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ORIGINAL RESEARCH

Genetic Counseling Assistants: an Integral Piece of the Evolving Genetic Counseling Service Delivery Model

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Abstract This study explores the potential impact of the genetic counseling assistant (GCA) position on the efficiency of the genetic counseling field, evaluates attitudes regarding expansion of the genetic counseling field to include the GCA, and presents data on GCA endeavors and GCA job tasks as reported by GCAs, certified genetic counselors (CGCs), and program directors (PDs). Data on GCA roles and attitudes toward different aspects of the GCA position were collected via surveys of CGCs who have worked with GCAs, PDs who have and have not had experience with GCAs in their programs, and GCAs. We analyzed responses from 63 individuals: 27 PDs, 22 CGCs, and 14 GCAs. GCAs' impact on efficiency was calculated via internal analysis of genetic patient volume per genetic counselor within the University of Texas Southwestern (UTSW) patient database prior to, and since the addition of, a GCA to the practice. The response rates for PDs, CGCs, and GCAs were 27 %, 79 %, and 61 %, respectively. Every CGC stated the GCA increased their efficiency. CGCs with a GCA reported a 60 % average increase in patient volume. This figure was congruent with internal data from the UTSW cancer genetics program (58.5 % increase). Appropriate responsibilities for GCAs as reported by CGCs and PDs (>90 %) include: data entry, shipping tests, administrative tasks, research, and ordering supplies. Regarding GCAs delivering test results, there was response variation whether this should be a job duty: 42 % of CGCs agreed to GCAs delivering negative results to patients, compared to 22 % of program directors. Twenty-two percent of PDs expressed concern about the job title "Genetic Counseling Assistant." Ninety percent of CGCs felt that GCA was a career path to becoming a CGC, compared to 42 % of PDs. Eighty-three percent of GCAs who decided to apply to CGC graduate programs were accepted. We conclude the addition of a GCA to a genetic counseling practice contributes to increased efficiency and is one way to expand the reach of the profession.

Keywords Genetic counseling assistant · Genetic counselor · Service delivery · Genetic counseling profession · Genetic clinic efficiency

Introduction

With the expansion of the fields of genetics and genomics and the current certified genetic counselor (CGC) workforce shortage, it is important to maximize the skill set of CGCs [Pan et al. 2016]. Increasing numbers of patients are seeking genetic counseling services, requiring CGCs to increase patient volume, while concurrently maintaining quality standards. Genetic services differ from other subspecialties in the amount of time required to assess patients, and have become more complex and time consuming as a result of advanced technology (Sukenik-Halevy et al. 2016). Additionally, a recent study of medical genetics professionals in Israel reported 11–25 % of work time was spent on administrative activities (Sukenik-Halevy et al. 2016).

Currently, several service delivery models have evolved to meet the increasing demand for genetic counseling, including

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telemedicine and telephonic services (Cohen et al. 2013; Platten et al. 2012; Trepanier and Allain 2014). In 2009, the National Society of Genetic Counselors (NSGC) appointed a Service Delivery Model Task Force to assess which service delivery models were being used to improve access. This task force found that 45.3 % of CGCs were using multiple service delivery models in their practice, which is a deviation from traditional genetic counseling models. Additionally, the 2016 NSGC professional status survey found that 44 % of CGCs saw no change in their office /clinical staffing, and 20 % saw a decrease in staffing despite that fact that 62 % of CGCs reported an increase in patient volume (PSS 2016 Work Force Environment). In the same survey, the second most common reason cited for dissatisfaction among clinical CGCs was a lack of secretarial /administrative support (NSGC Professional Issue Survey 2016 Professsional Satisfaction 2016). This indicates a need to expand the abilities of CGCs to see more patients, but that a lack of supportive positions in the clinical setting presents a barrier to doing so.

In attempts to adapt to the growing demand for genetic counseling services, CGCs are implementing a variety of modified practices, such as collaborating with non–genetics professionals to provide services (Cohen et al. 2013; O'Shea et al. 2011). Other professions have created a tiered level of training that has proven effective within the medical field, including positions such as nurse practitioners, physician assistants, and physical therapist assistants (Moote et al. 2012a, b; Nestler et al. 2012). For example, the physician assistant position was created in the late 1960s because of the need to perform many of the routine and less complex aspects of health care, freeing physicians from such duties (Larson and Hart 2007; Moote et al. 2012a, b; Nestler et al. 2012). Since its inception, the types of duties assumed by physician assistants has grown significantly. This profession has been integrated into most services provided by academic medical centers to increase patient throughput and access to care (Moote et al. 2012a, b; Nestler et al. 2012). The impetus for the recent expansion of advanced practice nurses in Israel was due to the shortage of primary care providers in the country (Maier and Aiken 2016). Healthcare assistants within community health rehabilitation agencies in the United Kingdom have been shown to improve service capacity and efficiency (Maier and Aiken 2016). Even within the field of genetics, disease specialty programs have long adapted to tiered levels of patient care – for example, the sickle cell counselor training program through the California Department of Public Health.

Furthermore, clinical genetics services have represented a fiscal challenge to the clinics that provide them. One study reported that the fees generated from the genetic visit did not cover the cost of service delivery; however, the associated fees generated from the identification of the genetic condition paid up to three times as much towards the medical center and its associated health professionals versus the genetics department. This did not allow the genetics clinics to be self-sustaining (Bernhardt et al. 1992). Genetics clinics will face rising challenges in the search for innovative avenues to decrease personnel costs and become more self-sustaining while increasing efficiency.

