Table 2. Baseline Characteristics of Respondents

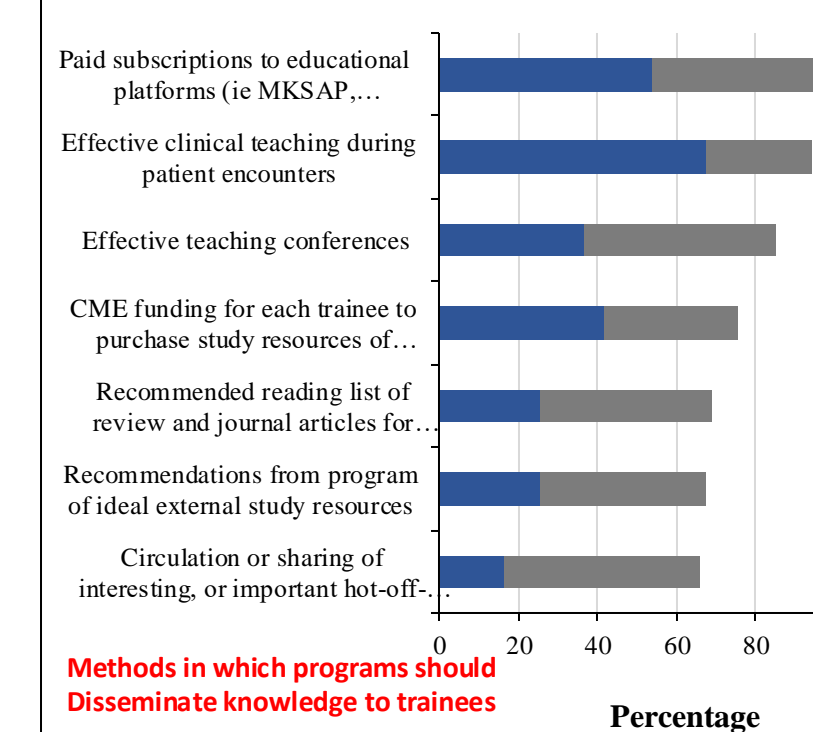
Specialty/Subspecialty	N= 84
IM Residency	47 (55%)
Hematology/Oncology Fellowship	38 (45%)
PGY Classification	
PGY1	9 (11%)
PGY2	25 (29%)
PGY3	11 (13%)
PGY4	20 (23%)
PGY5	10 (12%)
PGY6	10 (12%)

*61% Response Rate

81% feel that the training program should accept at least 50% responsibility in knowledge dissemination to learners

