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# “The team is more than the sum of its parts”: Implementation of charters to improve team dynamics in an anatomy course

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## Abstract

In the current healthcare environment, team-based models in the teaching and practice of medicine have become more a norm than a preference. Renewed focus on team-based practice discloses the effect that poorly functioning teams may have on successful outcomes in team-based delivery of patient care. Team incompetence compromises learning and work performance for all members; an outcome often rooted in poor communication and understanding of role responsibilities within the team. Business schools have been innovative and proactive in recognizing this problem and have instituted team charters to align team expectations and norms through discussion and consensus. Team charters were introduced in Block 2 Microscopic Anatomy and Block 3 Human Structure courses at Mayo Medical School in the first year curriculum. Teams were oriented on the concept of the team-charter and given the opportunity to create individual team charters to suit each team’s work ethos. Teams were encouraged to revisit their charters midway through the course to maintain a dynamic contract. Students took time to reflect on and adapt their strategy in order to facilitate better team cohesiveness, communication, interaction and ultimate performance. Qualitative student feedback indicated that the exercise fostered better group dynamic and improved communication within the team. Students were empowered to take responsibility for their own learning, professional identity formation, performance, academic development and their impact on total performance of the team.

**Keywords:** *Gross Anatomy Education; Medical Education; Team-based Learning; Team Charters; Assessment*

## Practice Highlights

- Concept of team charters adopted from business schools can be used to facilitate team-based learning strategies in basic science courses in medical curriculum.
- Team charters help engage students in development of non-traditional discipline-independent skills within the team setting.
- Team charters are the most effective when they are adopted and valued among team members
- Process of designing custom team charters reinforces student’s sense of accountability for their own learning and provides a welcomed infrastructure for internal management of team dynamics and productivity.

## I. INTRODUCTION

The notion that the “team is more than just the sum of its parts” (Siassakos et al., 2010) has never been more pertinent than in the current healthcare environment where team-based models in the teaching and practice of medicine are now more a norm than a preference, (Siassakos et al., 2010). Renewed focus on team-based

practice discloses the effect that poorly functioning teams may have on successful outcomes in team-based delivery of patient care. Team incompetence compromises learning and work performance for all members an outcome often rooted in the lack of clarity in communication and role responsibilities within the team, (Sutcliff, Lewton, & Rosenthal, 2004).

To align with the goals of healthcare delivery, medical educators have acknowledged the importance of teamwork and modern day curricula tend to build student learning environments within structured team-based models, (Dodge, Sherwood, & Shomaker, 2012; Pershing & Fuchs, 2013; Snyderman, Eibling, & Johnson, 2011). While the Accreditation Council for Graduate Medical Education (ACGME) lists “interpersonal skills and communication skills” and “system-based practice” as two of the six core competencies that are widely accepted in medical school curricula, the importance of teamwork, while not officially listed, has gained increasing attention with a drive to integrate this concept into the framework of curricular educational models. In both 2011 and 2012, *Academic Medicine’s* Question of the Year focused on promoting team behaviour in medical school so they can be utilized in the new practice settings (Dodge et al., 2012; Snyderman et al., 2011).

Historically, curricular improvements were aimed at improving two different ACGME core competencies, “professionalism” and “medical knowledge.” Professionalism has been promoted through active management of the hidden curriculum of medical schools and careful selection of role models (Derstine, 2002; Elliott et al., 2009; Hafferty, 1998; Maudsley, 2001; Wiseman, Bradwejn, & Westbroek, 2014). While professionalism remains difficult to define, there have been frameworks created with specific behaviours and actions to promote among students (Arnold, Blank, Race, & Cipparrone, 1998; Jones, Hanson, & Longacre, 2004). Basic science educators and in particular, anatomists, have taken an active role in fostering professional development of students during undergraduate medical training (Escobar-Poni & Poni, 2006; Pawlina, 2006). Through a focus on acquisition and development of non-traditional discipline-independent skills (also called non-technical skills in clinical disciplines, which includes teamwork, communication, leadership skills) along with peer and faculty feedback, “professionalism”, has been effectively promoted as a core competency in many anatomy classes (Camp et al., 2010; Evans & Pawlina, 2015). Similarly for “medical knowledge” competencies anatomists have been progressive by directing learning innovations toward more active student learning initiatives and participation through technology (audience response systems), increased imaging access, and utilization of near-peer teachers (Alexander, Crescini, Juskewitch, Lachman, & Pawlina, 2009; Bulte, Betts, Garner, & Durning, 2007; Drake & Pawlina, 2014; Lachman, Christensen, & Pawlina, 2013; Solomon & Crowe, 2001; Vasan, DeFouw, & Holland, 2008).