It is necessary to optimize the deployment of health care professionals with specialized skills, maximizing their time spent on tasks only they can do while delegating other tasks. With this rationale, in 2012 and 2011 respectively, two large academic cancer genetics programs, University of Texas Southwestern Medical Center (UTSW) and University of California San Francisco (UCSF), created positions in their clinics called GCAs to assist in service delivery. The initial goal of the GCA positions at these institutions was to increase the amount of time CGCs spent performing specific tasks they were trained for and decrease the time CGCs spent on clerical and administrative duties that could be completed by someone with less training. The job descriptions for the GCA positions at UTSW and UCSF are similar (see supplemental data); however, differences include that UCSF GCAs are trained to assist with research projects and the UTSW GCAs contact patients with negative genetic test results under supervision. The coordination between GCAs and CGCs at these institutions creates a tiered system that allows for optimization of the clinical, administrative, and research aspects of the field. Currently, many clinics and genetic laboratories are now using positions to support CGCs in their practice. However, research is needed to evaluate whether addition of the GCA improves efficiency, to determine if there is support for the GCA position within the field, and to evaluate appropriate roles for GCAs from the perspectives of key members of the profession.

Our research aims in this study include the following: 1. Explore the efficiency of the GCA position within the genetic counseling field; 2. Evaluate attitudes toward expanding the genetic counseling services to include the GCA; and 3. Gather data regarding GCA job tasks and endeavors. This is the first report of such data on the use of Bachelor's Degree-educated GCAs to support CGCs.

Methods

Measures

Four surveys were created via Survey Monkey software to be sent via email (see supplemental information) to four groups of participants: individuals who have held a GCA position, CGCs who have worked with GCAs, genetic counseling program directors (PDs) who have accepted GCAs (PDGCA), and PDs who have not had direct contact with a GCA to date (PDnoGCA). This study was approved by the UT Southwestern institutional review board (STU 0402015–

069). Survey questions were chosen to focus on the roles of the GCA as viewed by the CGC and PD, as well as the attitudes regarding the GCA position from the perspective of the GCA, CGC, and PD. We also asked questions to focus on the GCA's potential effect on the efficiency of the CGC, and to gather informational baseline data on the GCA group. Response options consisted of closed- and open-ended questions; closed-ended questions consisted of single response and multiple response questions.

Additionally, an analysis of patient volumes at the UTSW cancer genetics clinic was conducted (L.R.) via internal patient database query. UTSW patient database used for clinic volume calculations contains information for every patient seen in the UTSW clinical cancer genetics program since 2010. Analysis of the UCSF cancer genetics clinic volumes was not possible since these data were not recorded.

Procedures

The introductory email for each of the 4 groups to which a survey was sent explained the study, and consent was inferred when participants clicked the link to access the survey. For the PD group, one email was sent to the listserv that included two links and asked the participant to choose a link depending on whether they had experience with a GCA in their respective training program. Each participant was advised of the opportunity to obtain a $25 Amazon gift certificate upon survey completion. The surveys were sent in July 2015 and left open for 1.5 months with a reminder email for all participants sent at the midpoint.

To contribute data regarding change in clinic efficiency, weekly patient volume averages and the volume per CGC prior to and after initiation of GCA position were calculated via query of the internal UTSW patient database.

Survey Population

All CGCs and GCAs surveyed were previously or currently affiliated with UTSW or UCSF and worked only in the subspecialty of cancer genetics. To our knowledge, no other academic institutions had developed a formal position for a Bachelor's Degree GCA. GCAs in both programs were trained for tasks within their job description by program management. UCSF and UTSW program leadership provided email contact information for any CGC (past or present) in their program who worked with GCAs, as well as email contact for past and present GCAs in the program. Both UTSW and UCSF are large academic programs with clinics in their affiliated safety net hospitals and have local community clinics offering both pre- and post-test counseling. In addition to typical in-person consultations, UTSW offers telemedicine appointments via videoconferencing software and UCSF offers telephone counseling. UTSW patients complete an online questionnaire prior to their appointment and UCSF patient complete a paper questionnaire.

PDs were identified via the American Genetic Counseling Program Directors listserv which contained 102 subscribers, representing 45 institutions (including Canadian and Australian members), at time of survey dissemination. Those with access to the listserv are either current PDs or assistant PDs in 35 American genetic counseling training programs, as well as associate member organization PDs (those who are considering development of a training program). Each organization has 1–5 PDs/assistant or associate PDs.

Data Analysis

SurveyMonkey software calculated basic response percentages. *P*-values were calculated via Fisher's exact test of three proportions. We analyzed open-ended survey responses for themes through an iterative coding process. Two researchers (LR and SPM) developed a preliminary coding list for topics raised for each survey question. The codes were categorized into themes, which were reviewed by both researchers to ensure accurate reflection of the data. Upon reaching consensus, one author independently re-coded responses using the final version of the codebook. We also used Hsieh and Shannon's summative qualitative content analysis (Hsieh and Shannon 2005). We looked at the proportion or percentage of times that particular topics are raised by respondents by counting and comparing keywords, as well as interpreting the underlying meaning of the content.

UTSW clinic volumes prior to GCA position initiation in 2012 were calculated via internal patient database query for 2011 weekly patient volumes, with comparison to weekly patient volumes for 2012–2015. The ratio of CGCs to GCA in the clinic in those years was also queried via database, and the percentage of new patients seen annually in comparison to the baseline volume in 2011 was calculated based on this data. Patient volume per CGC and percent change from baseline was also calculated.