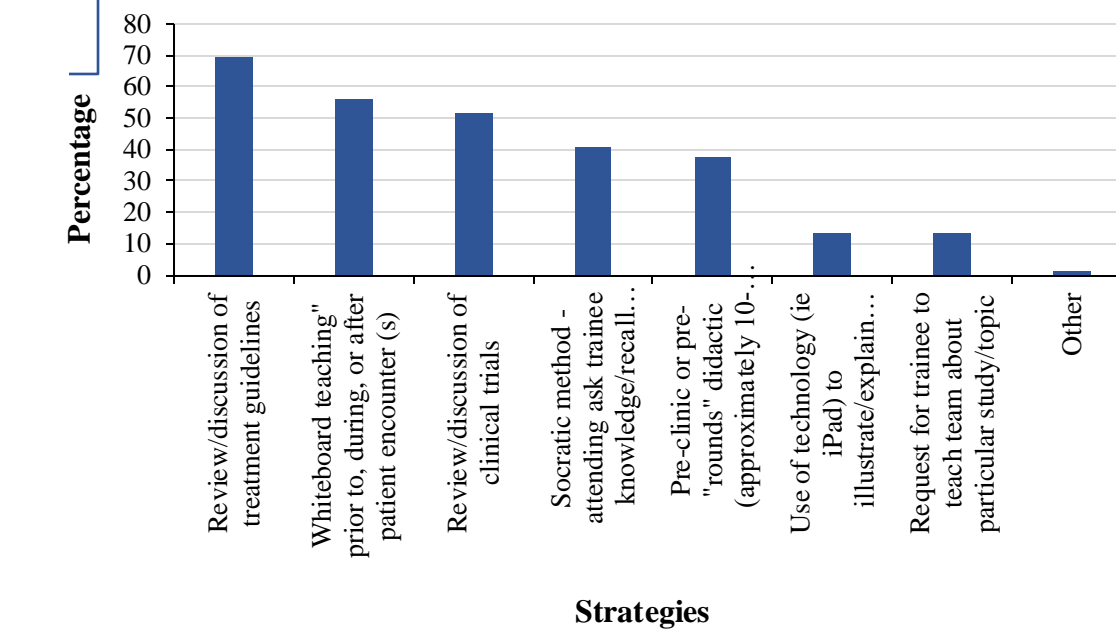


Most important / Moderately important

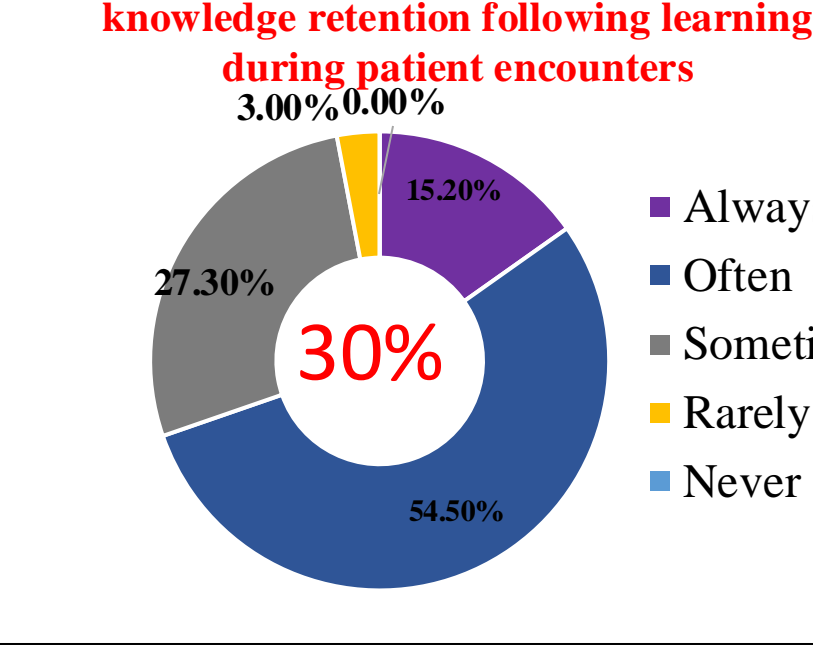


Clinical Teaching

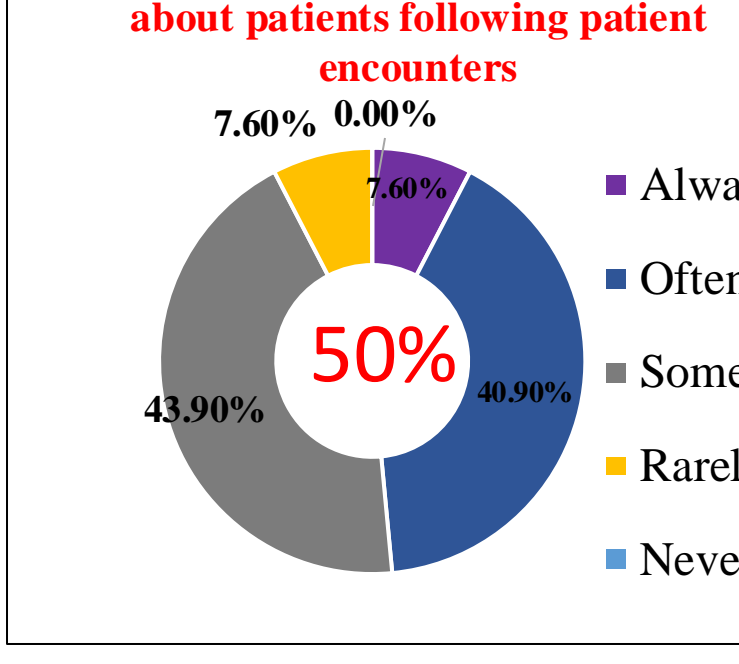
Preferred teaching strategies in clinical environment



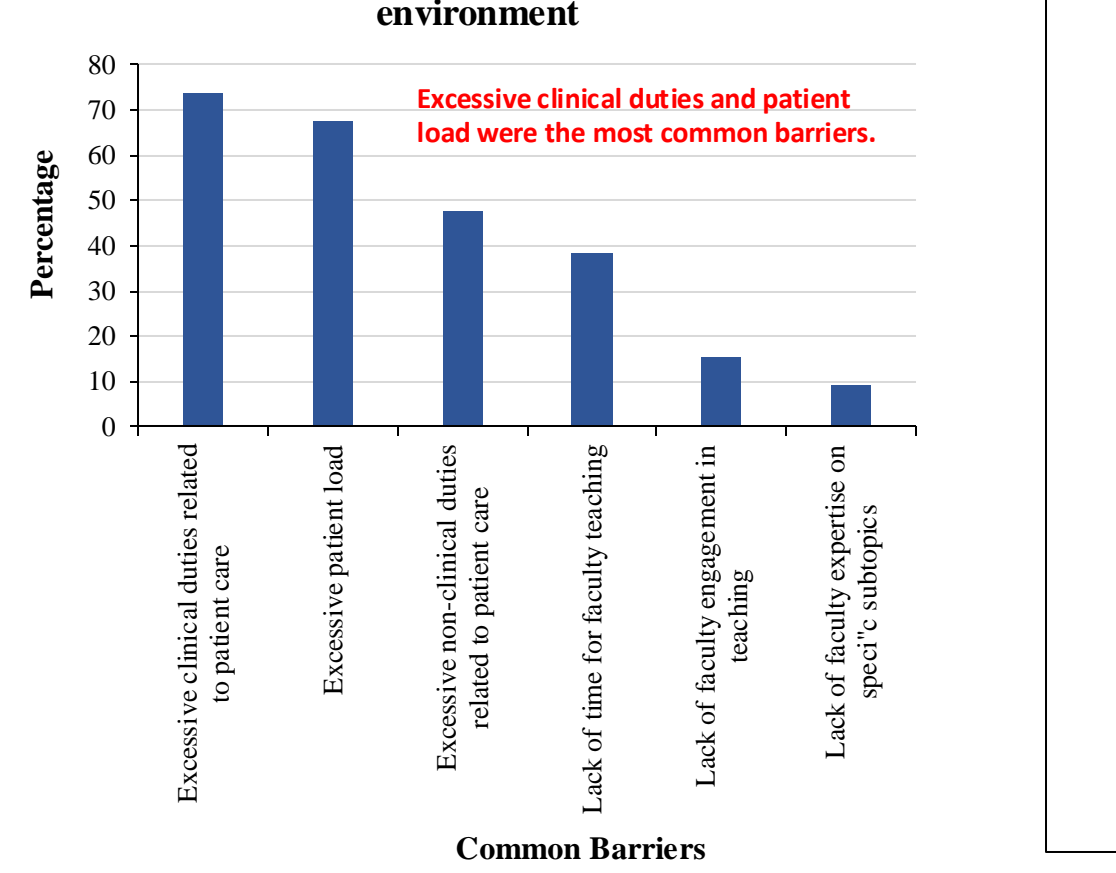
~30% are not confident about knowledge retention following learning during patient encounters