However, while anatomy programs have been successful in including assessments of non-traditional discipline-

independent skills into their grading systems, they have not as yet been successful in providing students with effective guidance on how to facilitate these skills for their own growth and for that of their peers. Near-peer teachers have long held the reputation of being particularly effective in relating to their junior counterparts since both TAs and students enjoy positive growth shared experience of medical knowledge and professionalism (Erie, Starkman, Pawlina, Lachman, 2013; Evans & Cuffe, 2009). The perspectives gained from more senior students who have been through the same course have become an invaluable resource in determining implementations for improvement in course delivery. Anatomy faculty striving to incorporate ACGME requirements into the curriculum are often challenged by limited opportunity to provide meaningful instruction on development of non-traditional discipline-independent skills (Evans & Pawlina, 2015). While this challenge is felt by faculty, the impact of this limitation is more strongly felt by the student who is being evaluated not only by faculty, but also by peers and themselves; and without a bar by which to support their perceptions and expectations, students are left challenged by their inability to reconcile the outcome of their performance.

Difficulties with varying norms are encountered frequently in business relations and thus have been the subject of extensive research. Traditionally, the business world has made significant contributes to medical education including the audience response system and the team-based learning approach (Collins, 2008; Michaelsen, Fink, & Knight, 1997). Most business research utilizes classical Tuckman’s team development framework (Tuckman, 1965). Tuckman asserts that teams grow through the following steps:

1. Forming: Team members avoid conflict as they establish a routine;
  2. Storming: Conflicts emerge within the team as members grapple for position and acceptance of their ideas;
  3. Norming: Members agree on roles and standards; and
  4. Performing: Team focuses on completing the task.
- Following a review of this framework in late 1970s, a fifth stage, "adjourning," was added to address the final phase of group disengagement, separation and termination (Tuckman & Jensen, 1977). The last stage of group dismantling after task is completed may trigger insecurity and anxiety related to separation and often contains elements of self-reflection by members of the group (Lacoursiere, 1974; Spitz & Sadock, 1973). Team performance decreases during the storming phase, but recovers during the norming phase to ultimately peak in the performing phase (Kozlowski & Bell, 2013; Tuckman, 1965). Unfortunately, it is known that not all teams completely progress through these steps and can

become derailed in the storming stage. In addition, some individual members of the team are prone to use less effort on a task if they are in a team versus when they work alone. This effect refers to as “social-loafing” and has been identified across teams and in different work populations (Kozlowski & Bell, 2013). There are known interventions (i.e., implementing transparency in identifying each team member individual contributions, or providing clear performance standards) that significantly decrease tendency to engage in social loafing (Kozlowski & Bell, 2013; Latané, Williams, & Harkins, 1979; Liden, Wayne, Jaworski, & Bennett, 2004). Many of the factors that eliminate social loafing also serve to enhance team performance, a process known as “social facilitation” (Bond & Titus, 1983). The decrease in team performance is particularly concerning in short educational courses, such as the current trend for condensed / reduced hours, basic science courses where team development needs to occur quickly, a problem that extends into medical practice as fluctuating personal often creates short-lived teams centred on patients.

As a possible solution to such problems, in addition to approaches for social facilitation, research in the business field proposes the strategy of using a “team charter”. A “team charter” is a document developed by all team members to outline team-specific norms on tangible manifestations of professionalism and teamwork (e.g., attendance, tardiness, participation), (Cox & Bobrowski, 2000; Mathieu & Rapp, 2009). Recently, the Harvard Business Review provided guidance on specific characteristics of great teams (Pentland, 2012). These include equal brief contributions by all team members, maintaining high energy, interpersonal relationships between all team members and their interaction with other teams (Pentland, 2012). At Mayo Medical School, basic science courses are delivered primarily within a team-based environment where non-traditional discipline-independent skills are emphasized through evaluation of team performance. As part of our commitment to quality improvement, course evaluations from the previous year are reviewed and discussed with upcoming teaching assistants (TAs) during the Student-as-Teacher program which prepares TAs for their teaching responsibilities (Erie et al., 2013; Lachman et al., 2013). Input of near peers (upcoming TAs) provides a more informed and authentic needs assessment of issues identified in students’ evaluations. Anatomy teaching faculty decided to engage students in taking ownership for their learning experience and concomitant development of non-traditional discipline-independent skills by developing custom created “team charters” to guide their team-based experience. The aim of this paper is to present a method for implementing team charters in a first year medical school team-based anatomy course.