Results

University of Texas Southwestern Clinic Volume Data

Based on internal data from UTSW in 2011 (prior to the first GCA at this institution), the average weekly volume of new patients per CGC was 6.5; this is based on 48 weeks a year in clinic, or 312 new patients per year. With a ratio of 3 CGCs to 1 GCA, our CGCs were able to see 58.5 % more patients collectively, or an equivalent of 546 more patients for three CGCs, or 182 more patients per CGC in 2015 (see Table 1).

Table 1 CGC new patient volume based on ratio of CGC to GCA (UTSW cancer genetics clinics)

Year	Avg. weekly vol. new patients per GC	Ratio of CGC to GCA	Percentage increase of total new patients seen compared to 2011
2011	6.5	None	N/A
2012	6.87	7 to 1	5.7 %
2013	8.17	7 to 2	25.5 %
2014	9.7	7 to 2	49.2 %
2015	10.3	3 to 1	58.5 %

CGC Certified Genetic Counselor; *GCA* Genetic Counseling Assistant; *UTSW* University of Texas Southwestern

Certified Genetic Counselors

Of 28 CGCs who were sent the survey, 22 responded (79 % response rate). One hundred percent of CGC respondents (22/22) reported an increase in efficiency in either patient care or in general productive time utilization. We asked the CGCs to list the average patient volume per CGC in their practice before and after implementing a GCA in the program. Twenty-one of 22 CGCs responded (one skipped response, 95 % response rate for question); 21total comments were dispersed amongst five themes. Of the 21 comments, 12 specifically defined patient volume increase. Of the 12 CGCs who reported volume data, there was an average 60 % overall increase in patient volume due to the GCA; this overall figure is consistent with the UTSW database analysis. Five CGCs reported that they did not know this information. One comment stated that volume stayed the same but the CGC did not have to work as late due to GCA completing certain tasks. Another commented that a smaller ratio of GCAs to CGCs in the practice would likely show a greater benefit for the CGC workload. The respondents did not include the ratio of CGCs to GCAs in the practice.

CGCs were also asked how their day-to-day workflow had changed with a GCA in place. Twenty-five comments, which encompassed five themes, were recorded from 21 respondents (one skipped response, see Table 3). The overwhelming response centered on the theme of increased productivity related to CGC competencies. Other themes included enjoying mentorship of someone interested in genetic counseling, the experience that GCA implementation forced streamlining of clinic processes, and an increase in patient volume. Three participants commented that they did not know since they had not worked without a GCA before.

Table 2 gives the percentages of CGCs who endorsed specific responsibilities for GCAs. The vast majority (>90 % or at least 19/21) endorsed data entry, shipping test kits, administrative tasks, research, and ordering supplies. In contrast, fewer than 50 % endorsed GCAs formulating results letters for patients, calling patients with test results (under CGC direction and supervision), calling patients with negative test results, positive test results or test results containing variants of uncertain significance.

When asked about whether the GCA position could function as its own career path or as a pathway to CGC training programs (participants could select multiple answers), the vast majority of CGCs thought it should be part of the pathway to the CGC profession (90 % or 20/22) and 72 % (16/22) thought GCA could also be a terminal position. Of note, 18 % (4/22) responded that GCA should not be a stand-alone career. Participants were also given the opportunity to provide open commentary to explain their rationale (Table 3). Twenty-one of 22 responded (one skipped, 95 % response rate to question) representing six themes and 44 total comments across themes. A common theme centered around the GCA position being a stepping stone to CGC programs, where participants commented on the ability to gain experience in the CGC setting ('behind the scenes'), while others discussed preparation for graduate school and experience and confirmation of CGC as desired career path. Among comments that referred to GCA as a stand-alone career, all stated this would be a good position for those who want a potentially higher-level medical or office assistant-type position but are not interested in or are unable complete a CGC training program. Other responses of note included addressed a rationale for why GCA should *not* be a stand-alone position; specifically, the GCA position does not offer enough upward mobility or development, and there are not enough unique aspects to the work to make it a specialty position separate from an administrative assistant. There also were comments addressing the challenges of needing to train new GCAs so frequently, and the benefits of having a GCA in the clinic for longer than a year.

Genetic Counseling Assistants

Fourteen of twenty-three GCAs responded to the survey (61 % response rate). For undergraduate degrees, 5/14 (35 %) reported biology, 4/14 (29 %) reported genetics; 2/14 (14 %) social science/psychology or 3/14 (21 %) another focus. Eight of 13 (62 %; one skipped question) were in the age range of 25–30 years old, and 12/13 (92 %) were female. Most (9/14 or

Table 2 GCA job responsibilities performed under the supervision of a CGC & percentage of individuals who felt the duties should be performed by the GCA

GCA job responsibilities	GCA $N = 14$ (% who stated the task was applicable to their job)	CGC $N = 22$ (%)	PDGCA $N = 9$ (%)	PDnoGCA $N = 18$ (%)	p*
Data entry	100	100	88.89	94.99	0.30
Administrative tasks (scanning, copying, filing, etc.)	100	95.24	100	88.89	0.58
Shipping genetic test kits (boxing samples)	92.86	100	100	88.89	0.16
Constructing pedigrees in computer program	85.71	85.71	77.78	88.89	0.75
Contacting patients for follow up information	85.71	85.71	55.56	77.78	0.21
Completing patient information on test requisition forms for testing	78.57	80.95	88.89	72.22	0.72
Assisting with clinic flow (receiving patients, etc.)	71.43	80.95	88.89	83.33	1
Research activities	71.43	95.24	100	94.44	1
Contacting insurance companies to facilitate genetic test coverage	64.29	90.48	100	83.33	0.57
Preparing letters of medical necessity for patient testing	57.15	71.43	100	44.44	0.01
Formulating results letters based on gene test results	57.14	38.10	55.56	33.33	0.59
Scheduling patients for genetic visits and/or with other specialists	50	85.71	100	88.89	0.70
Ordering supplies	50	95.24	88.89	77.78	0.21
Calling patients with negative gene test results	42.86	42.86	22.22	44.44	0.63
Calling patients with variants of uncertain clinical significance	35.71	23.81	0	5.56	0.17
Calling patients with abnormal results	0	4.75	0	0	1