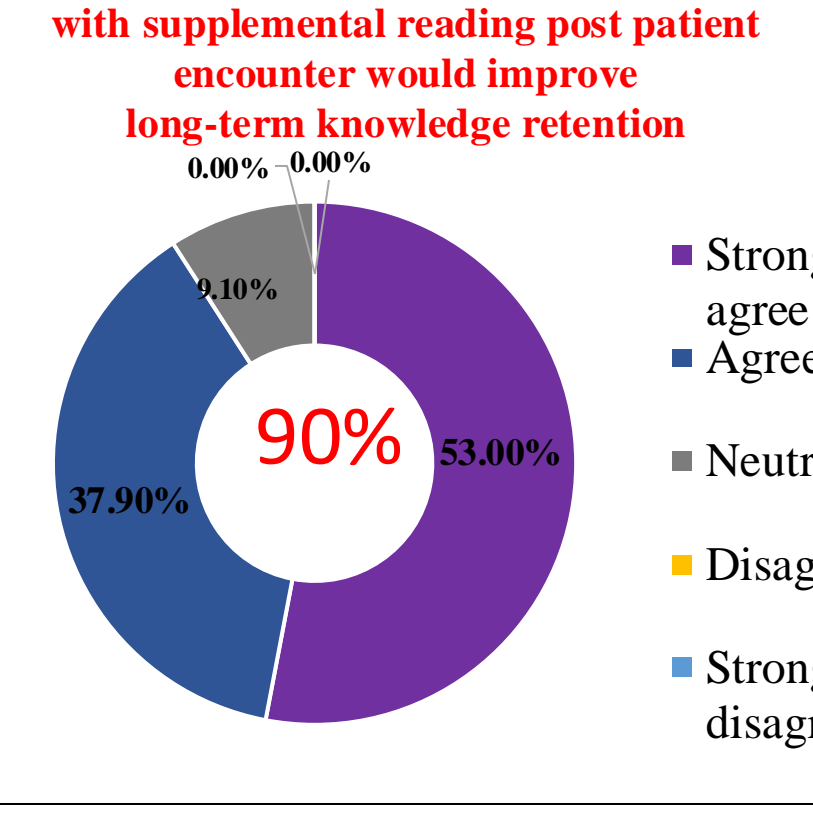
~50% are not frequently reading about patients following patient encounters



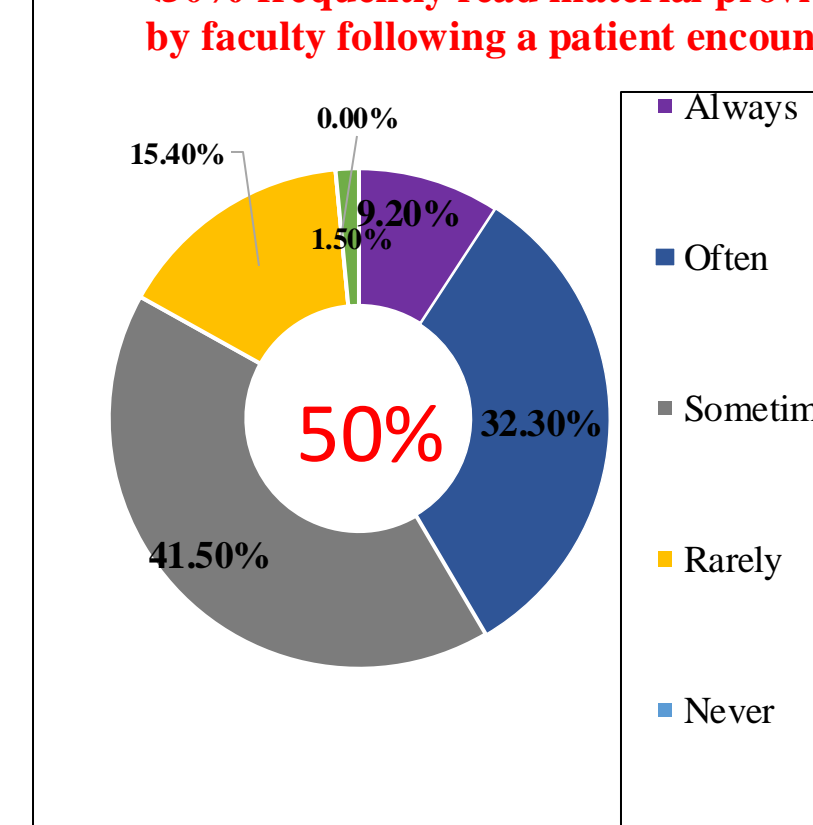
Barriers to effective learning in clinical environment