## II. METHODS

The Block 2 Histology and Block 3 Human Structure (Gross Anatomy) courses within the Mayo Medical School curriculum, employs an exclusively team-based learning approach in facilitation of the course objectives. The courses themselves are delivered by a team of core faculty and TAs in the Department of Anatomy (Erie et al., 2013; Lachman et al., 2013).

By providing students the opportunity to establish norms on common areas of contention and define characteristics of what they viewed as an effective team, faculty hoped to improve students experience of teamwork and appreciation of team dynamics during 13 weeks of working within the same team. Based on a review of the approaches used in the business field to improve team interaction, the concept of the “team-charter” was introduced prior to the start of the course (Block 2-Histology) with its perceived benefits of guiding students in their pursuit of assuming ownership for their learning experience.

Class size consisted of a total of 52 students divided into 13 groups of 4 students each. In order to maintain at best, a fair distribution and balance of academic merit and social factors, teams of four were structured using criteria that included academic performance scores, college background, home-town, previous experience with course content, gender, under-representative minority and curricular track (MD or MD/PhD). The design and finalization of the teams were conducted by the core teaching faculty without input from TAs.

Expectations for team-based learning were highlighted to students as follows:

- Understanding that teams differ fundamentally from working groups because they require both individual and mutual accountability
- Understanding that teams rely on more than group discussion, debate, decision and on more than just sharing information and performance on formative feedback based activities
- Understanding that team’s performance and outcomes (e.g., assignments, bed-side presentations, autopsy report, embryology brochure) are achieved through the joint contributions of all their members.
- Understanding that the role of the assigned team leader is to facilitate team activities and direct the team in maximizing the talents of individuals within the team.
- Understanding that providing and receiving feedback for personal and team enhancement is a responsibility of every individual within the team.

Evaluation criteria for successful completion of the course were highlighted in Table 1 as follows:

Component of the final grade	Percentage (%) of value	Type of assessment	Description
<b>Written assessments in the classroom</b>			
Written examination	30	Individual	Course examination based on course assignments
NBME® subject examination	10	Individual	Standardized board subject examination on Gross Anatomy and Embryology
Audience response system quizzes	10	Mixed (individual and group)	Daily sessions that consist of clinical questions that explore clinical reasoning based on acquired anatomy knowledge
Embryology brochure	5%	Group	Embryology brochure for lay public information produced by a team is assessed by course faculty and member of public education department.
<b>Practical assessments in the laboratory</b>			
Practical examination	20	Individual	Identification of tagged structures with second and third order questions.
Quality of dissection	2.5	Group	Weekly evaluation of assigned dissection by faculty and teaching assistants
Bed side presentations	2.5	Group	Assessment of presentation related to dissected cadaver evaluated by faculty and teaching assistants.
<b>Peer and Faculty evaluations</b>			
Peer evaluation	10	Individual	Score is provided by the team members based on overall teammate contribution to the learning process of peer evaluator.
Faculty evaluation	10	Individual	Derived from debriefing session of faculty and teaching assistants

Table 1. Summary of final grade calculation for block 3 human structure anatomy course

- Anatomy Written Assessments (40%): written examination includes material from assigned self-directed learning, briefing sessions, laboratory exercises, discussions, peer teaching, embryology, radiology, Ultrasound Mini Institute (Smither, Bhagra, Lachman, & Pawlina, 2014), and other assignments during the block. This category also includes standardized National Board of Medical Examiners® (NBME®) Gross Anatomy and Embryology Subject Examination (10%) score.
- Laboratory Practical Examination (30%): includes tagged structures and radiologic images (ultrasound, CT, x-rays). In addition, a result from a daily audience response quizzes which include clinical questions related to the dissected region in the laboratory (10%).
- Quality of dissection evaluations (2.5%): structure identification and subjective quality. Six structures are to be identifiable to TAs/faculty each week. These structures should be visible through adequate dissection. Quality of dissection is evaluated in a subjective manner by TAs and faculty according to a 4-point scale (Nwachukwu, Lachman, & Pawlina, 2015).
- Group projects (7.5%): include both the patient education embryology pamphlet (5%) and the bed-side presentation (2.5%). Goals for these assignments align with the goals for Improving the Public Health Block (Chock, Lachman, Havyer, & Pawlina, 2014) and patient communication skills (Lachman & Pawlina, 2015). The cadaver is presented as a patient in the hospital, while on internal medicine rounds. The goal of this assignment is to get the team accustomed to presenting a patient with a specific chief complaint, an underlying medical condition, and different comorbidities. The embryology brochure is prepared with guidance from Mayo Clinic Patient Education Department to present scientific material in lay language in order to improve doctor-patient communication skills (Evans, 2008).
- Peer and faculty evaluations (20%): include laboratory peer assessment score (based on Michaelsen's method), which represents the average