*Fisher's exact tests of the three proportions utilized on CGC, PDGCA and PDnoGCA data. *CGC* Certified Genetic Counselor; *PDGCA* Program Director with Genetic Counseling Assistant; *PDnoGCA* Program Director without Genetic Counseling Assistant

65 %) discovered the position via CGC contact, and all respondents said that on-the-job training and supervision were adequate to prepare for GCA responsibilities. Regarding their job description (Table 2 and Supplemental Information 2 for sample job description), more than 90 % (at least 13/14) reported that administrative, data entry, and shipping testing kits were required. Fewer than half noted that they call patients with negative genetic testing results or variants of uncertain significance. Of note, 0 % reported calling patients with deleterious results. Participants were also asked if they felt certain responsibilities should or should not be required; only one of thirteen respondents (8 %) reported that they felt results should not be delivered by a GCA. Additionally, 92 % of GCAs polled (12/13) would like to work with a GCA as a CGC.

Several questions asked about application to genetic counseling training programs. The majority (12/14, 86 %) of these GCAs were interested in a genetic counseling career and applied to genetic counseling training programs. The majority of these individuals (10/12, 83 %) were accepted in a first or second application cycle. The acceptance rate is markedly higher than the national average of 31.5 % reported by NSGC (Who are Genetic Counselors 2016). The majority (11/13 or 85 %, one skipped response) reported feeling 'prepared or very prepared' for CGC training programs; of note, at the time of survey 9/10 (90 %) had not completed their MS. When asked in what ways they felt most prepared for a genetic counseling training program, 13 respondents reported a total of 32 comments that represented eight themes (Table 4). The two most commonly reported themes were understanding CGC workflow and 'behind the scenes' work such as ordering testing and working with labs, as well as developing a baseline knowledge of cancer genetics and patient qualification for genetic testing. Other themes included comfort with patient contact, understanding pedigree construction, multitasking, and giving presentations to colleagues. Participants were also asked to describe the aspects of their GCA experience that provided the least preparation for a genetic counseling training program (Table 4). The 10 respondents replied with 15 comments that represented six different themes, the most common of which was 'genetics subspecialties outside of cancer', while other themes included psychosocial preparation and discomfort with insurance nuances. When asked how the GCA position could have better prepared them, 4/14 reported a need for more shadowing, research opportunities and career development.

Program Directors

Twenty-seven percent of PDs responded to the email survey request (27/102). PDs were surveyed in two groups depending on whether they reported having had a GCA in their program.

We compared opinions about GCA responsibilities amongst the CGCs and PDs (Table 2). Examples of these tasks including contacting patients with particular categories of test results and administrative tasks, amongst others. When all PDs were asked about appropriate responsibilities for GCAs, >90 % (at least 25/27) agreed that scheduling, administrative tasks, shipping test kits, and research activities were in their

Table 3 Examples of CGC open response survey question themes and illustrative quotes

Question	Themes	Quotes
CGCs: How has your job changed after implementing GCA in your practice (outside of patient volume)?	Better focus on patient visit due to less time on administrative tasks	'Allows for more time spent doing things that a GC is certified to do and less time on things that are administrative…allows more time to be billable, which benefits hospital."
	Opportunity to mentor someone interested in GC	'Not only has it increased my productivity, but it is also rewarding to share this experience, as a mentor, with an individual on the path to become a GC.'
	Comments on patient load	'Shifted focus from calling out negative results to focusing on services for positive results and seeing additional patients.'
	Helped to streamline processes throughout practice	'It has helped to streamline certain processes and helped to ensure similarity of certain aspects between different counselors in our practice.'
	Never worked without GCA	'I have only ever worked with a GCA so I don't have experience to compare it to.'
CGCs: Do you think the GCA position could function as its own career path or as a pathway to CGC training programs (multiple response and open response to explain)?	Great stepping stone to GC program	'Gain experience in GC setting with certain responsibilities they wouldn't get otherwise/behind the scenes experience.'
		'Prepares for graduate school experience.'
		'To know GC is the career path they want.'
	Some may thrive in long-term GCA position/clinic benefits more from GCA employed for longer	'If someone is not interested or able to go to GC training program, GCA is a good alternative.'
		'Higher level medical assistant/office assistant position.'
	Challenging to retrain GCA every year	'It is a challenge re-training GCAs year after year.'
	Not enough GCA-specific requirements to make a specialized position	'It would be fine as a stand-alone career but I feel that there aren't enough aspects that are specific to genetic counseling that would make it different from other administrative assistant roles to be a specialty.'
	Not enough upward mobility to be separate career	'There is not enough room for development or upward mobility to make it a separate career path, and they type of individual you would ideally want in that position would have more drive.'
	GCA is avenue to address lack of shadowing opportunities in academic setting	'As clinical opportunities to shadow diminish under increased restrictions in HIPPA and privacy, the genetic counseling community needs an effected way to train and provide experience opportunities for individuals interested in joining the field.'