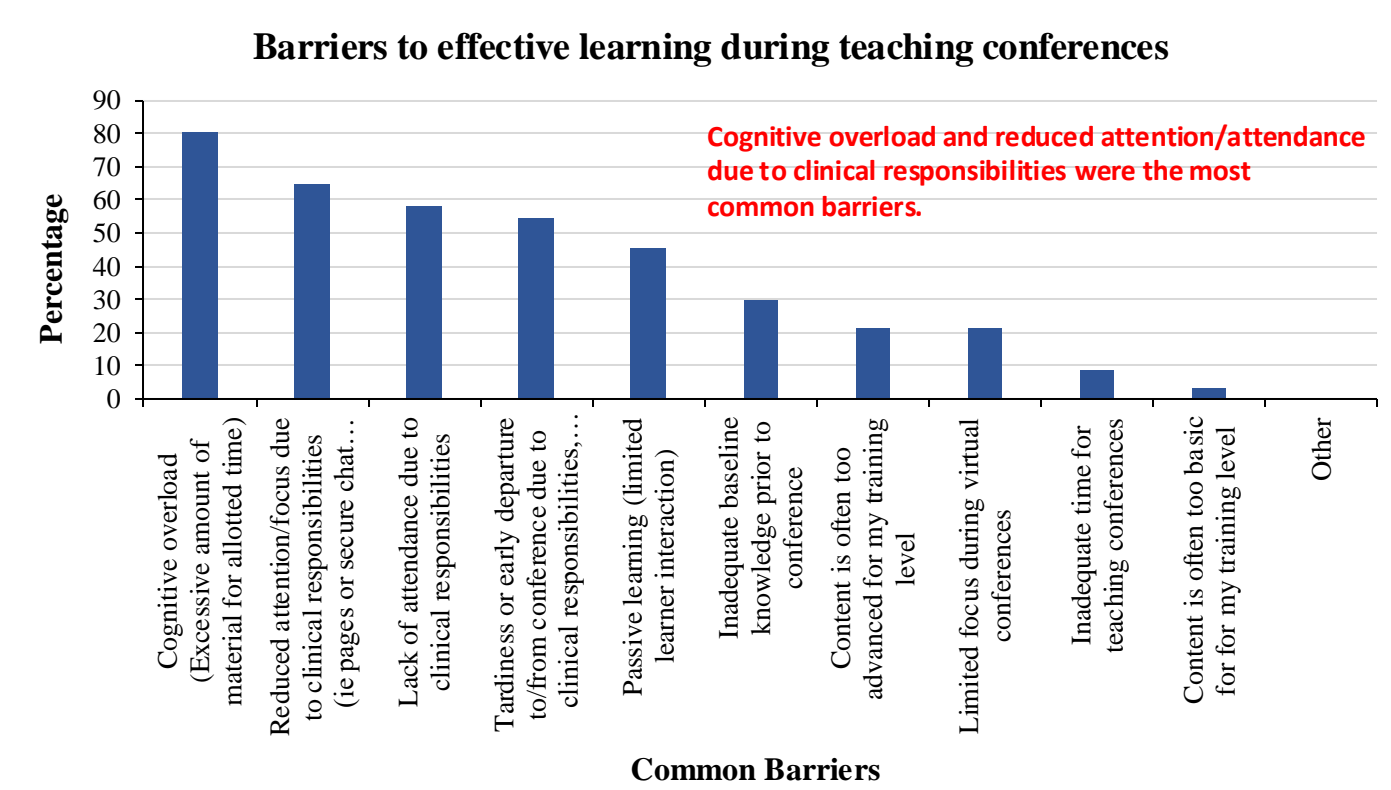
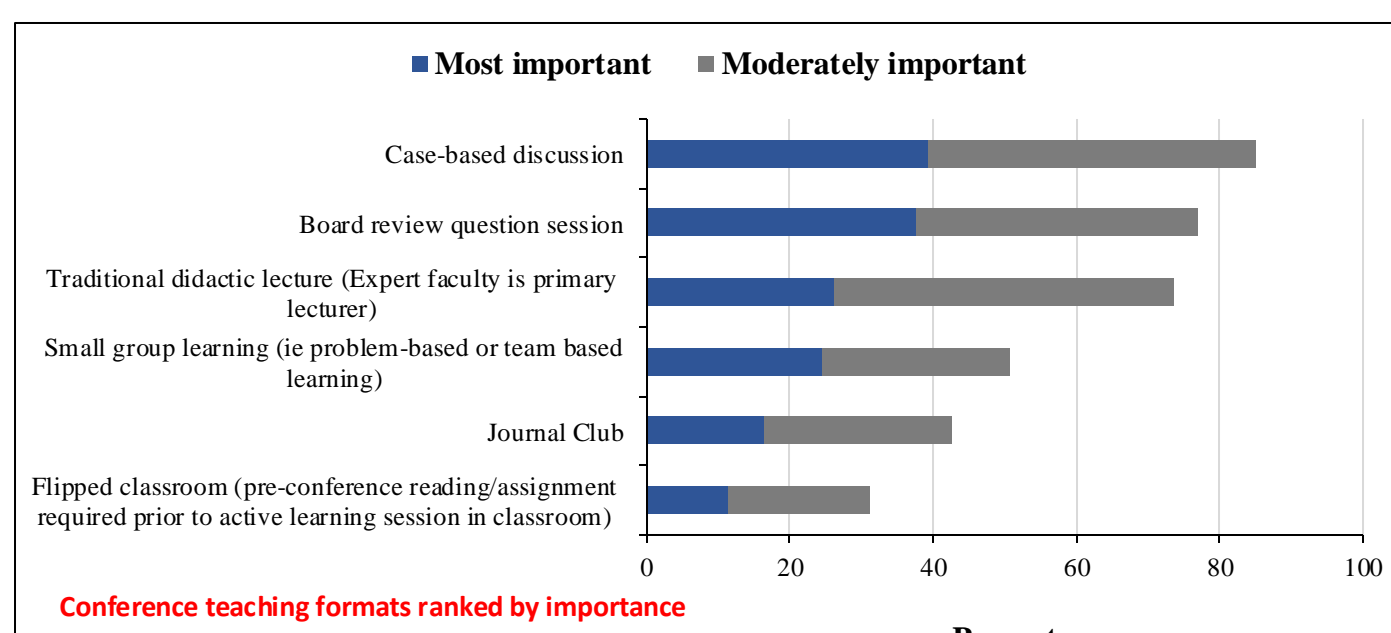
>90% agree that clinical teaching combined with supplemental reading post patient encounter would improve long-term knowledge retention



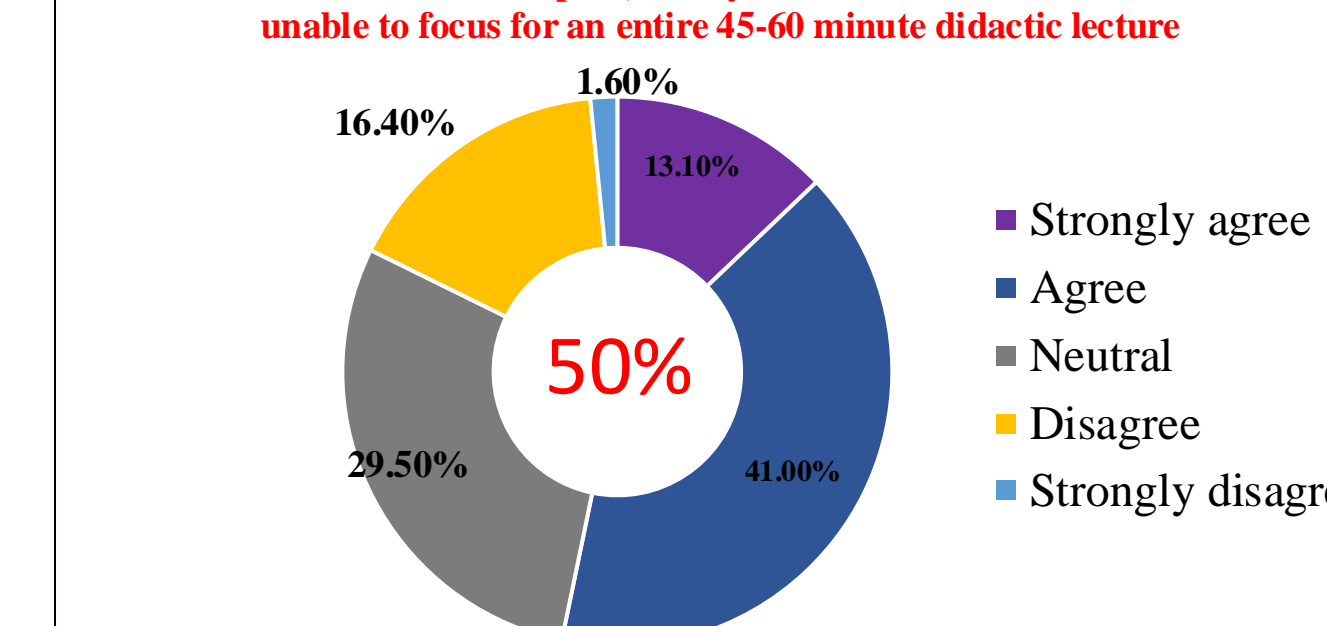
<50% frequently read material provided by faculty following a patient encounter