percent value calculated from the sum of points assigned by each team member (Levine, 2008). For 10% of the score, students are expected to assign a score to teammates based on their own assessment how their teammates contributed to their own learning and to overall team performance during the course. Students are asked to distribute a total of 60 points among their peers with differentiation among their ratings. Evaluation is subjective and includes qualitative feedback and justification for highest and lowest ratings. Faculty assessment is provided on a 5-point scale (where 5 = exceeds expectation and 1 = needs improvement) which is based on faculty and teaching assistants assessments of professionalism, leadership, teamwork, and other non-technical skills.

Evaluation criteria for non-traditional discipline-independent skills were highlighted as follows:

The following standards were applied to the format for all evaluation data collected through peer evaluation, leadership evaluation, self-evaluation and faculty evaluation (Lachman & Pawlina, 2015).

- Respect: Demonstration of personal commitment to honouring the choices and rights of others.
- Integrity: Demonstration of commitment to honesty and trustworthiness in evaluating and demonstrating own skills and abilities.
- Responsibility: Demonstration of the ability to accept responsibility for own actions and decisions without blaming others.
- Compassion: Demonstration of adequate appreciation of other person's special needs for comfort and provides support without overt emotional involvement.
- Commitment to Excellence: Demonstration of adequate commitment to the pursuit of excellence and continuous quality improvement.

### III. RESULTS

#### A. *Defining the team charter for anatomy teams*

In order to orientate students on the guiding principles for the construction of a team charter, the following guidelines for the formulation of a framework were presented during outlines of the objectives for team based learning (Table 2).

#### B. *Timeline for Formulation and Implementation of Team Charter*

- STEP 1

Introduction and creation of team charter: Two weeks before the commencement of Block 2, the course, a short

presentation was given explaining the purpose of the team charter and highlighting the areas where students should focus their discussions.

- STEP 2

Student Meeting: Students met in their assigned teams (made available to them at the start of the academic year) and developed their charters before the start of Block 2 Histology course. Team Charters were emailed to the instructors in order to increase accountability.

- STEP 3

Creation of team charter framework: To guide discussion toward positive behaviours and previous areas of contention, a framework (Table 2) was provided for each individual team to develop and customized for its own needs. This framework included elements from "Characteristics of Successful Teams", exit interviews from previous students, and faculty experience (Pentland, 2012). There were eight main categories including: goals, norms, decision making, participation, attendance, interruptions, team socialization and conflicts.

- STEP 4

Implementation of team charter: The course appoints a rotating team leader who was primarily responsible for implementing the charter. Near-peer teachers and peers evaluated the leaders on their ability to promote the team-specific policies. At the end of the leadership block, leaders were given specific feedback on their success in promoting or how to better promote the charter. During near peer lead feedback sessions, leaders were able to reflect on these results with their instructors.

- STEP 5

Revision of team charter: A mid-block review of the team charter was encouraged with a re-alignment of expectations at the point of transition from Block 2 to Block 3. Teams were required to meet and revise their charter based on their experience of team interaction and usefulness of their charter as they proceeded into the next block where the expectations for team-based productivity were higher.

According to course evaluation qualitative metrics, the team charter concept, was recognized as largely "helpful in guiding team expectations" by many students. However, it was also perceived unfavourably by some as "adding more paperwork" to their already heavy workload.

Key Principles	Guidelines
Goals	What are the team's goals (academic performance, dissection time, lab reviews) and objectives? How will the team keep members motivated during the block? How will the team reward itself (and individual members) for a job well done?
Norms	What behaviours are permissible? How do we deal with inappropriate humour? How do we deal with people who dominate, resist, are too quiet or noisy, etc.? How will we monitor our progress? What important roles need to be assumed by team members during the fall? How will these roles (dissection leader, radiology liaison, clean up leader) be assigned?
Decision Making	How do we make decisions? What decisions must be agreed to by all? What does consensus mean? Who will ask when we get stuck (another team, TA, professor, first available)?
Participation	What do we mean by participation? How do we encourage equal participation? Are there group norms that we can establish to encourage participation?
Attendance:	How often should we meet? How we address flat contributions? How long should our meetings be? When is it OK to miss a meeting? How will be responsible when we do not complete a dissection to return and complete it? Since team meetings should start on time, how do we deal with lateness? What does "on time" mean?
Interruptions:	How do we deal with interruptions? What is allowed? Phone calls? Messages?
Team socializing:	Do we have food or coffee? Who cleans up? How many breaks should we have? How much socializing is permissible?
Conflict:	How will the team encourage positive/creative conflict and discourage negative/dysfunctional conflict? How can the team encourage and manage differences of opinion and different perspectives?