CGC Certified genetic counselor; *GCA* Genetic counseling assistant; *GC* Genetic counselor (as quoted by respondents)

purview. Regarding the task of GCAs preparing letters of medical necessity for patients, 71 % of CGCs (16/22) and 100 % of PDGCAs agreed it was an appropriate task compared to 44 % (8/18) of PDnoGCAs ($p = .01$). PDGCAs and PDnoGCAs differed in their opinions in regards to GCAs calling patients to disseminate test results. Twenty-two percent (2/9) and 8/18 (44 %) respectively thought calling patients with negative results was appropriate ($p = 0.67$), and none of the PDGCAs agreed that calling variants of uncertain significance or positive results was appropriate. Only one of 18 (11 %) PDnoGCAs reported calling variants of uncertain significance was appropriate, and none agreed to GCAs delivering positive results.

Regarding the GCA as a terminal career path versus GCA as a path toward a CGC training program (participants could select multiple responses), a similar percentage of both groups (44 % or 4/9 PDGCAs and 41 % or 7/17 PDnoGCAs – one skipped response) agreed on GCA as preparation for programs. Thirty-five percent (6/17) of PDnoGCAs and 22 % (2/9) of PDGCAs said it should not be its own career path.

We asked both groups about objections to the job title 'Genetic Counseling Assistant.' Of the 25 responses between the two groups, 11/25 (44 %) had no objection, 11/25 (44 %) were unsure, and 2/25 (8 %) did object to the title (of note, these were both PDnoGCA respondents). Of the 6 PDnoGCAs who commented on this topic, all discussed title confusion with CGCs.

In response to the open-ended question regarding concerns about the GCA position or its development in genetics programs nationally, we also obtained larger-scale commentary

Table 4 Examples of GCA open response survey questions themes and illustrative quotes

Question	Themes	Quotes
GCAs: In which aspects did you feel most prepared for CGC training program?	CGC workflow/process	'I also feel very prepared knowing what happens in the genetic counseling clinic besides just the counseling session. Seeing everything 'behind the scene' gave me a good idea of what paperwork was necessary along with running a clinic.'
	Cancer genetics knowledgebase	'I also feel like I have learned a lot about what makes a patient a good candidate for genetic testing.'
	Multitasking	'I can multi-task like no other and juggle multiple projects at a time and still see everything to completion.'
	Comfort with patient interaction	'I also feel prepared in how to handle speaking to the patient prior to test results.'
	Presentation to colleagues	'I had made presentations at tumor boards…'
	Pedigree construction	'I worked on making my own pedigrees with the GC.'
	Working with insurance	'I felt prepared for how to deal with insurance companies based on my experience.'
GCAs: In which aspects did you feel least prepared for CGC training program?	Understanding/working with insurance	'Inadequate knowledge of working with insurance.'
	Cancer genetics	'I feel like there is still a lot for me to learn on the science side of genetic counseling.'
	Psychosocial preparation	'I felt least prepared for the psychosocial aspects of genetic counseling. Mostly because I come from a basic science background and have had little psychology experience.'
	Subspecialties outside of cancer	'Exposure to other specialties, and how different the approached are to genetic counseling, testing, and management options.'
	Develop research projects	'Not comfortable in development of a research project.'
	Feels prepared	'I can't think of anything. I felt I was much more prepared in comparison to my classmates.'

GCA Genetic counseling assistant; *CGC* Certified genetic counselor; *GC* Genetic counselor (as quoted by respondents)

on GCA position development. Seventeen of 18 (94 %) PDnoGCAs responded with a total of 20 comments that encompassed seven themes (Table 5). Of note, 6/20 comments were either 'no concern' or 'good for non-patient direct care activities.' Other comments revolved around concern about employers hiring GCAs for CGC work at a lower cost and hiring more GCAs instead of CGCs in general; the need for defining the scope of GCA responsibilities via establishing guidelines and/or job descriptions; and concern that formalizing the GCA position could lead to shortage of GCAs; potential GCA title confusion with CGC; GCA experience not being seen as automatic acceptance to CGC training programs; and GCA experience not necessarily being a good predictor of the CGC skill set.

In the PDGCA group, 11 comments by the nine respondents encompassed six themes, all of which overlapped with the PDnoGCA group (Table 5). In this group, 5/11 participants responded that they had 'no concern/helpful to have GCAs.'

PDnoGCAs (58 % or 10/17) and PDGCAs (44 % or 4/9) thought that a GCA background would not allow their students to cover more material within their CGC programs. Ninety-four percent (16/17) of PDnoGCAs and 100 % (9/9) of PDGCAs said they would or might provide standardized GCA information to prospective students. Forty-four percent (4/9) of PDGCAs had accepted two to three former GCAs into their programs, while 33 % (3/9) accepted one GCA, and 22 % (2/9) accepted four to seven GCAs. PDGCAs were asked about the skills of former GCAs coming into their programs. All responded that these students were very good, but each was person-dependent (not necessarily superior to their non-GCA peers). Eighty-nine percent (8/9) of respondents indicated the former GCAs were 'prepared/very prepared' for training programs compared to their peers (the remaining respondent said GCAs were 'the same as other applicants'). Where GCAs excelled was in understanding healthcare delivery on a higher level and knowledge of genetics (see Fig. 1). Other responses on this topic included that GCAs exhibited comfort with patient contact and had an understanding of 'behind the scenes' duties of CGCs, as well as appreciation of insurance complexities. Of PDnoGCAs polled, 82 % (14/17) reported no hesitation in admitting former GCAs, and 64 % (11/17) had received an application from a GCA at some point.