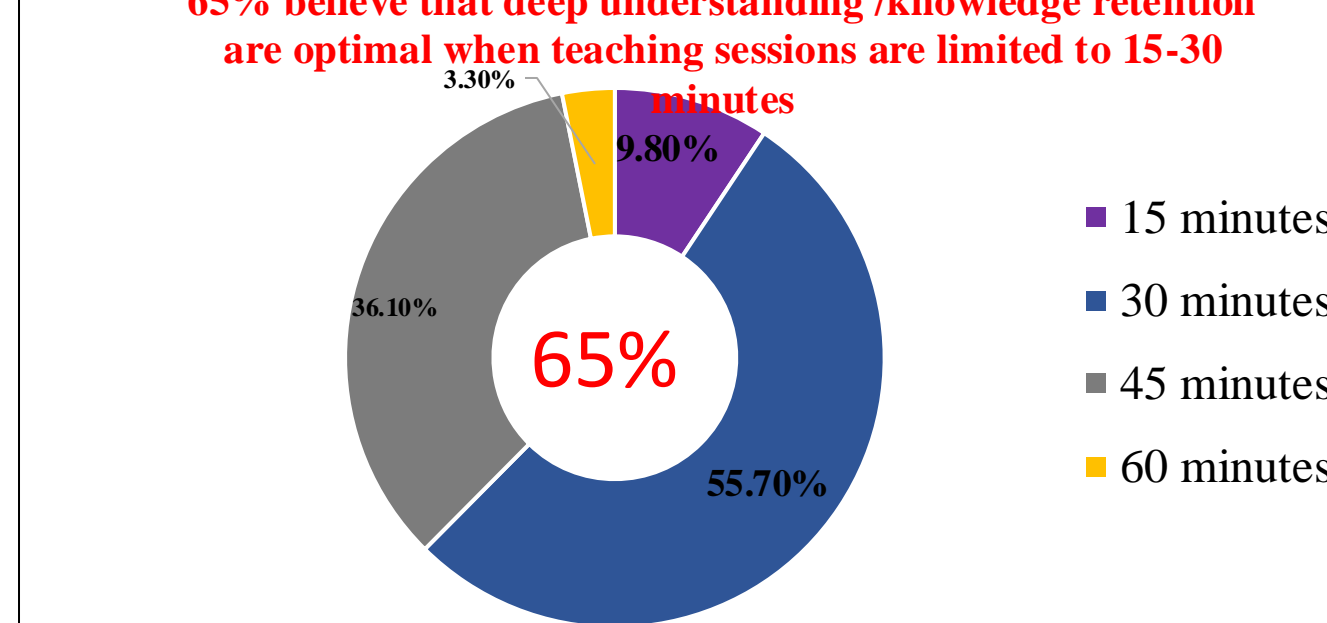
Teaching Conferences



Even when uninterrupted, nearly 50% are either ambivalent or unable to focus for an entire 45-60 minute didactic lecture

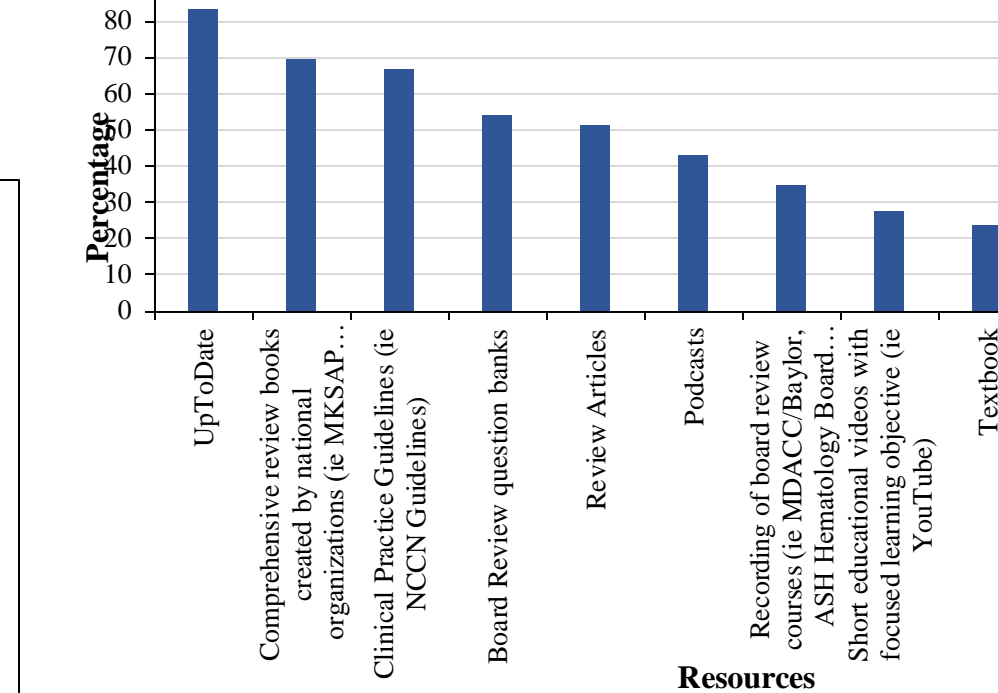


65% believe that deep understanding /knowledge retention are optimal when teaching sessions are limited to 15-30 minutes