Table 2. Framework for the development of team charters

#### IV. DISCUSSION

##### A. *Perspectives and Experience on Implementation of Team Charters*

Student feedback at the end of the course suggested that the introduction of team charters made a positive impact on teamwork experience within the first year gross anatomy course. The revision of the charter was critical for team functioning and teams that did not take the time to consciously review their charters appeared to face challenges in team productivity during Block 2, when the course demands and student expectations were greater.

Scholarly contributions from the field of business education reinforce that effective team performance requires more than simply bringing students together to accomplish common goals (Hunsaker, Pavett, & Hunsaker, 2011; Mathieu & Rapp, 2009). Even though students, and in particular, medical students may have the capacity to accomplish tasks individually, effective execution as a team requires additional organizational skill. According to Mathieu & Rapp (2009) team effectiveness is dependent on a team member's ability to manage "two major tracks of activities: task work and

teamwork". Both "what" students are doing and "how" students are accomplishing goals translates to effective teamwork. In the current anatomy curriculum, these skills are imperative for ensuring that students stay on task in a fast paced educational delivery format. Teams who are unable to complete dissection goals for the day, often end up having to dedicate many more hours after class, creating imbalance in other shared academic responsibilities. When team charters are used effectively, a sense of accountability amongst team members provides an important source of motivation for achieving team goals.

As anticipated, the course was not without its challenges and faculty intervention was instituted for groups that required additional support in alleviating their discordance. However, based on our impression of the dynamic within the overall team-based learning environment, we believe that the accountability that came with creation of the team charter may have played a role in decreasing the need for faculty intervention in team performance measures during the gross anatomy course. Business practitioners and business education specialists, consider the use of team charters as a valuable exercise for establishing norms and a foundation for teamwork. When used appropriately within the educational setting team charters empower partnerships and fosters shared decision making, responsibility and identification of individual strengths, essential to meeting designated milestones in curricular competencies (Aaron, McDowell, & Herdman, 2014).

Effectiveness of the team charter in improving team dynamic, communication skills, effort, mutual support, cohesion, and bringing clarity to team expectations needs to be quantitatively measured through establishing any correlation that might exist between successful charter implementation and revision with other measurable outcomes of learning and team dynamics (Aaron et al., 2014).

Student and TA feedback have been helpful in understanding student comfort level with creation and implementation of the team charter. By maintaining a dynamic charter students were able to reflect on behaviours and performance strategies within the safety of their team environment. Open communication improves team's conversational capacity by promoting balanced, candid, non-defensive dialogue about difficult to approach situations. According to Weber (2013), a team with high conversational capacity is known to perform well, maintaining focus even through the uncertainty of unanticipated events. The ownership for facilitation of team charters is a best suited responsibility for the near peer teacher who is able to meet the student at the level of comfort needed to encourage open

communication. Near peer feedback is also a valuable and essential tool in helping students recognize their own strengths and areas for improvement as they relate to their near peers own past experience of the course. Facilitating non-technical skills in basic science education remains one of the more challenging objectives. Small interventions aimed at providing benchmarks to implement better understanding of what these skills are and how to recognize them will inadvertently provide students with capacity to enhance them.

#### *B. Limitations*

This paper is not based on any quantitative measure of effectiveness of implementing team charters in the gross anatomy course. The practice of creating a team charter was instituted as a means of providing students with a document of accountability for team interaction and responsibilities. Future studies may be designed to measure use of the team charter against overall team performance both on cognitive and non-technical levels. Additionally, as we continue to use the team charter student feedback will be used to improve student orientation and expectations. As a next step, team charters may be used to provide more structured student-near peer interaction time for feedback and debriefing.

### V. CONCLUSION

The team charters initiative provided a novel framework for facilitating team-based learning in basic science courses. While we acknowledge that student reaction to this task was both positive and challenging for some, we believe that the process of designing custom team charters reinforced student's sense of accountability for their own learning and provided a welcomed infrastructure for internal management of team dynamics and productivity.

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Ryne W. Dougherty, MD is a second year-resident of interventional radiology in the Department of Radiology at University of Michigan, Ann Arbor, MI, United States. He was instrumental in introducing team charter concept into Human Anatomy didactic block.

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### Ethical Approval

This study was considered exempt by the Mayo Clinic Institutional Review Board (protocol number 14-005364).

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### Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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