Table 5 Examples of PDs open response survey question themes and illustrative quotes

Questions	Themes	Quotes
PDGCA: Do you have any concerns regarding GCA position or its development in genetics programs nationally?	None/Helpful to have assistant	'It would be helpful for genetic counselors to have an assistant, this is primarily an administrative assistant position.'
	Concern hiring more GCAs vs. CGCs	'I have concerns about 'watering down' the profession. When I see the need for help with clinical duties, I don't want to see places hiring more GCAs and fewer GCs.'
	Concern of GCA as a separate career	'See my first comment regarding separate career. I think that is a bad idea.'
	GCA title confusion with CGC	'We already have trouble getting recognized as GCs. I could see a GCA complicating matters.'
	Not a 'shoe in' for graduate school admission	As an assistant PD and on the interviewing committee my concern would be that we should be clear that being a GCA is not a 'shoe in' for getting into a graduate program.'
	Defining scope of GCA practice	'Speaking as a clinical counselor who would like a GCA in the clinic, it may be useful to have sample job descriptions and training guidelines.'
PDnoGCA: Do you have any concerns regarding GCA position or its development in genetics programs nationally>	None/Good for non-patient care activities	'No concerns. There are many assistants already employed by genetic programs although the titles vary.'
	Hiring GCAs to replace CGC	'Concern that hospitals will hire GCAs at lower rate and then given the more responsibilities anyway.'
	GCA title confusion with CGC	'I am quite concerned that these positions do not develop into genetic counseling positions for those with some skills but not full training.'
	Defining scope of GCA responsibilities	'I think there needs to be very clear ideas of what should be the 'scope' of GCA responsibilities. A GCA should help the GC with the day to day activities that do not need specialized expertise that only a GC can provide.'
	GCA is not good predictor of CGC skill set/not automatic CGC training program entry	'I don't feel it's a good predictor of a genetic counselor's skill set; it is mainly administrative, organizational and a small bit of teaching, which are easy to teach. It does not prepare students for the critical thinking and counseling skills required of a GC.'
	CGC competencies practiced by GCA	'Yes, the two GCA individuals who applied to our program last year were calling out results and writing patient letters and assessing pedigrees. I believe this is at the very essence of our value and should not be farmed out to GCAS.'
	Formalizing GCA will create problems	'I would be concerned that formalizing the position would resulting a shortage of individuals to fill them.'

PDGCA Program directors with genetic counseling assistants (enrolled in program); *PDnoGCA* Program directors without genetic counseling assistants (none enrolled in program); *GC* Genetic counselor (as quoted by respondents)

Discussion

Many healthcare offices employ assistants to support clinic function. This is the first publication to explore the uses of the GCA position based on the experiences of cancer genetics clinics in two academic institutions. Given the dearth of literature to support a discussion of GCA roles, as well as the limited comparable assistant positions in other healthcare fields, we must also rely on descriptions of internal processes and experiences to initiate baseline data in the hopes of further study.

A limited number of CGCs reported an increase in patient volume with the implementation of the GCA position. The average increase calculated based on the CGCs' responses was in line with the internal UTSW patient volume change (60 % vs. 58.5 %). Given the respondents were affiliated with UTSW or UCSF, this congruence represents a similar trend between these two institutions with 4–5 years of GCA utilization in clinical programs. While these data represent a limited sample of CGCs and institutions, which could limit large-scale applicability, data of this nature are in need. Other efficiency factors might have impacted these data outside of GCA implementation; such factors were not ascertained in this study. The positive trend in patient volume is also comparable to increased patient throughput seen with use of physician assistants (Nestler et al. 2012). Additionally, a recent report

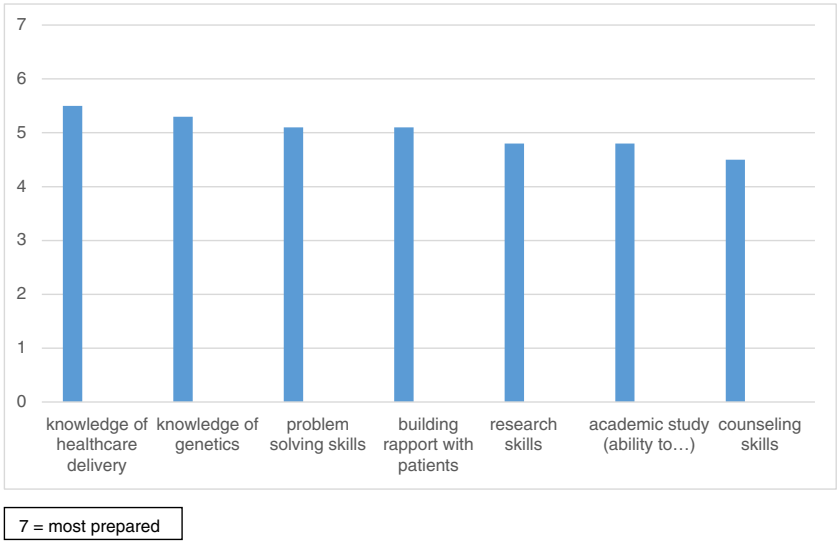

Fig. 1 Genetic Counseling Program Directors' assessment of the preparedness of students who were former Genetic Counseling Assistants

of oncologists' perceptions of nurse practitioners and physician assistants in the oncology clinic showed two-thirds of respondents reported increased efficiency in clinics (*Ensuring Quality Cancer Care through the Oncology workforce: Sustaining Care in the twenty-first Century* 2009).