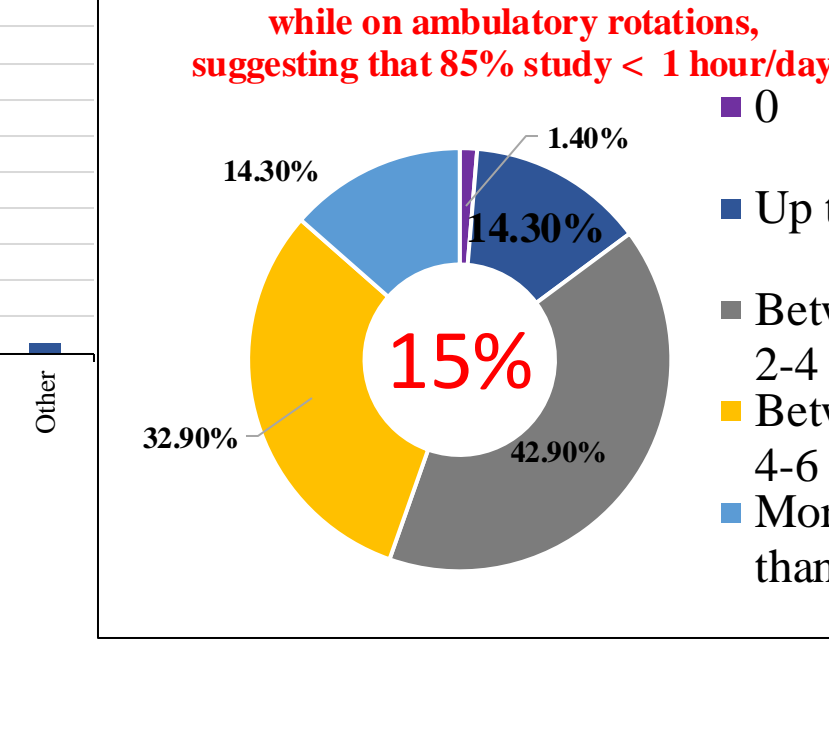


Independent Study

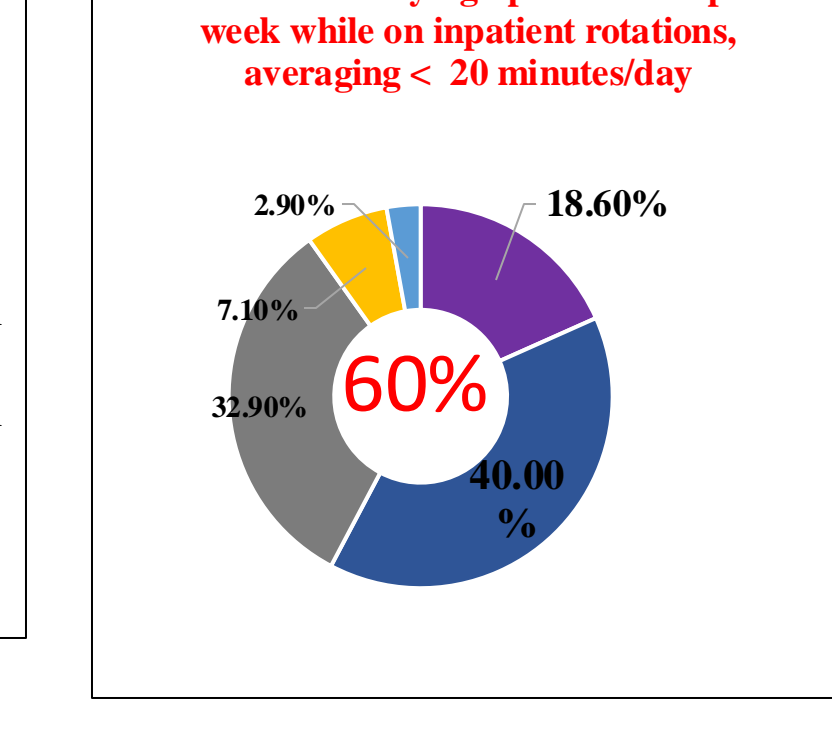
Resources used during independent study



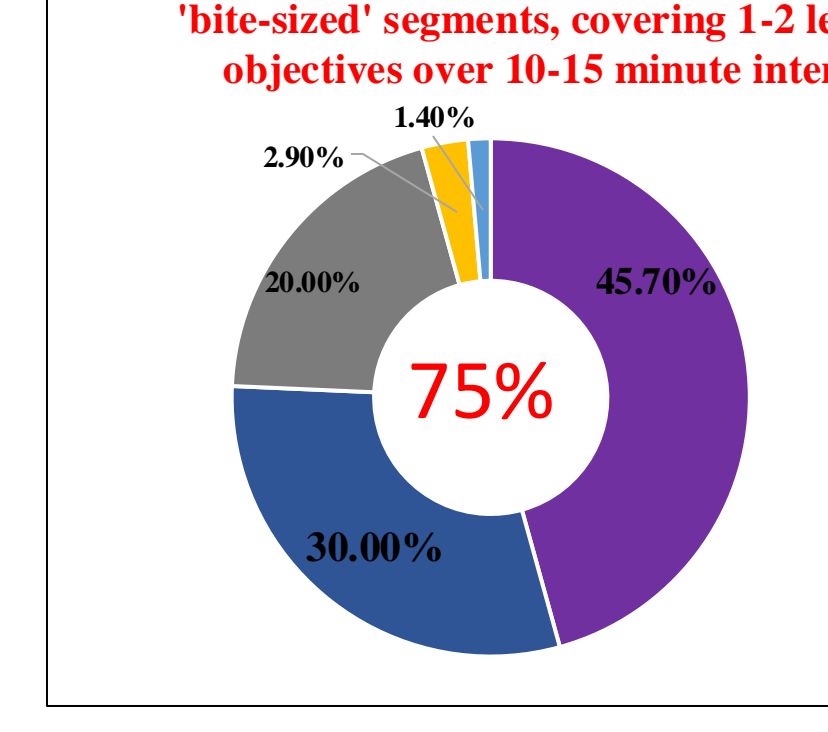
<15% are studying > 6 hours per week while on ambulatory rotations, suggesting that 85% study < 1 hour/day