In today's changing healthcare climate, the CGC, like all other professions, is challenged to develop a model based on efficiency, quality of service, and productivity. With a ratio of three CGCs to one GCA, UTSW was able to transform the volume of work conducted, which was equivalent to the work of 4.75 CGCs (Table 1). Moreover, the equivalent of an added 1.75 CGCs comes at half the salary cost of one genetic counselor (Internal data). The exact increase in patient volume with the use of a GCA may vary depending on the unique clinic structure and the ratio of CGCs to GCAs. To increase financial efficiency, CGCs can consider delegating administrative tasks to others at a lesser pay grade in order to spend more of their time in practicing their core competencies. The academic institutions included in this study reported the GCA salary at approximately 50 % of the genetic counselors (phone conversation and internal data, unpublished). Additionally, allowing a CGC to obtain more Relative Value Units (RVUs) for services rendered is a potential option to provide support for their salary and that of their assistant, but this needs further study. One study attempted to quantify productivity of physician assistants and nurse practitioners in an oncology practice via RVU tracking, which demonstrated high variability amongst the practitioners and opportunities to better utilize these professionals (Moote et al. 2012a, b).

In our survey, 100 % of CGCs polled attested to maximizing their productive time with a GCA in place, whether this manifested as an increased patient load or CGC competency-associated work. It is difficult to ascertain whether other efforts at the respective institutions during this same timeframe may also have impacted improvements in efficiency. Other healthcare professions have routinely integrated assistant positions for the sake of improving efficiency via increased patient throughput or workflow. While the GCA position is not exactly comparable to a physician assistant, nursing assistant, or the like, the trend of increasing productive time and efficiency of the CGCs with whom the GCAs are affiliated is in line with data published from the aforementioned healthcare professionals (Nestler et al. 2012). With the current demand for CGCs in the United States at an all-time high, the use of the GCA could allow the existing workforce to increase the number of patients seen per CGC, and/or elevate competency-based productivity. Healthcare and the delivery of genetic services is a complex issue that will need innovative solutions; the utilization of the GCA is just one option (Pan et al. 2016).

Perspective Attitudes of Expanding the Field of Genetic Counseling with the GCA

Certified Genetic Counselors

When asked if the GCA position should function as a step to CGC program application, 90 % agreed. When asked if the GCA position could also be a stand-alone career, 72 % agreed; of note, 18 % of CGC felt that it should not be a stand-alone career. Based on these responses, many CGCs also seem to have a comfort level with an assistant position as a stand-alone profession, which is potentially due to the fact that many other healthcare professions utilize credentialed assistants and have for many years (Robinson et al. 1995). For those who disagreed on GCA being a stand-alone career, one comment outlined a lack of unique aspects to make this position

different from other administrative assistants. Other assistant specialties have embarked upon this exploration to make these determinations and define the scope of practice and necessary qualifications This speaks to the need for more research on this position to determine whether there are or are not enough unique aspects to the job description to warrant special classification just as other healthcare provider entities have for their respective assistants.

The majority of respondents commented on how significantly their day-to-day workload has changed with the addition of GCA; this is most pronounced by less administrative work and more focus on CGC competencies. While we did not specifically ask if these changes increased CGC perception of job satisfaction, the feedback within the open response on this topic was obviously positive. An increase in job satisfaction was also reported in multiple international studies of healthcare assistants and satisfaction of their associated healthcare providers (Cattrell 2005; McCartney et al. 2005; Moran et al. 2012). It will be important to see if this effect translates to other genetics subspecialties, including laboratory-based positions.

Program Directors

Less than 50 % of the program directors (PDs) viewed the GCA as a direct stepping stone to a career in genetic counseling, and less than 35 % thought it should be its own career path. Multiple responses were available for this question, so these answers potentially did not represent unique respondents. In their commentary between the two PD groups, many similar themes arose. These primarily had to do with concern of tier formulation to the profession (specifically that this would draw away good CGC candidates), that GCAs would be hired to replace CGCs as a more economical choice, the GCA experience being a 'shoe in' for acceptance to GC training programs, and concerns of GCAs inappropriately performing CGC competencies. Additionally, concerns with GCA position development varied nationally between the two groups. The themes for respondents who had concerns were very similar to those already listed. Differences in opinion could arise due to interactions between PDs and GCA-experienced students versus students who were not GCAs, or PDnoGCAs who inherently do not have interactions with former GCA students to know their experience. As more GCAs potentially enter the hunt for acceptance to CGC training programs, examination of the GCA experience and how it might impact qualification or acceptance into training programs would be a future area of study. As these messages of uncertainty were repeated throughout the respondents' commentary, the idea of potential national standardization of the GCA position, like assistants have for other specialties, is an important consideration as the profession continues to increase efficiency with the existing workforce.

PDs in general agreed upon the most appropriate job responsibilities for the GCA, but reported differing opinions regarding calling patients with negative test results under CGC supervision. It is interesting that PDs with GCA experience were less likely to agree with GCAs delivering negative results, but more than half of both groups did not think it was appropriate. It is possible that the experience the PDs had with the former GCAs led them to believe this was not appropriate, or perhaps this is just the opinion of a small group and different results might be found with a larger respondent sample size. Additionally, the 2014 revision to the Clinical Laboratory Improvement Amendment requires that patients can request their own test results directly from the laboratory without having to go through their physician, which invites the concern of patients receiving information without accompanying clinical interpretation and causing potential patient harm. In many areas of healthcare, the clinician does not deliver all results to patients by phone. As an example, physicians and physician designees are increasingly using electronic methods to disseminate results to patients with the advent of electronic medical record and messaging systems (Baldwin et al. 2005). The provocative question to ask is: how do negative genetic test results differ from other medical results, particularly when a supervising CGC has deemed them appropriate for the GCA to handle? This will undoubtedly be a topic of discussion going forward within the profession and different clinic settings.

When asked about using the job title of 'Genetic Counseling Assistant' or GCA, 44 % of PDs did not object to the title of GCA, 44 % were unsure, and 8 % did object to this title; additionally, commentary from PDs on this topic addressed possible title confusion between GCA and CGC. As our centers embarked on defining this unique position, we believed it was important to create a title for the new job category that delineated the expertise needed. A GCA as described in these 2 academic clinic settings has a Bachelor's Degree (typically biology or genetics). The rationale for this is that an individual with a background in science has a basic understanding of human genetics that we can build upon. We did not define this position as a typical administrative assistant that has been trained to do administrative and clerical tasks. We also looked to our institutions for guidance, particularly given the lack of published literature on the topic, and it was agreed that the GCA title was in line with other professions (i.e. physical therapist assistant). Just as there was debate early in our profession about the title of the Genetic Associate or Genetic Counselor, discussion and qualification about what to call an assistant is sure to ensue. Other professional societies have worked to define the titles and qualifications of assistants. An important consideration for NSGC and/or the American Board of Genetic Counseling will be how to handle this particular topic.

Genetic Counseling Assistants: Gathering Informational Data Regarding Job Tasks and Endeavors

The majority of GCAs used the position as a stepping-stone to a career in genetic counseling. At this time, the GCA position is not technically defined as a terminal position and has been viewed as an avenue to gain more exposure to the CGC profession for interested individuals. This is different from other positions, such as the physical therapist assistant, which over many years has developed a defined scope of practice, training, and licensure requirements that have transformed the position into a terminal profession (Wojciechowski 2003). This 'stepping stone' trend may also change if the GCA position is further defined. The GCA acceptance rate to genetic counseling training programs (83 %) was higher than reported by NSGC (31.5 %), likely because the GCA position allowed them to become more knowledgeable about the profession before applying (Who are Genetic Counselors 2016). The majority of GCAs felt prepared for graduate school based on their position, which is reflected in the acceptance rate of this small group. As other healthcare assistants do not have published literature on their acceptance rates to postgraduate training programs for another profession, it is not possible to compare this trend to others.

Limitations

The main limitation of this study is ascertaining information based on the GCA experience of CGCs and GCAs in only two academic cancer genetic centers; however, these are high volume centers with multiple satellite sites in the community and safety net facilities. The relatively small pool of GCAs/CGCs ascertained, as well as only one CGC practice sub-specialty addressed in this study, may limit the general applicability of this data across the profession. Only 12/28 CGC respondents reported specific patient volume change data; the information reported could have been based on recall (database analysis status unknown for all respondents). In addition to the UTSW clinic data analysis, the considerable overlap of responses from the two institutions studied could limit the wider applicability of increased clinic efficiency data, as well as other data collected from this study. We also had a low response rate from PDs in general; the respondents' may not represent the entire PD community perspective and could overlap at institutions as multiple respondents could have represented the same training program. PDs who registered as having GCA experience are based on self-report, and also may not be aware of every person with GCA experience that might have interviewed for or been accepted to their programs. Some questions in the surveys were built as multiple response, but also included separate topics within one question, which is a significant limitation in evaluating unique responses to each topic. Another limitation in interpreting GCA effect is the dependence on the availability of other administrative support within a department. Although the GCA does help the CGC with administrative tasks, we view the job duties of this position as different from other administrative assistants in a department based on the level of education and critical thinking skills.

Research Recommendations

One of the concerns expressed by the program directors was defining the scope of responsibilities of a GCA. Research in identifying tasks that CGCs feel do not represent an ideal use of their time, and assessing their willingness to pass these tasks on to other individuals, will aid in developing a conceptual framework for improving clinical efficiency. Exploration and analysis of economic variables with GCA integration in genetics programs will be important to understand potential cost savings with addition of this position. Additionally, research that assesses patient outcomes and access to care within genetic counseling practices that utilize GCAs would provide important data that could impact broad implementation of GCAs.

Summary

The demand for genetics professionals is not expected to decrease over the next ten years. On the contrary, the US Bureau of Labor projects a 29 % growth in genetic counseling positions in the field between 2014 and 2024 (US Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook 2016-2017 edition). While this growth is significant, an increase in available genetic counseling positions without a comparable increase in genetic professionals entering the workforce will not meet the entire demand throughout the medical profession for CGCs. A recent report reveals consistent numbers of graduates from genetic counseling programs without significant growth (Pan et al. 2016). This fact challenges the CGC profession to prioritize increasing the efficiency of existing professional resources and to be forward-thinking regarding the utilization of trained support staff, such as GCAs, to assist the current CGC workforce. This study provides a baseline of attitudes and an exploration of efficiency impact, as well as informational data regarding the GCA position. This is the first study to describe the GCA position. Further study on defining the GCAs scope of work and analysis of the use of GCAs in other CGC professional settings (clinic, laboratory, etc.) is needed.

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Compliance with Ethical Standards

Ethical Approval All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for inclusion in the study.

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Conflict of Interest Sara Pirzadeh-Miller, Linda Robinson, Parker Read and Dr. Theodora Ross do not report any conflicts of interest.

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