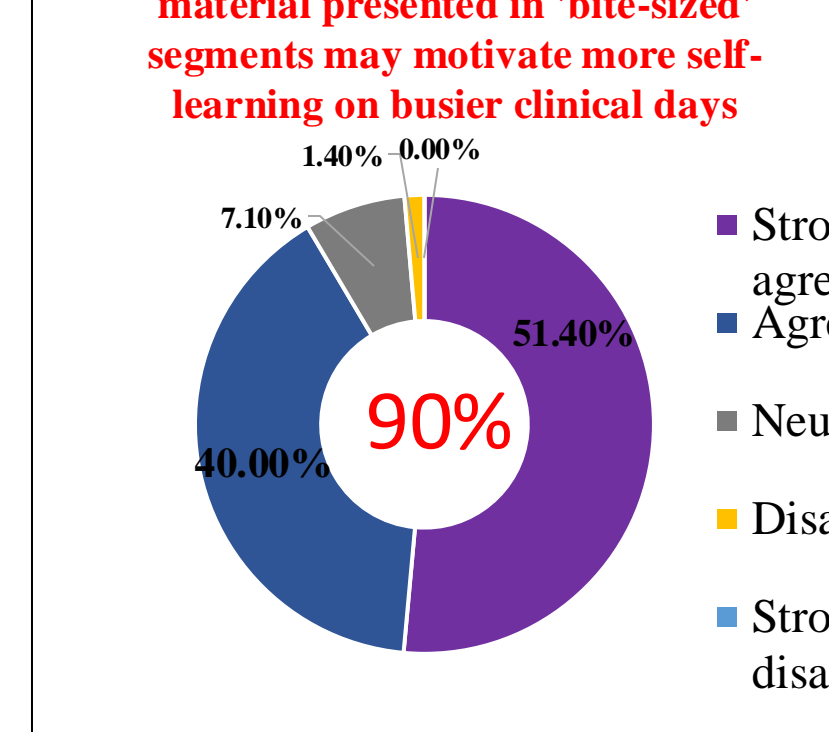
>60% are studying up to 2 hours per week while on inpatient rotations, averaging < 20 minutes/day



75% prefer study material presented in 'bite-sized' segments, covering 1-2 learning objectives over 10-15 minute intervals

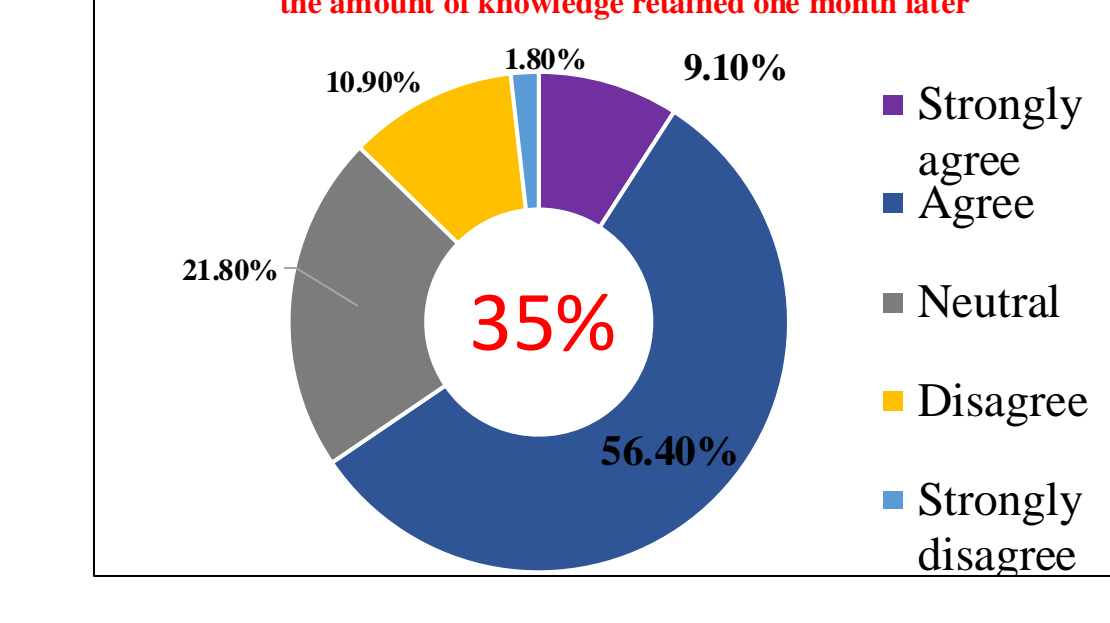


90% agree that access to study material presented in 'bite-sized' segments may motivate more self-learning on busier clinical days

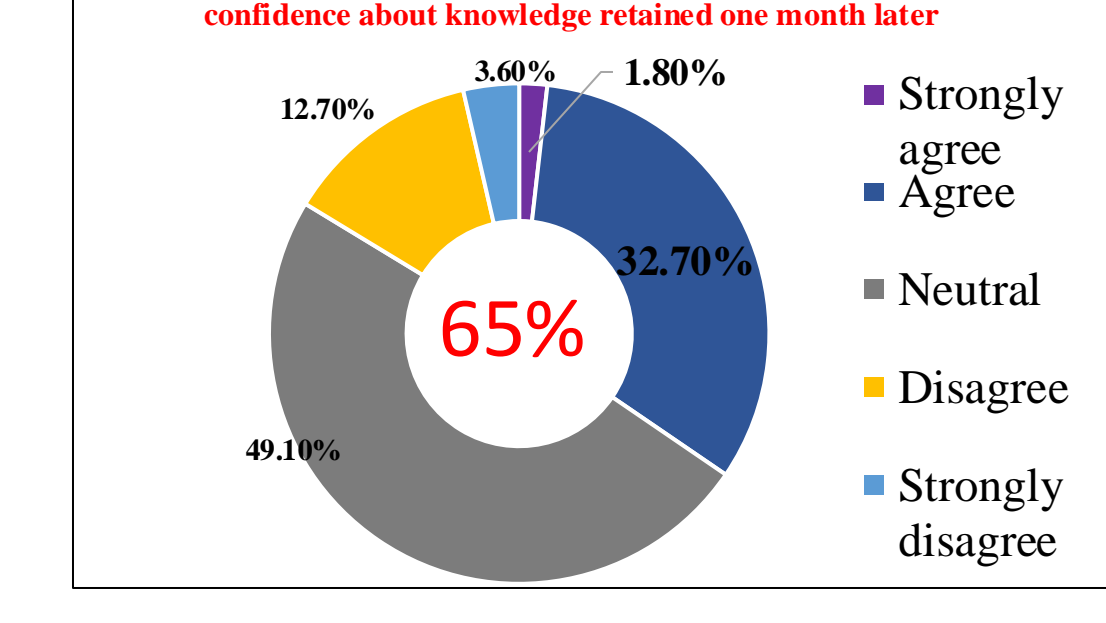


Knowledge Retention/Spaced Repetition

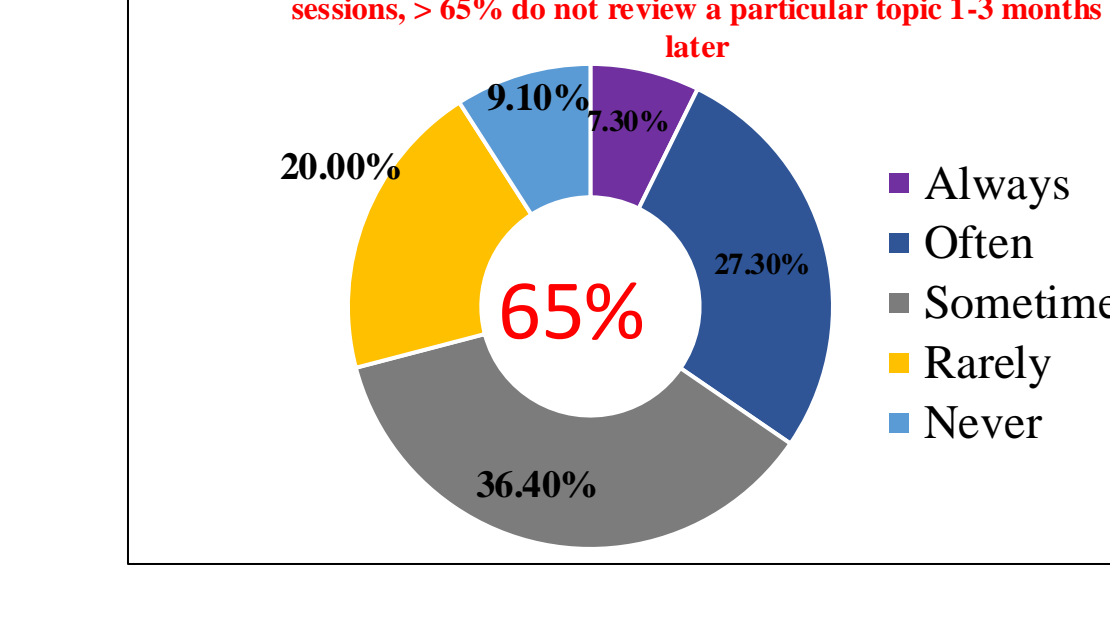
Following patient encounters, 35% are not confident about the amount of knowledge retained one month later



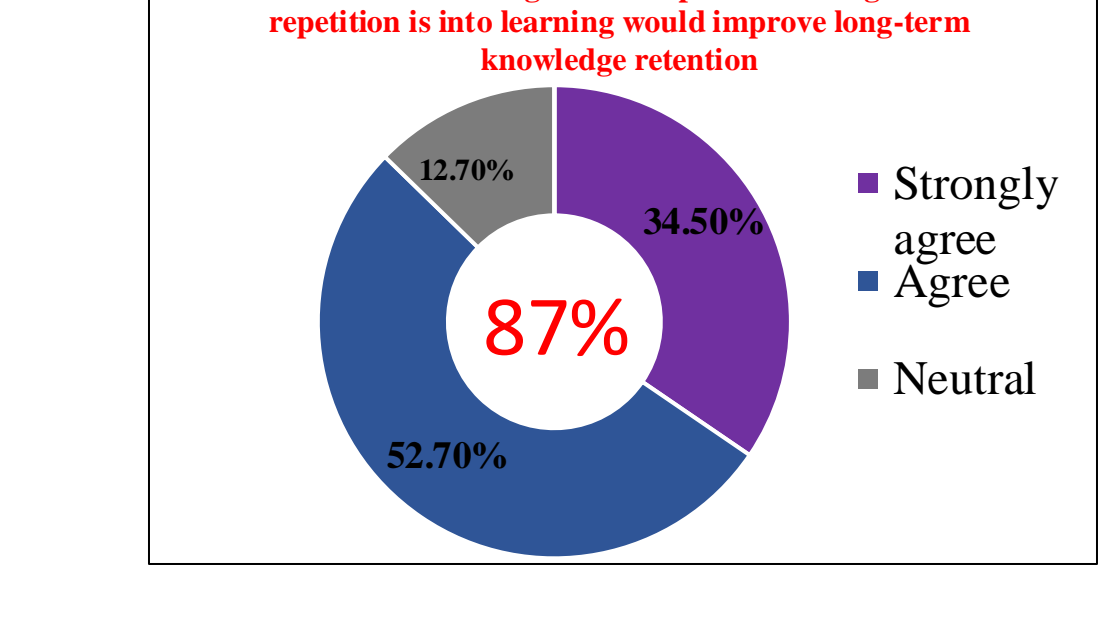
Following independent study sessions, >65% lack confidence about knowledge retained one month later



Following teaching conferences and/or independent study sessions, >65% do not review a particular topic 1-3 months later



87% believe integration of spaced learning and repetition is into learning would improve long-term knowledge retention



Conclusions/Future Directions

Conclusions: GME learners desire their training programs to have active involvement in knowledge dissemination to trainees, largely by providing access to educational resources, an educational clinical environment, and effective teaching conferences. Though many traditional teaching strategies and resources utilized in GME are still preferred, a substantial number of trainees are unclear on how effective these strategies and resources deliver knowledge and maintain knowledge retention. Lack of time is a barrier in all learning domains, suggesting that more resources and teaching that embrace microlearning may be beneficial. In addition, spaced repetition learning may further improve knowledge retention. Last, service responsibilities are major barriers to learning and should similarly be addressed at the program/institution level.

Future Directions: Expansion of this survey to a broader audience, including more medicine subspecialty fellowship programs and training programs across other institutions will increase the power of this study. Development and implementation of teaching tools incorporating microlearning and spaced repetition, followed by interventional studies testing the effect on learner satisfaction and knowledge assessments may determine if these modifications may help reduce knowledge deficits in GME learners.